The Social Impact of Information Systems at a Tertiary Institution

Sam Lubbe
Maishe Bopape

Abstract
Tertiary educational institutes have had many Information Systems (IS) developed and implemented for the use of end-users. The problem is that more often than not, the impacts of IS on social communities of organisations have not been taken into account. This research explores the issues of the interface between IS and society, and addresses the social impact of these systems. A thorough investigation of the IS and users of those systems at the University of South Africa has been undertaken in this study. This research proposes a set of guidelines to help ensure that the social impacts of tertiary institutes' IS are taken into account in the design and implementation of these systems, thereby increasing the chance of success of those systems.

Keywords: Social informatics, socio-technical systems, social context, user involvement, Information Systems, Information Technology, user acceptance and technology adoption.

Introduction
A serviceable working conception of social informatics is that it identifies a body of research that examines the social aspects of computerisation (Kling, 2000). Kling notes that it is the interdisciplinary study of the design, uses and consequences of Information Systems (IS) that also takes into account their interaction with institutional and cultural contexts. Due to the IS implications of this study, this research is classified in the field of Social

Informatics. This research therefore explores the issue of the interface between IS and the community of users.

Problem Statement

The University of South Africa (UNISA) is one of the bigger distance learning universities in the world with over two hundred thousand (200 000) registered students for the 2007 academic year (UNISA 2007). This current and prospective community of users try to access information on the various websites of UNISA, struggling to find the relevant information. This may be because the system designed by the authorities, is not always user friendly. Also, to facilitate open distance learning, academics develop study material for students to access electronically on various UNISA sites (myUNISA, EDS & Osprey).

Students and staff members accessing or utilising these listed systems expressed concern during a pre-study mini-survey by e-mail about navigating the sites to get information or accessing services. Based on various complaints and queries by students and staff members as well as informal discussions, this mini-survey was conducted by the researcher requesting the respondents (these include lecturers and students) to search three elementary items on the relevant sites. More than half of the respondents indicated that it was not easy to find the information. They argue that they spent time searching for the information jumping from one page to the other without getting the information.

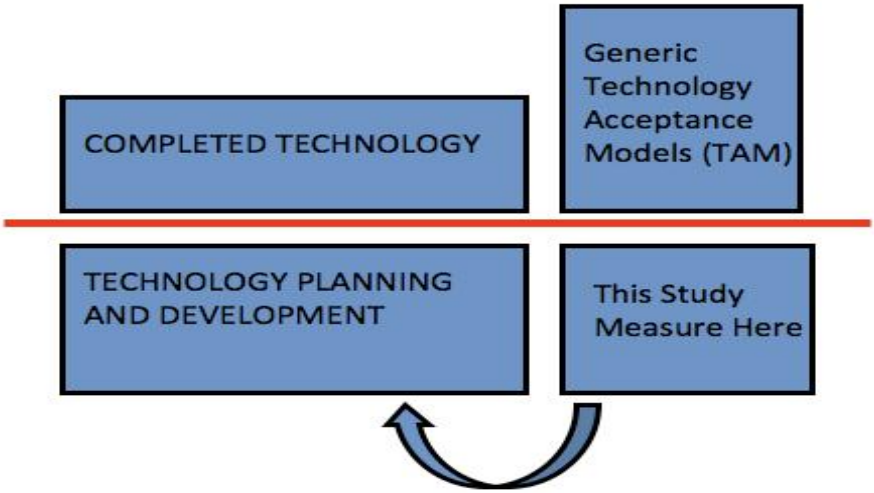
The observations made by the researchers were confirmed in the management meeting of the School of Computing held 23rd May 2007. Senior Professors of Computer Science and IS complained about the difficulty in accessing information from UNISA systems, and also how and why these systems were implemented without them being socially involved (School of Computing 2007). Specific issues of concern, which require investigation and verification on the UNISA's Information and Communication Technology (ICT) systems, were:

- The influence of community of users' involvement in the success of systems;
- Inclusion of all user requests; and
- The development of systems without consulting and involving users.

Delimitation of the Study

Only one institution of higher learning, UNISA, is investigated. The research study will however only focus on the social factors and specifically user perceptions and impact of UNISA systems. Figure 1 below defines the delineation of the study.

Figure 1. Diagrammatic Representation of what the study will focus on



Source: Lubbe and Klopper (2008)

Foundation of the Study

This study's context is the field of Social Informatics. There is speculation about the social impact when new ICT are to be planned and developed (Kling 2000). Questions about the consequences of new technologies are often posed in a very black and white manner. People expect a straightforward 'yes-or-no' answer. However, life is not that simple, and usually there are no clear-cut answers (Kling 2000). Therefore, the social changes that might occur because of the implementation of new and complex ICT need to be analytically and empirically researched (Kling 2000). This research explores issues of the interface between IS and the community of users at UNISA.

IS at Tertiary Institutes

Tertiary education institutes around the globe have had many IS developed and implemented for the use of students and lecturers/academic personnel (Hall 2006). He continues that the problem is that more often than not, the impacts of IS on social communities of organisations are not taken into account, and/or insufficient attention is paid to them. He also argues that, the social impacts of IS are rarely taken into account when systems are being designed or implemented, and as a result leads to many IS failures. King and Zmud (1981) suggests that factors such as the organisation, the environment, the task, personal and interpersonal characteristics, as well as Management Information Systems (MIS), staff characteristics and policies can influence the success of system implementation.

Technological innovations have allowed educational institutions the opportunity to expand enrolment and offer courses beyond the traditional classroom setting (Clow 1999). Distance learning delivery systems include television, interactive television, online computers and the Internet (Clow 1999). He argues that students are able to earn degrees without even setting a foot on an actual college campus. He argues that the impact of technologies on students is a concern.

Social Nature of IS

For the purpose of this research IS is defined as the various technologies used in the creation, acquisition, storage, organisation, dissemination, retrieval, processing, manipulation, interpretation, transmission of information to accumulate knowledge and expedite communication (Chan 2002; Moll 1983).

IS applications conceived from the perspective of rationalistic explanation of how IS used in an organisation exhibit Tayloristic work design. This work design focuses on the individual's task productivity while under-estimating the importance of the social context. This, according to Roode (2003), often leads to inappropriate application designs, difficulty of use and outright failure of many information technologies. Chaharbaghi and Willis (2000) argue that technology forms some sort of a paradox, which is that individual's survival depends on the technology, but their problems also derive from it.

Therefore, IS support and facilitate human and social processes and

contributes towards a meaningful work life for the users within an organisation. Roode (2003) concludes that IS are developed by people for people and are therefore, rooted within human nature, which is the social context.

The 'impact' that the introduction and use of IT may have on the organisation, on work and on the users in an organisation can either be of a technology nature, that are often explicitly known; or of a social nature, which are those that are usually not easily identifiable (Kling 2000). Hall (2006) argues that it is important that the technological and social factors should be managed. The focus of this study is on the social factors of IS.

Social Context

According to Horton *et al.* (2005) the introduction and utilisation of technology in organisational settings are more complex than technologically deterministic accounts. The social context in which IS function is specifically examined in social informatics research. This particular research can thus be considered as social informatics research. Kling (2000) describes social informatics as the body of research that examines the design, uses and consequences of ICT in ways that take into account their interaction institutional and cultural contexts. It can therefore be said that the IS social context is important when considering the areas of IS. Kling (1999) states that social context does not refer to some abstract 'cloud' that hovers above people and IS. Rather, it refers to a specific matrix of social relationships.

According to Lamb and Kling (2003) several organisations have stressed the need for a larger environmental scope when dealing with ICT use. They noted that the individual ICT use is influenced by organisational, cultural, and global contexts, as well as by the social context within the environment. Wood-Harper and Wood (2005) inform that defining an IS in action can be construed as a paradigm of assumptions, which in turn is socially constructed. They, and Horton *et al.* (2005), conclude that technological and social practices of organisations are inseparable.

Adoption, development and use of IS are shaped by the institutional environment that envelops the IS. Lamb and Kling (2003) argue that users of IS in organisations utilise multiple ICT applications as part of their effort to produce goods and/or services while interacting with a variety of other

people, and often in multiple social contexts. This implies that the social context within which IS operates play a role and therefore must be considered when designing and implementing these systems.

According to Rosenbaum and Sawyer (2000), IS take place within a social context and are influenced by a wide range of non-technical decisions and practices. These social issues are often overlooked even though they often bear directly on the success and failure of IS. Mansell (2005) states that the social context of IS is an important matter and is one of Rob Kling's statements. Rosenbaum and Sawyer (2000) support this by stating that that ICT and IS do not exist in social or technical isolation. Lamb and Kling (2003) also argue that people together with their technologies comprise social networks. Therefore the technical and social issues are inseparable and must both be considered when viewing IS.

Bostrom and Heinen (1977) categorise social systems analysis into four general areas as follows:

- Individual needs, characteristics, and abilities of people in the work system;
- Internal work system characteristics;
- External environment of the work system; and
- Support system for that work system.

This categorisation is still relevant and used in modern times. Moreover, the various areas of analysis need to be broadened to fully account for the social context of IS. Rosenbaum and Sawyer (2000) state that the social context of IS development and use plays a significant role in influencing the ways people use IS. Thus, the social context of IS influences people' consequences for work, organisations and other social relationships.

The idea of social context is inherent when considering the social informatics research area. Social informatics research pertains to IS use and social change in any sort of social setting, which may include societies, individuals and organisations (Kling 1999). The idea behind social informatics is that the social context of IS development and use plays a significant role in influencing the ways that people use information and technologies. Social informatics focuses on the social consequences of the design, implementation and use of IS over a wide range of social and organisational settings.

Kling (1999) states that social repercussions of new technologies are usually taken into account. These repercussions include: sponsorship of projects, training people to use new systems and controls over access to information. He goes on to suggest that these social repercussions are insufficient; and larger social context must be taken into account.

According to Kling and Star (1998), the idea of human centred systems promises that the knowledge of human users and social context in which systems are expected to operate, become integrated into the design and implementation of systems. When using human centred analysis, one must take into account the various social units that structure work, information, organisations and teams, and communities and their distinctive social processes and practices.

Amory (2003) suggests that the development or selection of appropriate systems need to take into account institutional and current user needs. This can only be done by taking the social context of the IS into account and carrying out a thorough analysis thereof.

Impact of IS on the Social Community within Institutions

In educational contexts, the changes brought by the introduction of IS have variously been perceived as either: a great good (Hill 1999), a virulent evil (Brabazon 2002), or neither (Shields 2000). Regardless of its relative value, all the above authors agree that IS has greatly impacted education activities, aims and aspirations. Yusuf (2005) also supported the above three in saying that the field of education has not been unaffected by the penetrating influence of ICT. Yusuf argues that ICT have impacted on the quality and quantity of teaching, learning, and research in traditional and distance education institutions.

As IS developed, it provided increasing opportunities, options and strategies for education (Hill 1999). Kroeker (2000) argues that the prevalence of IS generated an expectation that all education institutions will have a virtual as well as a physical location, and that students can access of the information they need via a web browser. This capacity of IS to modify traditional understanding of the location of education, suggests the need for a completely different set of social and institutional infrastructures with which learning can be facilitated (Shields 2000).

Dertouzos (1998) argues that the current reformation of IS impacts

education, since it mediates the way information is stored and transmitted; while Watson (2001) notes that IS brings about change in the way information is also learnt and taught. These changes of access, learning and teaching have particular bearing on education and impact social community within institutions.

While education has historically been centred on teaching and learning, Duderstat (1999) argues that IS has affected changes to the aims of education. Education is therefore increasingly perceived as the process of creating, preserving, integrating, transmitting and applying knowledge. IS particularly impacts course content and teaching methodology and the recruitment and training of teaching staff (Hill 1999).

In considering the impact of IS, changes have been evident in the methods (Hill 1999; Shields 2000; Watson 2001), purpose (Dunderstat 1999; Hill & Shields 2000), and the perceived potential of education (Duderstat 1999; Hill 1999; Kroeker 2000). While these authors have differed in their opinion of the degree, desirability and destiny of these changes, they all agree that change processes have certainly been underway which impact socially on the individual interacting with this technology.

For people trying to use these various technologies in a domestic setting for educational purposes, there are a range of potential problems and possibilities that are not simply attributes of the technologies per se, but arise from the relationship of the technologies with the social environment (Kirkwood 2000). Kirkwood (2000) argued that research with students and all other community of users is necessary in order to reveal the significance of the diversity of learners' experiences and contexts. This could mean their involvement in System Development and Planning.

Through IS more people are able to network and thereby ensure they contribute to the impact they can have on the systems they use (Mao 2002). They are also able to appreciate one another even though there are cases where there may be breakdown of trust due to increased networking (Levy 2005), which is another form of Social Impact. What one notes is that more people are able to understand where they can obtain specific types of information. Those who want to collaborate in research can also find each other more easily (Levy 2005). Theory of Reasoned Action is thus enhanced through IS because causal relations can easily be identified. The increased networking often improves attitudes of people with common interests. As a

result their intentions tend to become more positive, and their behaviours can be easily improved.

User Involvement and Participation Relation to IS Success

The domestication theory was founded by Silverstone and Haddon (1996) who view technologies as social, cultural, political and economic products which play a symbolic and aesthetic as well as material and functional role. It entails having to consult users regarding issues of relevance in their work and obtaining buy-in for own ideas. Pedersen (2003) distinguish between the first system development and/or planning decision, which refers to decision, and post-start decisional behaviour. They recommend that system development and/or planning be seen as a transition between stages of increasing consumer sophistication in the consumer life cycle rather than a specific event. Brown and Randell (2004) use the term 'dwelling' with technology to describe the study of technology system development and/or planning over a long period of time where the context in which technology is used may change.

The concept of domestication was derived from the British studies on consumption. It refers to the taming of a system development and/or planning by the individual and focuses on the process that integrates technology into everyday domestic life (Pedersen 2003). The domestication approach considers the following phases in the adoption process (Silverstone & Haddon 1996; Ling 2001; Habib 2003): Commodification - The way a technology is designed to give it an image with a number of functional, aesthetic and symbolic claims; Imagination - The way in which a system development and/or planning enters our consciousness; Appropriation - The actual production of the technology; Objectification - The phase in which the technology system development and/or planning is acceptable and familiar in the daily life of the consumer; Incorporation - Integrating the technology with daily use; Conversion - The technology becomes fitted into routines and is seen by others as part of the individual's identity.

The domestication approach considers system development and/or planning rather than mere use, and views adoption as a process rather than a specific event (Ling 2001; Haddon 2003). The domestication approach aims to discern the interaction between the innovation and the context in which it

is being placed. Therefore contexts are often contrasted, for example work versus leisure, private versus public, and contrasts between users in different demographic groups (Ling 2001).

Domestication studies do ex post facto examination of system development and/or planning to understand why a technology has been adopted and why not (Pedersen 2003). It is intended as a tool for observing adoption rather than a tool for the prognosis of an adoption (Ling 2001).

This paper views users as social entities, which is in accordance with the domestication approach. The acknowledgement of the importance of context and the post-adoption focus make the domestication approach relevant to understanding the factors that influence system development.

Critical Application of Literature

The development and planning of IS is a complex process that entails a mix of technological, social and organisational interactions (Gal & Berente 2008). It involves multiple stakeholder groups which have varying needs, interests and capabilities (Gal & Berente 2008). They suggest that different groups may have different interpretations and perceptions of the developed and planned technology and its purpose, hence their involvement in the initial stage of IS projects is necessary for the projects to be successful.

The key to the successful diffusion of advanced IS is whether new applications are responsive to the social, economic and cultural conditions within which people work and live (Crede' 1997). He argues that involvement of users at an early stage of development and planning allows early identification of key choices available to users and producers of IS.

The improved understanding on the part of users of their own requirements and the changes in the environment in which they operate is needed if advanced applications are to be incorporated successfully within commercial and consumer lifestyle (Crede' 1997).This suggests the need to move beyond awareness campaigns towards measures which enable users to learn and fully understand how IS can address their needs (Crede' 1997). This might mean users need to be involved in the development and planning of IS. Lastly how the designed and implemented IS at impact socially on the community of users is not directly or specifically addressed by literature and this research attempts to address.

Research Questions

The literature study addressed the history of the social impact of IS. Most of the issues have been addressed but the following still remain an issue:

- Does the social relationships of users during system development and/or planning impact on IS?
- To what degree are the users of the UNISA IT involved and participate in the development and/or implementation of these systems?
- How does user involvement and participation relate to IS success?
- What social factors influence the development and/or planning of IS?

Conclusion

IS are social systems rather than technical systems (Lamb & Kling 2003). Computer systems structure social relationships and not just information. It can therefore be said that IS's affect more than just the way that users perform tasks (Kling 1999). The development and planning of an IS is a social process involving users and systems analysts, carried out in an organisational setting, and therefore as a social process have social consequences (Lamb & Kling 2003).

Research Methodology

Since this research study aims to answer the research questions developed by surveying the attitudes of students and staff on UNISA's IS as well as to uncover the social impact of UNISA's IS on the social community within the institution (this research is descriptive and explanatory in nature), the questionnaire has been chosen as the data-gathering tool. This will allow the collection of quantifiable data and allow for the quantitative analysis of this data to determine patterns and relationships.

Developing the Questionnaire

Research questions can be considered as critical questions which are based on the research problems under investigation. The following are details of the research questions that formed the bases of this study and were used to

formulate the research tool, the questionnaire. The different questions of the questionnaire are specified under the research question/s that was used to formulate them:

1. What is the impact of UNISA IS within the institution?
   - Questions 1 – 6 and 23 – 26 in the questionnaire
2. In what ways does the social relationships of users during system development/or planning impact on IS?
   - Questions 18 – 20 and 23 – 26 in the questionnaire
3. To what degree are the users of UNISA IS involved and participate in the development and/or planning of these systems?
   - Questions 7 – 17 in the questionnaire
4. How does user involvement and participation relate to IS success?
   - Questions 7 – 17, 21 – 22 and 27 in the questionnaire
5. What social factors influence the development and/or planning of IS?
   - Questions 1 – 6 and 23 – 26 in the questionnaire

Questionnaire Validation and Finalisation

The questionnaire was tested by sending it to two friends and one academic person to read it and if their understanding is same of the authors. The people did not recommend any changes to the questionnaire. After receiving the responses and feedback from the pilot group, the questionnaire was updated. After discussing the second draft the questionnaire was finalised. The final questionnaire was then discussed with the supervisor. It was circulated through e-mail to the targeted population after necessary approvals from the Supervisor.

Population and Sample Size

The population consists of both academics and students who use the system for information. For classification purposes they will all be regarded as the same user for this study. In this study that subpopulation, or sample frame, consisted of staff and students who were around Pretoria during the time of the study. The research sample was selected from the sample frame. A sample of size 384 was selected for the results to be statistically significant.

The population consists of both academics and students who use the systems for information. For classification purposes they will all be regarded as the same user for this study. The sample consists of users of myUNISA, EDS and Osprey, which is the UNISA's principal IS. The sample size was 384, which was the required size according to Krejcie and Morgan (1970) for the results to be statistically significant.

Data Handling

No permission is required to run the survey. The questionnaire was administered through e-mail. According to Witmer *et al.* (1999) cited by Saunders *et al.* (2003), e-mail offers greater control as to who answers the questionnaire because most users read and respond to their own mail at their personal computer. Data analysis was done through Excel. A few minor consultations were made with statisticians in the University's Department of Statistics and the South African Revenue Services.

Data Analysis and Interpretation

Respondents Profiles

A total of 384 respondents answered the questionnaire. Some respondents were also temporary or permanent staff members of UNISA. The respondents consisted of 233 (60.7%) respondents that are only students and 151 (39.3%) who are also temporary or permanent staff members of the university. The respondents were all given an equal chance to be included in the study.

Nearly 40% of the respondents are between the ages 25 and 34 (the reason might be that they preferred to work first to pay their own study fees), between 18 and 24 are 26% of the respondents, and between the ages of 35 and 44 26% of the respondents. There were 28% respondents from Management studies and 72% from other colleges. It supports the fact that the College of Economic and Management Studies is the college with the largest number of student registrations at UNISA.

If Student, Year of Study

In this instance a total of 327 people responded. There were 94 first years,

50 second years, 88 third years, 25 honours, 57 master and 13 doctoral students. This shows that the sample included every level of study the university offers; hence the sample is representative in terms of level of study. Some respondents used more than one Internet access method. Therefore, the sum total of frequencies reflects a higher total than 384.

Figure 2: Primary internet access

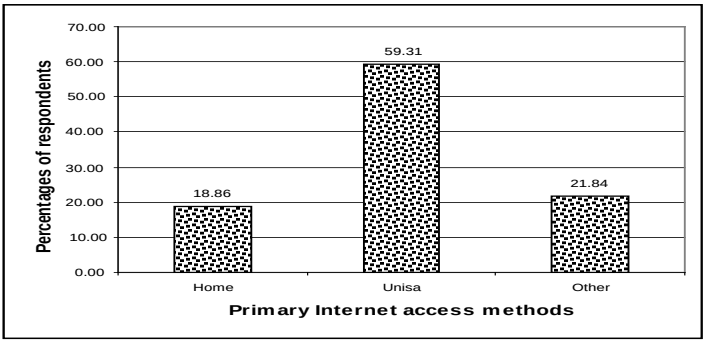


Figure 2 shows that UNISA provides the primary means of accessing the Internet to its students. The study indicates that 19% respondents had Internet access in their homes; 59% accessed the Internet at UNISA while 22% used other means of Internet access.

Some respondents were aware of more than one IS at UNISA. As a result, the total of frequencies also reflects a higher total than 384.

Table 1: Awareness about IS

Information System	UNISA Website	myUNISA	Osprey	EDS	Student system	E-mail
Awareness	246	302	69	88	113	238
Percentages	23.30	28.60	6.53	8.33	10.70	22.54

Most respondents know about myUNISA (303) and little less about the UNISA website (246) and e-mail (238). All the respondents should know about myUNISA, website and e-mail because it is advertised in all study

letters and used to deliver study material to the students. Few knew about Osprey and EDS because they are subject related and not many of the respondents study the courses. Respondents who know about Student System are those students who are also employed by UNISA, because this system is not accessible to students.

Comparing Level of Awareness of the IS

A chi-square test is performed to determine if some IS were known by the respondents. If there is no higher awareness for some, then identical awareness implies equal probability of awareness of the different IS.

Table 2: Chi- square test on IS awareness

IS	UNISA Website	myUNISA	Osprey	EDS	Student system	E-mail	Total (N)
O	246	302	69	88	113	238	1056
E	176	176	176	176	176	176	

Thus, $\chi^2 = \sum \frac{(O-E)^2}{E} = \frac{(246-176)^2}{176} + \ldots + \frac{(238-176)^2}{176} = 271.4886$

Using the 5% significance level the critical region is

$$\{\chi^2 > 11.07\}$$

Since the calculated values of $\chi^2 = 271.4886$ falls in the rejection region, the suggestion that the respondents had awareness for all the IS cannot be accepted. Therefore, it is concluded that some IS at UNISA are known more than others.

IS Option you Used

This was a section where overlaps occurred. Some respondents used more than one IS. Thus, the total of frequencies obtained also reflects a higher total than 384. It was noted that a limited number of people are using myUNISA since this is the primary method of delivering study material. This is in agreement with Amory (2003). The large number is also assessing the UNISA website and is important since it means that they are using the site to search for information.

Correlation between Awareness and Use of an IS

There exists a statistically significant, strong, positive correlation between the two variables ($r = 0.9981$, $n = 384$, $p < 0.05$). In other words the more one is aware of the system the more one will tend to use the system. This relationship is excellent, and the regression linear equation resulting from the relationship can be used with 97% accuracy of results.

Comparing the Level of Use of the IS

A chi-square test was performed to determine if some IS were used by the respondents more than others. If there is no higher use of some IS than other, indistinguishable awareness implies that there are equal probabilities of use of the different IS (Hill 1999). Thus,

$$\chi^2 = \sum \frac{(O-E)^2}{E} = \frac{(214-153.33)^2}{153.33} + \ldots + \frac{(63-153.33)^2}{153.33} = 214.324$$

Using the 5% significance level the critical region is $\{\chi^2 > 11.07\}$

Since the calculated values of $\chi^2 = 214.324$ falls in the rejection region, the suggestion that the respondents use the different IS equally cannot be accepted. The general perception is that students and staff should be using all the systems at UNISA but the stats prove the opposite.

Satisfaction with UNISA's IS

The respondents were requested to state if they were satisfied with the IS they used. They had to report the level of satisfaction or dissatisfaction on each IS they were using. Since the total number of respondents was affected by overlapping, this is inherited here. The extent of satisfaction or dissatisfaction was also required. Only six respondents indicated they were not happy with the systems available to them. This could be interpreted that the respondents are happy with the systems even though they were not involved. These results indicate that UNISA IS is reasonably successful as only 2% of users were not satisfied with the systems available to them.

Overall Perception of UNISA's IS Quality

The respondents were requested to make their own judgment on the quality

of the IS they used. They had to report whether they found it to be excellent, good, acceptable or poor. Again, the total number of respondents was affected by overlapping. The majority of respondents perceive UNISA IS of good quality, the reason might be that students are able to access the information required of them.

There exists a statistically significant positive correlation between perceived quality of a system and the satisfaction level from the system ($r = 0.5316$, $n = 384$, $p < 0.05$). This might mean that the more students use the system, the more the quality of the system become evident to them.

Involvement and Participation in Developing Systems

According to Lamb and Kling (2003), user involvement must be divided into user participation and user involvement. User participation refers to the actual physical involvement of the users in the development and/or implementation of the IS, whereas user involvement refers to the subjective psychological state reflecting the importance and personal relevance of a system to the user.

Lamb and Kling (2003) reveal one theme has been prominent, that is the fact that user involvement and participation in the development and/or implementation of a successful IS is vital. Over 80 % of respondents did not participate at all in the development and/or implementation of any of the specified UNISA IS. This indicates that there was a forced acceptance as the users have no choice but to use UNISA's IS.

The 76 respondents who indicated that they were involved in the development of the IS was invited to indicate the specific system in which they were involved. The respondents were involved only in the UNISA website, Osprey and myUNISA and no one was involved in EDS, e-mail and the student system. The extent of involvement as three (4.0%) respondents having participated in the development of the UNISA website, two (2.6%) having participated in the development of Osprey and 71 (93.4%) having participated in the development of myUNISA. This also supports the fact that systems were 'forced' on users.

Needs Considered During Development and/or Planning

More than 60% (66.7%) respondents believed that their needs were taken into account in the development and/or implementation of the UNISA's IS.

The reason for the unexpected student response could be that the students themselves do not fully understand their own needs.

The respondents needed to indicate if they were consulted about what they wanted/needed in the IS they were to use while working or studying at UNISA. This is in accordance with Clow (1999) that feedback on users of systems is important, if the IS is to be successful.

More than 90 (94) of the respondents indicated that they were consulted regarding what they needed in an IS for their work at UNISA, 277 indicated that they were not consulted and 13 did not tell whether they were consulted or not. These results are almost paradoxical, as fewer students were asked if they wanted or what they wanted from the system, but most students feel that their needs have been taken into account. The reason might be that best practices were applied in the development of these systems.

The question wanted the respondents to indicate if they were willing to be involved in the development of the IS used for studies and work at UNISA. Mckeen *et al.* (1994) stated that it is important to note the difference between voluntary versus forced acceptance. It goes to say that users involvement does not affect acceptance if there is forced acceptance, as the user has no choice but to use the IS, whereas users involvement does affect user acceptance if the acceptance is voluntary. Therefore it is necessary to have positive user involvement when acceptance of an IS is left up to the user. Users' involvement in the development and implementation of these IS, can be described as their willingness to participate in the development and improvement of the university's IS, and users view on the effect of their input on the quality of those systems (Mckeen *et al.* 1994).

The results reveal that 85% of users said that they would be willing to participate in the development of UNISA IS that is built for them. Hall (2006) argues that those users, who would not be willing to participate in the development, may do so because of the time and effort that would need to be expended or because they do not want to use and/or do not support the implementation of the proposed IS.

The results also reveal that 89% of respondents would be willing to participate in the improvement of these systems. This is in accordance with Kling (1999).

To determine if the respondents had confidence that their knowledge and/or opinions could be useful in improving the quality of the IS used in

UNISA. Another determining factor of user involvement is how valuable a user views their input into the development or implementation of IS built for them. Nearly 92% of the respondents feel that their participation would have improved UNISA' IS.

Use and Satisfaction with UNISA's Systems

The respondents were requested to indicate their extent of use and satisfaction regarding the three UNISA's Systems below. A higher percentage of respondents use myUNISA more often. This rate of use is logical because it is the system that is mainly advertised by the university, study material is delivered through this system assignments are also submitted through this system and tutorial letters are posted on this system by academic. This is in accordance with Yusuf (2005) that ICT provides access to more extensive and current information.

myUNISA is the system that was accessed at least once a week compared to other systems. Also, myUNISA is the system with the least rate for the systems that was never accessed. The reason is that myUNISA is primary to the distance learning mode of UNISA and should always be accessed by students for students to remain current. Only 2.11% of the respondents never accessed myUNISA.

ANOVA for Testing Frequencies of Access and IS

ANOVA is a technique for comparing sample means; but unlike the t- test, it can be used to compare more than two means. With ANOVA, because several sample means are usually being compared, once a null hypothesis has been rejected we need a follow-on, or post hoc, procedure. It is possible that some pairs of means may not be significantly different from one another. Thus the process is a bit like aerial photography. ANOVA gives a high-altitude picture, and the null hypothesis can be rejected.

Hypotheses tested are:

H_{or}: There are no differences in yield according to frequency of access
H_{oc}: There are no differences in yield according to IS accessed

The results were not significant for both rows and columns. It can be concluded that there is no evidence against the hypotheses that the yield is

not affected by the type of IS used or by the frequency of accessing an IS.

Dependency of Frequency of Access on the Kind of IS

A chi-square test is performed to determine if that dependence is not there, then independence would mean that (row total)×(row total)/(grand total) would be close to the observed values. In this case the statistical hypotheses are:

H_0: Frequencies of access and IS types are independent vs.

H_a: The said variables are dependent

Thus,

$$\chi^2 = \sum \frac{(O-E)^2}{E} = \frac{(50-38.29)^2}{38.29} + \ldots + \frac{(44-23.40)^2}{23.40} = 145.3774$$

Using the 5% significance level, df = (3 – 1)(4 – 1) = 6, the critical region is

$$\{\chi^2 > 12.59\}$$

Since the calculated values of $\chi^2 = 145.3374$ falls in the rejection region, the suggestion that the frequency of accessing and IS is independent of the kind of the system cannot be accepted. Thus, it can be concluded that the frequency of accessing an IS depends on the kind of system.

Viewing of assignments is the most popular task used with the systems (18.1% of the time) in the systems; followed by submitting/posting assignments (16.7%); that are closely followed by communication between students and lecturer (16.0%). It is logical because the tasked indicated are the most common in distance learning environment (Yusuf 2005).

Comparing the Level of Use of the IS on Various Tasks

A chi-square test is performed to determine if some IS were used by the respondents on certain tasks more than in other tasks. If there is no higher use of some IS than other, indistinguishable awareness implies that there are equal probabilities of use of the different IS.

H_0: $p = \frac{1}{9}$ vs. H_1: $p \neq \frac{1}{9}$

O = observed frequencies and $E = Np = 1806\left(\frac{1}{9}\right) = 200.67$

Thus,

$$\chi^2 = \sum \frac{(O-E)^2}{E} = \frac{(327-200.67)^2}{200.67} + \ldots + \frac{(233-200.67)^2}{200.67} = 487.7143$$

Using the 5% significance level, df = 9 -1 =8, the critical region is

$$\{\chi^2 > 15.51\}$$

Since the calculated values of $\chi^2 = 487.7143$ falls in the rejection region, the suggestion that the different IS are used equally on the specific tasks listed cannot be accepted. Thus, it can be concluded that the respondents were using IS in some tasks more than in other tasks.

Miscellaneous Use of Systems

myUNISA is the system used most often for all the tasks, even though it differs in extent of use for the various tasks. Viewing assignments, submitting/posting assignments, library information, posting/reading notices, posting/viewing lecturer notes and lecturer/student communication, in the order from highest to lowest, are the most significant tasks for which myUNISA is used. These tasks are also higher than the highest rates of use of all significant uses of EDS and Osprey. This results are logical because the primary purpose of myUNISA was to facilitate the tasks as indicated and all students should be using myUNISA to do exactly those tasks. This is in agreement with Yusuf (2005) that IS has impacted on how teaching and learning is delivered in traditional and distance institutions.

EDS is used more than Osprey. The most significant uses of EDS, from highest to lowest, are lecturer/student communication; submit/post assignment; post/view lecturer notes; view assignments; post/read notices; and library information. This results shows that myUNISA is a popular Information System at UNISA.

The uses of Osprey, from highest to lowest, are lecture/student communication; and post/read notices. The reason is that Osprey is course specific system and not many student registrations in this field of study. This is also in accordance with Dertoulos (1998) that people use IS if perceived useful and has relevance to their task.

ANOVA for Testing Different Tasks and IS

Hypotheses tested are:

H_{or}: There are no differences in yield according to task
H_{oc}: There are no differences in yield according to IS

The results are not significant for both rows, but for the columns they are significant. It can be concluded that there are differences in yield due to the type of IS. Due to the fact that the effects of rows are not significant; there is no evidence that the type of task undertaken does not affect the yield.

Dependency of Use of Specific Tasks on the Kind of IS

A chi-square test was performed to determine if that dependence existed.
H_0: IS types and use of certain tasks are independent
H_a: Use of IS on tasks and the IS are dependent

$$\chi^2 = \sum \frac{(O-E)^2}{E} = \frac{(69-91.26)^2}{91.26} + \ldots + \frac{(13-23.61)^2}{23.61} = 156.2702$$

Using the 5% significance level, df = (3 – 1)(9 – 1) = 16, the critical region is

$$\{\chi^2 > 26.30\}$$

Since the calculated values of $\chi^2 = 156.2702$ falls in the rejection region, the suggestion that use of IS on specific tasks and the types of IS are independent of each other cannot be accepted. Therefore, it can be concluded that the use of IS depends on specific tasks and depend on the kind of the system used. Kling (1999) states that the consequences of IS depends on the context in which IS are developed and designed.

Use of IS in Courses

In using the different IS in the courses of UNISA, myUNISA was the IS used the most. Use of myUNISA in courses also exceeds the combined uses of EDS and Osprey. In the use in courses, Osprey is used more than EDS.

EDS is the least used in courses, but is not far exceeded by Osprey. This is expected as myUNISA is the main IS provided for the use of students and academics. This is also in accordance with Kling (1999) who states that the consequences of IS depends on the context in which IS are developed and designed.

Miscellaneous Impression about System

Another measure of a successful IS could be the number of problems experienced by users. Fifty percent of respondents reported that they had experienced problems with UNISA's IS. This is a relatively high rate of respondents that have experienced problems. This might mean that just over 50% of the students accessing UNISA's IS are frustrated by the systems. As indicated by Kling (1999) that this might be as a result of lack of user involvement in the design and planning of these systems.

Meeting usage needs, ease of use of IS and functionality are all determining factors of IS success. UNISA is successful in the IS it made available for its students and employees. Results reveals that, 76% of the respondents indicated that information content met their needs, 75% reveals that the Systems are easy to use, 77% indicated that the Systems are user friendly and 72% indicated that the necessary information was available. The results reveal that higher percentage of users is satisfied with UNISA's Systems. Slightly fewer respondents are not happy with the systems UNISA made available. Lamb and Kling (2003) find that user participation in the development of an IS, may not necessarily lead to user satisfaction, but it is still a necessary antecedent.

Since a higher percentage of users were not involved in the development and implementation of these systems, this might be the reason why 69% feels that the systems need modification where their inputs should be taken into account. The remaining 31% feels that what they have is good enough for them.

Level of Satisfaction with Use of System

The results indicate that UNISA IS are reasonably successful as no users were dissatisfied and completely dissatisfied with the systems available to them. This is in agreement with Amory (2003) who states that many people are not unhappy with systems.

myUNISA is the most preferred medium to receive study material. This is logical since myUNISA was developed to improve flow of academic information. Academic information comprises courseware, subject-related academic guidance, discussion groups, and recommended books. This also proves that most students are starting to accept these systems. This is in agreement with Kroeker (2000) who stated that IS affected education methodologies. It also support Dertouzos (1998) who states that IS mediate the way information is accessed, organised, stored and transmitted. Most of the respondents prefer e-mail to communicate. The reason might be that they want to establish a personal kind of a relationship which is non-existence in distance learning environment. A higher percentage of respondents prefer mail to communicate. The other reasons might be issues of integrity and privacy and also most people logon to their e-mail than other forms of IS available for them.

Preferred Form of Communicating with Peers for University Work

Regarding the form of communication among peers (i.e. from students to students and from lecturers to lecturers), about 57 (12.1%) respondents used EDS, 264 (55.9%) used e-mail, 19 (4.0%) used Osprey and 132 (28.0%) used myUNISA. The reason again may be the issues of integrity and privacy. Also people respond more quickly while using e-mail other than any form of communication. The other reason is the fact that most people have access to their e-mail wherever they are and can keep communication going. This is in agreement with Yusuf (2005) that IS provides opportunity for users to communicate with one another through e-mail, mailing lists, chat rooms and so on.

As a result the social relationships of users are affected by the IS that they use for communicating with their peers. The structures of those relationships are moulded around the IS that are used as a communication medium.

In testing the valued IS among EDS, myUNISA and Osprey, about 170 (23.5%) respondents valued EDS, 183 (25.3%) used Osprey, and 371 (51.2%) used myUNISA. This seems logical since myUNISA is the most advertised system. Respondents might value the system because they are only exposed to it, and forced to use it as it is the only system where

information pertaining to courses and study letters are posted and students have no choice but to use if they want to succeed in the courses they are registered for. This is in agreement with Clow (1999) that student perceptions of technology are important in the future of distance learning. Also authorities of the university have decided that as from 2009 access to myUNISA will be a registration requirement. In testing the valued IS that enhances studies, myUNISA was considered by (56.1%) as a system that makes their learning environment more conducive to study.

Involvement in Development

User involvement and participation in the development and/or implementation of a successful IS is important. Users' involvement in the development and implementation of these IS, can be described as their willingness to participate in the development and improvement of the university's IS, and users view on the effect of their input on the quality of those systems. Users said that they would be willing to participate in the development of UNISA IS that are built for them, whilst 50% would willing to only participate in the development of MyUNISA. The remaining 21% and 28.27% of users are willing to participate in development EDS and Osprey respectively. This is in accordance with Amory (2003) that user involved when s/he considers a system to be both important and personally relevant.

Quality of UNISA IS can be influenced to some extent by whether or not users were asked whether they wanted or needed any of the specified UNISA IS. It can therefore be said that, just by merely asking users whether they want or need the Information System can increase the success of that system. This is in agreement with Kling (1999). The question wanted to determine the IS wanted by the respondents. About 170 of the respondents wanted EDS, 132 wanted Osprey, and 327 wanted myUNISA.

Needs Taken into Account in Development

This is another question where overlaps occurred. Some respondents used more than one IS. Thus the total frequencies reflects a higher total than 384.The question wanted to determine if the respondents believed that their needs were considered in the development of specific IS. About 113 (21.2%) of the respondents believed that for EDS their needs was considered, 113

(21.2%) believed that for them, Osprey considered their needs, and 308 (57.7%) believed that development of myUNISA considered their needs. Those who feel that their needs have been taken into account perceive UNISA IS to be of good quality and the majority of those users who feel that their needs have not been taken into account; perceive UNISA IS to only be of acceptable quality. In all cases it showed that myUNISA forms the integral part of students' lives at UNISA. This is again in accordance with Bostrom and Harrion (1977) who stated that many people are not unhappy with systems.

Conclusion

This section provided an analysis of the data obtained from the empirical study. A description of how the results were calculated and interpreted was given. This was done to determine the Social Impact of Information Technology at UNISA. The IS investigated were myUNISA, EDS and Osprey.

The UNISA IS were explored from various uses.The study found that the dominant IS used by majority of users at UNISA is myUNISA. In addition, the research reveals in Section 5.4 that over 80% of users were not consulted in developing and implementing UNISA IS. However, users feel that their needs have been taken into account and they are also willing to participate in future development and implementation of UNISA IS. It can be concluded that UNISA IS is relatively successful in delivering in meeting the needs of community of users.

The success of a system is determined by the community of people who use it. Therefore it is imperative that UNISA considers social context of its users when designing and implementing Information System. In addition, since myUNISA is the most accessed Information System of the three, it will be more logical to consolidate the best functionality of the two systems EDS and Osprey.

Conclusion and Recommendation

The organisation that formed the basis of this Study is the University of South Africa (UNISA). Items that were investigated are, MyUNISA used to

facilitate learning at the institution, Electronic Delivery System (EDS) used to facilitate learning for students registered for the Master of Business Leadership (MBL) and Doctor of Business Leadership (DBL) through UNISA's School of Business Leadership (SBL) and Osprey used to facilitate learning by students registered for Computer Science and IS in the School of Computing.

The research was aimed at determining the level of impact UNISA's IT has on its community of users. To determine to what extent the user of UNISA's IS were involved and participated in the development and/or implementation of these systems. The research questions arrived at are as indicated previously.

This study analysed the effects of UNISA's IS from Social Informatics perspectives. It was noted that social impact of IS are rarely taken into account when systems are being developed and/or planned. A social impact of an IS are the users. Users play a role in the success of an IS, but the social implications that affect them are not fully accounted for by system designers\analysts and those implementing the system.

The study revealed that even though over 80% of respondents were not involved or participated in the development and implementation of UNISA's IS as indicated in the results, but the users are satisfied with the IS provide to them by UNISA.

Response to Research Questions

The main findings of this research in relation to each research question will now be discussed. Each question is followed by a discussion of the findings.

What is the social impact of UNISA IS within the institution?

From Kling (2000) it can be concluded that IS have an effect on the social relationships of users. The social relationships of users are affected by the IS that they use for communicating. The structures of those relationships are moulded around the IS that are used as communication medium.

Respondents (63%) indicated that they do not have access to the internet at their residences, and at the same time study material, notices and other form of information that can enhance learning. These are posted on these systems for students to access, of which the majority of students have

no access. The impact this have on the community of users is that these systems contribute to the inaccessibility of academic staff as students are always referred to this systems for more information which impact negatively on their academic progress.

Respondents view these systems of value and aid their learning. It can be concluded that the impact is two folded. The social relationship with academic staff is impacted negatively by these systems. UNISA is operating in the third world with the characteristics of first world and this on its own affects the entire social structure of community of users.

In what ways does the social relationships of users during systems development/planning impact on IS?

According to Kling (2000), the Internet, raises issues about changes in areas such as working at home, communication, entertainment, and other personal issues. IS have been used and relied upon and therefore social implications of IS for users have become prevalent. ICT are an integral part of some organisations and so shape identity and institutions (Lamb & Kling 2003). People routinely use computers, information products and other ICT's in their daily lives. These technologies shape who they are as organisational representatives, their relationship with other people in the organisation as well as their perceptions about themselves (Lamb & Kling 2003).

An example of a social consequence of IS's on users is given by Kling (1999). The development of an IS may reduce the amount of paper produced and used, systems designers may however may not realise that paper plays important roles in some places where one wouldn't think it would be used. This could have social consequences for users of the system. Rosenbaum and Sawyer (2000) suggest that the use of ICTs often lead to both intended and unintended consequences included in this are the social consequences for users. In summary IS's have social consequences and these consequences need to be considered when IS's are designed and implemented. The consequences of IS's depend on the context in which systems are developed, implemented, and used (Kling 2000). As indicated in the results show that traditional in-person or telephonic conversations is been replaced by this System for social chatting at UNISA.

To what degree are the users of the UNISA IS involved and participating in the development and/or planning of these systems?

User involvement is described as subjective psychological state reflecting the importance and personal relevance of a system to the user. User participation is described as set of behaviours or activities performed by users in the system development process (Kling 2000). The results show that 80% of the respondents did not participate at all in the development and/or implementation of any of the specified UNISA's IS. Users were not even asked if they wanted the implementation of the specified IS, or what they wanted in terms of their needs. User acceptance has a lot to do with the users' involvement in the development and/or implementation of an IS. According to Kling (2003), it is important to note the difference between voluntary versus forced acceptance.

It goes to say that users involvement does not affect acceptance if there is forced acceptance, as the user has no choice but to use the IS, whereas users involvement does affect user acceptance if the acceptance is voluntary. Therefore it is necessary to have positive user involvement when acceptance of an IS is left up to the user. UNISA's IS were forced on the users.

How does user involvement and participation relate to IS success?

It is indicated that 85 % of respondents are willing to be involved and participate in the development and implementation of UNISA's IS. If the success of an IS is measured by user satisfaction and user participation in systems development is related to user satisfaction, then user participation is essential for the success of an IS (Mansell 2005). In the article written by Mansell (2005) it was found that user participation in the development of an IS, may not necessarily lead to user satisfaction, but it is still a necessary antecedent for the success of IS.

It can also be argued that a successful IS would be one that users of that system are satisfied with, perceive the system to be of high quality, their needs are satisfied and the IS does what it was designed to do. Only 2%

users are not satisfied with UNISA's IS, hence UNISA's IS is reasonably successful.

What social factors should influence the development/ planning of IS?

According to Gal and Berente (2008) characteristics and attributes of the users of the system being developed are expected to influence the systems' success in a variety of ways. Each of these factors is described below.

Bias is defined by Dey (1993) as the users' 'willingness to change'. This includes the users' willingness to try new technological approaches to support the work system or changes to the business processes that make up the work system itself. It is generally accepted that most individuals have a natural tendency to resist change. This may impact a project's success by users insisting that the new system work the same way the old one did, e.g. that a printed report must be in the exact same format or that a printed report is required at all.

User commitment is defined by Crede (1997) as the level of importance the users being affected by the application place on the project's successful completion. This reflects their level of emotional or psychological obligation to the project. This construct is expected to be similar to team motivation and management commitment. The users' commitment to the project would be expected to impact on the project's success by influencing the time users are willing to dedicate to the project. Users that want the project to succeed will be more willing to provide documents, answer questions, and perform other development activities.

Users' communication skills were defined by Amory (2003) as the writing, speaking, and listening skills of the users participating in the IS Development project. The primary reason for user participation in systems development is to transfer their job knowledge. Without an adequate level of communication skills, the communication and interaction between the users and IS personnel may be difficult. Without adequate communication skills, the users' may be willing to provide the information needed for a successful project, but not able to express their requirements to the IS personnel, other users, or management.

Users' computer literacy is defined by Amory (2003) as the level of knowledge and understanding that the users' possess regarding computers, software, and technology in general. If users are more computer literate, communication between IS personnel and users may increase because the users can understand some of the computer jargon. Also, as computer literacy increases users may be more likely to accept new technology, this is the may display less bias. Also, if users tend to be computer savvy they may have more realistic expectations with regard to what can and cannot be accomplished using Information Technology as well as toward the amount of time and money needed to design, construct, and implement new software.

User ownership is defined by Amory (2003) as a psychological attachment to the system or business process for which a new system or software is being developed or implemented. Similar to user commitment, but focused on the business activities, user ownership may have a positive or negative impact on IS Development project success. If a user with a strong feeling of ownership believes that a new system will help the m perform their activities better or quicker, this may increase user commitment to the project and positively impact project success. However, if a user with a strong feeling of ownership to the business process sees the project as threatening the process, increasing their workload, or eliminating their job; this will decrease commitment and negatively impact project success.

User participation is defined by Amory (2003) as the active, substantive participation of the actual users of the application in the development process. This includes identifying the correct end users and their performance of specific tasks and activities during IS Development. The proper type and amount of user participation in IS Development is still a matter of debate within industry and the academic world. New techniques such as extreme programming, that minimises the user's participation, are being suggested as the most productive IS Development methods while at the same time the socio-technical approach is still popular and has many dedicated advocates. User participation in the IS Development process has had a great deal of attention and yet the effect of participation on project success is not well understood. It would seem likely that a contingency approach for user participation in IS Development based on the type of system, management goals, etc. is appropriate.

Users' understanding of the current system is defined by Amory (2003) as the level of knowledge that the users participating in the IS Development process have regarding current manual and computer based processes and procedures used to perform their duties. Users that have a high level of understanding of the current system should be able to point out specific problems and areas for improvement that can be incorporated into the new system. One the other hand, users that do not understand the current system or how it is related to other operations of the business may not be able to provide the details needed to automate processes and may resist efforts to streamline or eliminate redundant processes or system outputs.

The users' understanding of needs by Bostrom and Heinen (1977) is defined as the level of knowledge that the users who are participating in the development process have regarding the information required to perform their duties. This includes knowledge about the information outputs required and the processing and data required to produce this output. Again, the primary reason for the participation of users in the IS Development process is to determine the information requirements needed for the users to perform their job activities. For this transfer of knowledge to occur, the users must have some idea of what these information requirements are.

Managerial Guidelines

From the results of this study the following guidelines are given to tertiary institutions that already have, or are planning to develop/implement IS for the use of lecturers and students:

- Users needs should be taken into account whether or not they understand.
- IS affect the social aspects of users; therefore these impacts must be taken into consideration before implementing these systems.
- Most users want to participate and feel that they can add value to the development/implementation of IS built for them.
- Users must participate and be positively involved in IS development/ implementation for it to be truly successful.
- Users' needs must be taken into account, using best practice isn't sufficient.

- University IS are reasonably successful, but are not as effective as they could be. By accounting for the social aspects of these systems, their successfulness and effectiveness can be optimised.
- IS have the potential to add value to and increase the effectiveness of educational practices, but also have the potential to impact immensely on the encompassing community. This must be considered before implementing any IS.

Conclusion

The different social impact of IS is important to their success and has a influence on these systems and their users. The study intended to investigate this social impact in the context of University IS, how they impact on the users of those systems and how those aspects affect the success of those systems.

It can be said that a broader view of users as social actors is needed for IS developers to fully understand the needs of users and the social impact of the IS. Users' perception of IS usefulness and ease of use has an impact on the users' view of the quality of the system. It can also be proposed that user participation and involvement is necessary for IS success, but having it does not necessarily guarantee IS success. Tertiary Institution IS do have an effect on social relationships, as they can change the structure of many of the relationships that user may have, be it relationships with fellow peers, students, lecturers or friends.

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Sam Lubbe
School of Information Systems
North West University
South Africa
Sam.lubbe@nwu.ac.za

Maishe Bopape
School of Computing
University of South Africa
Pretoria, South Africa
bopaphm@unisa.ac.za