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Distance Education as enabler in crossing the digital divide: Will the Phoenix Fly?

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Abstract

Education, powered by technology, has been hailed as the silver bullet for empowering developing communities and helping them to cross digital divides. The path to success becomes obscured by the complexities of crossing these divides, but the objective remains paramount. Our focus is on distance education and the particular challenges of designing technology for this context. For many students distance education is the only feasible option of gaining an education. The ideal approach would be to study the adoption of these approaches in developed countries and then leapfrog over the problems encountered – effectively learning from their experiences. This assumes a linear adoption path towards success and sustainability. In contrast, existing literature shows a 'rise-fall-plateau-rebirth' progression that has been likened to the mythical Phoenix bird that is supposed to die by fire in order to be reborn from its own ashes (Romiszowski, 2004). It is possible that the pitfalls sabotage the adoption process to such an extent that the entire process appears to terminate, before re-emerging once again, quite unexpectedly, later. This raises the question: "*Can ICT supported education benefit from the experiences of others, effectively leapfrogging over pitfalls and sustaining a steady adoption process, or will it have to follow the same Phoenix-like pattern of adoption?"*

In an attempt to shed some light on this conundrum, we consider the adoption of a learning management system by distance education students in South Africa. The main contribution is the

identification of factors that could be useful in supporting e-learning in developing contexts. The identified factors and issues will be of value to researchers in the field of Learning Management Systems (LMS), administrators and faculty who have to choose an appropriate LMS and manage the adoption thereof. Other beneficiaries could be distance learning course developers interested in more effective knowledge transfer.

Keywords: learning management system, student profile, technology adoption

INTRODUCTION

There is a growing convergence between traditional and distance education methodologies in the pursuit of open education ideals. Distance education is mostly offered through some Learning Management Systems (LMSs) that spans the administrative, content related and pedagogic spheres of students' lives. In exclusively online training facilities, using the LMS is often a prerequisite to academic progress (Zubas *et al.*, 2006). We explore the concept of adopting an open distance education LMSs, to cater for students engaged in distance learning. This implies providing complete service delivery to students wherever they are, whatever their background and context. The challenge comes from the fact that there is no "homogenous" student profile: students come from a variety of backgrounds and study in diverse contexts. Dealing with the concept of the 'unknown student' necessitates a thorough understanding of the needs and capabilities of all potential students.

In this paper we review literature on the issues surrounding distance education students, in order to gain some understanding of the special needs of such students, and then we provide a brief overview of technology adoption models. One factor which is particularly crucial in the South African context is that of culture, something none of the other models for distance education have included. There is evidence to show that culture influences the way students perceive and evaluate LMSs, so we argue that culture should be investigated as a factor operating within a culturally rich environment. This study proposes a number of factors that can influence the adoption of a Distributed Learning Management Systems (DLMS). This research can act as a springboard for further research into LMS and DLMS adoption.

LEARNING MANAGEMENT SYSTEMS

A learning management system is a software system which delivers, tracks and manages learning.
LMSs are not a novel concept – they have been in existence for at least 40 years. However, they were initially intended merely to ease the management side of e-delivery (not e-learning) – by making it possible for faculty to administer courses more efficiently. The Web-Based LMSs mostly emerged in the 1990s. Some researchers have pointed out that many LMSs have very little to do with actually supporting learning (Dalsgard, 2006, Siemens, 2006), with the needs of the organisation being paramount when the individual LMS is chosen. A discussion of the terms employed to refer to the range of ICT systems used to deliver and support learning such as *learning management system* (LMS), *learning content management system* (LCMS), *course management system* (CMS), *virtual learning environment* (VLE), *managed learning environment* (MLE), *technology-enhanced learning environment* (TELE), or *learning support system* (LSS) is beyond the scope of this article and we will proceed to use the term *learning management system* (LMS) for this study.

The system's functionality ranges from those which merely act as a repository for lecture and auxiliary materials to those which facilitate online collaboration. Many LMSs are web based to maximise accessibility. Examples of such systems include Moodle[1], Saba[2], TeamScape[3] and Solstra[4]. Often the actual learners' needs are not even considered, which means the LMS fails to support them adequately. Siemens (2006: 5) argues that: "To meet the needs of all learners in various stages of their education, a multi-faceted (holistic) view of learning must be considered." The following section will consider those needs in the context of distance learning.

DISTANCE EDUCATION

Distance education students have a learning experience that is vastly different to that of traditional students. At a very basic level the difference is that they do not attend lectures and very little interaction between student and lecturer takes place directly. The unfortunate consequence is a sense of isolation both for the students (Lee & Chan, 2007) and the lecturer (Howell *et al.*, 2003). Most interaction between student and lecturer is mediated by phone, mail or email and the perceived quality of this interaction is a strong predictor of the success of the learning experience (Picciano, 2002). Students therefore have some unique challenges to overcome. Hara and Kling (Hara & Kling, 1999) found that communication breakdowns and technical difficulties were particularly distressing. The same authors report on frustrations related to the lack of prompt feedback, ambiguous instructions and, once again, technical difficulties (Hara & Kling, 1999).

Open distance learning is not a new concept. The term "open" is an imprecise phrase describing educational provision where the restrictions on the learners are minimised and the decisions about learning are taken by the students themselves (Rumble 1997). Open distance learning strives to achieve the same aims while acknowledging that the students are not on a specified campus, i.e. location is not specified. Tait (2000) notes that despite the substantial literature on methodologies relating to the production of learning materials and resources for open and distance learning (ODL), relatively little has been written about the planning and management of student support. Our research focuses on the students themselves, the *raison d'etre* of any LMS.

Best practice formulates and relies on the concept of a homogeneous student profile and LMSs are often designed and developed for this "generic" student. In an open, distance education environment there is no such thing as a generic student. Unfortunately, the use of a profile to describe a student in this setting is bound to be impoverished. What we have, therefore, is the concept of the 'unknown' student. It is undeniably challenging to develop software for such a heterogeneous group so the better approach is to consider the needs of *all* potential students in terms of how their learning can best be supported, whatever their background.

Understanding the student

Distance education students are diverse in terms of age, gender and previous experience(Howell et al., 2003). Furthermore, many are in full-time employment and may have various responsibilities related to child or aged parent care roles which compete for their time. However, they tend to be more

1 moodle.org
2 www.saba.com
3 www.teamscape.com
4 www.solstra.com

motivated than full time students (Knowles, 1980). Some researchers have found that distance education students tend to be more, or as, successful as full-time students (Cavanaugh, 2001; Hogan, 1997; Wegner *et al.*) but others have found distance education students to have performed more poorly (Deka & McMurry, 2006).

LMSs are one of the ways that distance education institutions attempt to maximise their students' possibilities of succeeding in what are often difficult circumstances. Shneiderman(2000) contends that universal usability will be met when affordable, useful and usable technology accommodates the vast majority of the global population by addressing challenges of technological variety, user diversity, and gaps in user knowledge. In order to address this challenge we need to come up with a better way of understanding the challenges faced, uniquely, by the distance education student. The specific barriers to distance education learning include (Galusha,1997):

- their own insecurities about learning,
- cost,
- time constraints,
- learning style mismatches,
- fear of failure,
- lack of contact with the lecturer,
- lack of support such as tutors,
- lack of technical assistance,
- feelings of isolation,
- lack of social interaction with other students, and
- lack of technical training.

It is clear that some of these are related to the student him or herself and others are related to institutional or environmental aspects. We need to isolate those aspects which an LMS can accommodate and include those in our student profile – other factors have less to do with learning and can be addressed by the institution. For example, Carswell *et al.*(2000)) strongly advise that distance education institutions offer round-the-clock technical support because of the inevitable technical problems that will occur. The extent to which we are able to anticipate and satisfy students' needs will surely impact on the acceptance or rejection of the LMS by the student body. We will now consider some pertinent aspects.

Distance education students, at the most basic level, can be described in terms of their age, gender, work experience, previous educational experience, whether or not they are in full time employment, their technical expertise, and their special needs and disabilities. The following sections give more detail about particular aspects we have included in our model.

Personality

The student's locus of control is an important predictor of success. Those with an internal locus of control are more likely to succeed (Parker, 1999). The student's learning style may well also impact on his or her success. Terrell and Dringus (2000) found that whereas learning style did not impact on performance, it was likely to make students drop out if their learning style did not match that of the online system. This is confirmed by Lu, Yu and Liu (2003) and DeTure (2004).

Another important aspect is self belief (Dweck, 2000). A student without self-belief is likely to impose limitations on his her own performance expectations. This is often referred to as *self-efficacy* and has a definite impact on performance (Bandura, 1986). Miltaidou and Savenye (2003) argue for institutions to make use of various channels to increase students' self-efficacy appraisal. One of the channels is called "vicarious experience" and the development of a social aspect for distance education students is bound to assist students in this respect.

The student experience

The one big difference between distance and full-time education is that the distance education student does not experience one of the most highly rated aspects of University education, the social aspect of student life (Yorke, 2004). When students have a deadline they work together and the sense of camaraderie is something that sustains them. The distance education student has none of this, and must manage on his or her own unless the institution recognises this and takes steps to facilitate social interaction between students. Tello (2002) found that the use of online discussion forums contributed to course persistence rates.

One of the most important aspects of a LMS, therefore, could well be to bring the student into contact with other students doing the same courses. Alstete and Beutell (2004) found that, of a number of different performance indicators, discussion board grades were significantly related to better performance. Lammintakanen and Rissanen (2005) identified peer support as a success factor in online education. Shin (2003) also found that the distance learner's sense of the presence of peers has a direct impact on their likelihood of persisting with their learning. Yorke (2004) also found that the student's sense of belonging would encourage them to persist in their studies. Rovai (2002) reported that students who had a strong sense of community felt less isolated.

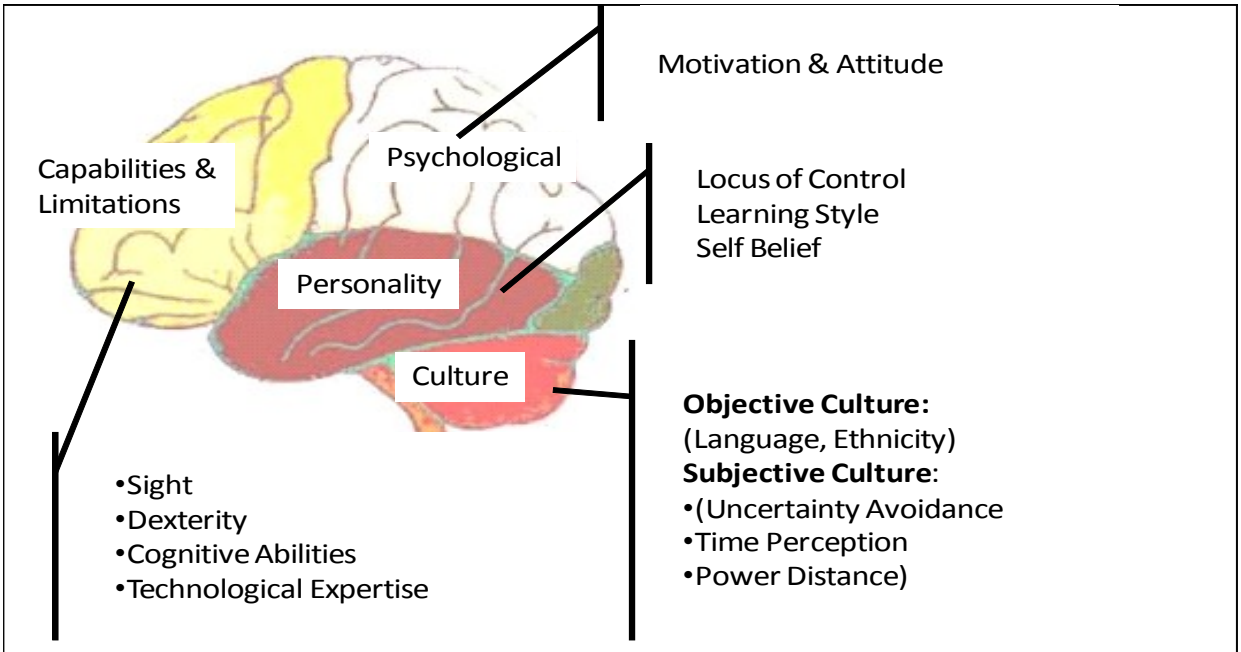

Figure 1: Student attributes mapped to the brain

However, facilitating the development of a supportive student community is by no means a simple task. People are reluctant to divulge their personal details due to fear of being stalked or otherwise targeted. Hence the LMS needs to find a way to allow students to benefit from closer links with other students while still preserving their own privacy and retaining control over their levels of disclosure. Much work has been done on student profiles (Romiszowski, 2004). The model depicted in Figure 1 presents the physical, psychological and cultural components as the main student attributes to be considered. Personality is attributed to an individual and is both learned and inherited while culture is specific to a group of people and is learned, not inherited Hoft (1996).

The following section further clarifies the cultural aspect, thus far not considered in other adoption studies.

Culture

The word *culture* originally stems from an agricultural root: "culture as cultivation of the soil and plants" (O'Sullivan *et al.*, 1994). Applying this to people offers a metaphor for the cultivation of products, minds and social relations. Del Gado (1996) defines culture as learned behaviour consisting of thoughts, feelings and actions, while Hall (1990) articulate culture as communication through words, material things and behaviour. Hofstede (1995) conceptualizes culture as 'programming of the mind' and focuses on determining the patterns of thinking, feeling and acting that form a culture's mental programming and this is the definition we will use in this study.

When considering designing for culture we have to distinguish between objective and subjective culture (Hoft, 1996; Limaye & Victor, 1995). Objective culture is related to social and material institutions and artefacts, manifesting in concrete things that are visible, tangible and easy to examine: for example language, date and time formats, currency, colour preferences, infrastructure and technology. Subjective culture is related to the psychological and sociological features manifesting in people's assumptions, beliefs, values, attitudes, and patterns of thinking (Ford, 2005). Hofstede (1995) did a survey at IBM that dealt with 'the employee's personal values related to the work situation' and investigated cultural variations within five different dimensions. Each of these dimensions (or 'international variables' as coined by Hoft (1996) is a dichotomy, in that there are two opposing sides: (Hofstede, 1995):

- Power distance, denoting the extent to which less powerful members expect and accept unequal power distribution within a culture, and scaling from high-power-distant to low-power-distant.
- Masculinity vs. femininity, referring to gender roles, not physical characteristics, as commonly characterized by the levels of assertiveness or tenderness in the user, and scaling from masculine to feminine.
- Individualism vs. collectivism, referring to the role of the individual and the group, and is characterized by the level of ties between an individual in a society, and scaling from individualistic to collectivistic.
- Uncertainty avoidance, referring to the way in which people cope with uncertainty and risk, and scaling from high-uncertainty-avoidant to low-uncertainty-avoidant.
- Time orientation, referring to people's concerns with the past, present and future and the importance they attach to each, and scaling from short-term orientation to long-term orientation.

These dimensions correspond with dimensions identified in the other models of culture mentioned above. Hall (1990), however, identified time perspective in terms of polychronic time (doing many things at the same time) and monochronic time (concentrating on one thing at a time), adding a further time dimension compared to time-orientation as identified by Hofstede. Baumgartner (2003)researched the importance of cultural dimensions in the field of user-interface design and confirmed the importance of *uncertainty avoidance*, *time perception* and *power distance*. Despite the criticism for oversimplification, Hofstede's cultural dimensions are still being used as the basis for many studies in subjective culture, for example the recent study on the impact of cultural context on web design for e-government in Southern Africa (van Greunen & Yeratziotis, 2008).

Current student models comprise the physical (age, gender, etc) and the psychological (motivation, attitude etc) aspects and, in some cases, objective culture, but they do not make explicit allowances for the influence of *subjective* culture (van Biljon & Kotzé, 2008) . Culture comprises the objective (nationality, language) *and* the subjective (uncertainty avoidance, individualism/collectivism, time orientation etc). Another culture related development to consider is the emergence of the Homo Zappiens (Veen, 2008), also known as the Net-generation (Oblinger, 2004). Veen coined the term *Homo Zappiens* to refer to the generation growing up with modern communication technologies shaping their behaviour and views on the world. *Zapping* is the skill of constructing meaningful knowledge from disjointed audio-visual and textual information flows. The prominent characteristics of Homo Zappiens include their preference for images and symbols as an enrichment of plain text, their seemingly effortless adoption of technology and their cooperation and sharing in networks (Veen & van Staalduinen, 2009). They adopt technology up to the conversion phase where they use technology for their purposes other than the original purpose. Their learning patterns and expectations are different: networking is central to their learning style and they take responsibility for independent exploration and mastering of technology. The following values regarding ICT usage have been associated with Homo Zappiens (Veen, 2007) : expression of self, personalisation, winning by sharing, peers as reference, power to the user, non-linear learning behaviour.

Arguably, people need exposure to technology to become Homo Zappiens and users from developing communities are less exposed to technology than their counterparts in the developed world. However, given the uptake of mobile technology in the developing world (Van Biljon, 2006) there is reason to believe the potential for technology adoption is present in Africa. Furthermore, the tide of globalisation will certainly strengthen the influence of the Net-generation. The next section reviews technology adoption where the student characteristics become one of the factors to be considered.

TECHNOLOGY ADOPTION PROCESSES

Here we present an overview of technology acceptance models before considering technology acceptance models tailored specially to LMSs. It is important to make a distinction between technology *adoption* and *acceptance*. Technology adoption is a process – starting with the user becoming aware of the technology, and ending with the user embracing the technology and making full use of it, but it could equally end with rejection. Acceptance, as opposed to adoption, is an *attitude* towards a technology, and it is influenced by various factors. A user who has purchased a new technology item has not yet adopted it – acceptance plays an important role in leading to adoption.

The field of Information Systems (IS), proposes a number of technology *acceptance* models which focus, at a micro-level, on factors influencing *acceptance* (without considering the process towards full adoption) (Van Biljon, 2006). Sociological studies prefer a macro-level approach, contemplating the purchasing decision as part of a process - incorporating the user's acceptance or rejection and use of technology i.e. the *adoption process* (Haddon, 2003).There are two primary technology adoption process models: Rogers' innovation diffusion model (Rogers, 2003) and the domestication approach (Silverstone & Haddon, 1996).

Rogers' innovation diffusion model focuses on marketing and sales processes proposing various levels of progression from not having used the technology to full adoption. Rogers (2003) proposes the following five stage process of product adoption: the knowledge phase where the person gets to know about the product; the persuasion phase where he or she becomes persuaded of a need for the product; the decision phase which leads to a purchase; the implementation phase where the item is used and the confirmation phase where the individual seeks to confirm that he or she made the right decision in purchasing the product. This process is unlikely to end at the desired conclusion, confirmation, if the use does not accept the product, and acceptance is influenced by a number of factors, as explained next.

TECHNOLOGY ACCEPTANCE MODELS

The seminal Technology Acceptance Model (TAM) was presented by Davis (Davis, 1989) to model technology acceptance within organisations (Ling, 2001). The Technology Acceptance Model (TAM) proposes a number of factors that are essential in determining user attitude towards accepting a new technology, (Davis, 1989; Malhotra & Galletta, 1999). TAM incorporates six distinct factors (Davis, 1989; Pedersen, 2005):

- *External variables* (EV), such as demographic variables, influence perceived usefulness (PU) and perceived ease of use (PEU).
- *Perceived usefulness* (PU) is defined as 'the extent to which a person believes that using the system will enhance his or her job performance' (Venkatesh et al., 2003).
- *Perceived ease of use* (PEU) is 'the extent to which a person believes that using the system will be free of effort' (Venkatesh et al., 2003) .
- *Attitudes towards use* (A) is defined as 'the user's desirability of his or her using the system'(Malhotra & Galletta, 1999). Perceived usefulness (PU) and perceived ease of use (PEU) are the sole determinants of attitude towards the technology system.
- *Behavioural intention* (BI) is predicted by attitude towards use (A) combined with perceived usefulness (PU)
- *Actual use* (AU) is predicted by behavioural intention (BI).

Venkatesh et al. (2003) extended TAM and developed the Unified Theory of Acceptance and Use of Technology (UTAUT) through a review and consolidation of the constructs of the following models (theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, a combined theory of planned behaviour/technology acceptance model, model of PC utilization, innovation diffusion theory and social cognitive theory, which attempts to explain user intentions to use an information system and subsequent usage behaviour. An important contribution of UTAUT is to distinguish between factors *determining* use behaviour namely the constructs of performance expectancy, effort expectancy, social influence and facilitating conditions and then

factors *mediating* the impact of these constructs. The mediating factors are gender, age, experience, and voluntariness (i.e. the degree to which use of the innovation is perceived as being of free will). Both TAM and UTAUT can be applied to any technology type and both focus on technology adoption in organisations.

Drawing on both TAM and UTAUT, (van Biljon & Kotzé, 2008) proposed a model for personal mobile phone adoption and use. This model, depicted in Figure 2 included the demographic, socio-economic and personal students' factors as mediating factors.

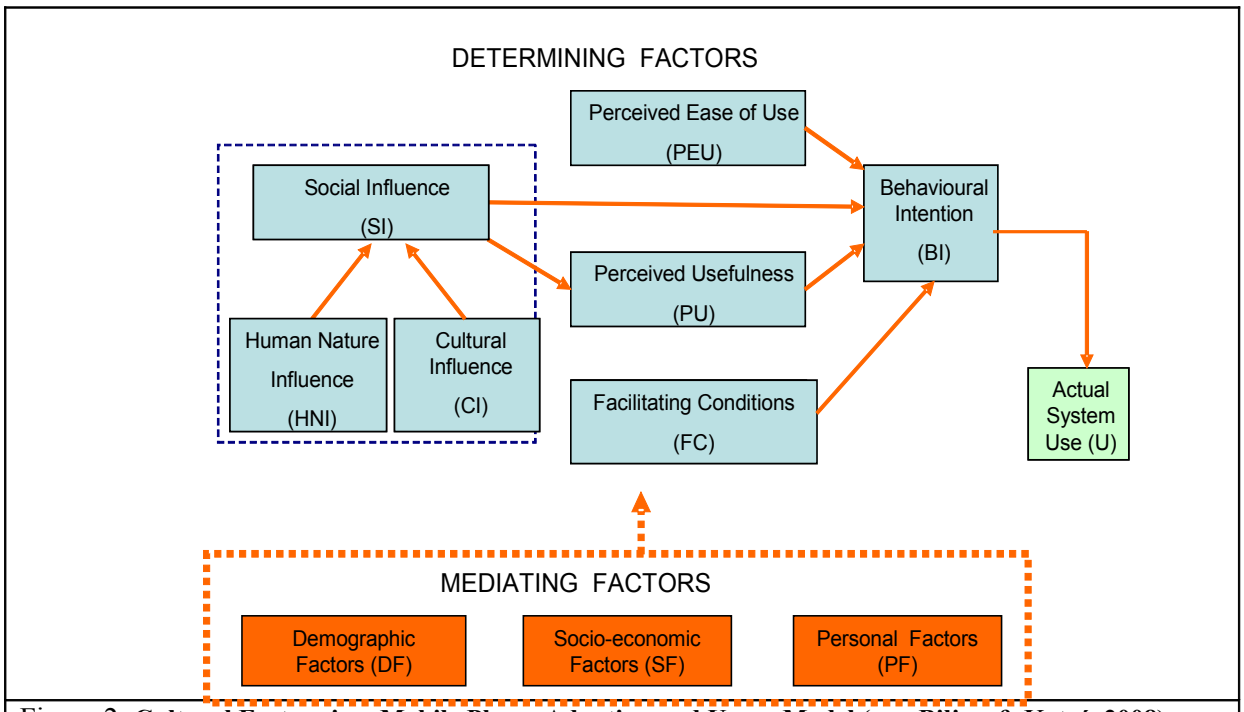

Figure 2: **Cultural Factors in a Mobile Phone Adoption and Usage Model (van Biljon & Kotzé, 2008)**

This model with South African students from residential universities as participation base, includes culture as a component that could influence technology adoption. This raises the question of whether culture would also play a significant role in the open distance learning environment.
Several technology adoption models for E-learning have been proposed. Drawing on the models by Hussein (Hussein *et al.*, 2007), Nanyakkara (2005) and Chen (2007), Table 1 provides an overview of the most common factors identified in these studies and the relations between the factors.

Table 1 provides an overview of the technology acceptance models proposed for Learning Management Systems

Determining factor	Characteristic(s)	Related to	
Personal	Perceived enjoyment	PU	Chen&Chen (2007)
Personal	Self efficacy	PEU	Chen&Chen (2007)
Infrastructure	Cost, accessibiility	PU, PEU	Nanyakkara (2005)
Instructional design	Design metaphors	PEU	Nanyakkara (2005)
Organisation	Policies, cost	PU	Nanyakkara (2005)
Lecturer	Attitude	PEU	Hussein (2007)

The student's individual characteristics are accounted for by Nanyakkara (2005). Hussein mentions only self-efficacy while Chen includes self-efficacy and perceived enjoyment. This minimal representation of individual characteristics is typical of organisational technology adoption models but the adoption of an LMS is more personal and it is clear that the students' characteristics should be included as a determinant. A usability study, carried out on the LMS of an open distance learning South African university, found that many students avoided criticising the usability of the LMS although they were observed having difficulties using it (van Biljon & Pretorius, 2009). The explanation proposed is that the power distance relationship, a dimension of subjective culture, prohibited them from criticising the LMS. This is supported by De Angeli et.al.(2006) who found that users make different judgements about the interfaces for scenarios of serious educational use. The context, a South African multi-cultural open-distance learning university, has many participants who come from African cultures where less powerful members expect and accept unequal power distribution (Blunt, 1997). Therefore the inclusion of subjective culture needs to be investigated.

LEARNING FROM FAILED TECHNOLOGIES

According to Veen (2007) education systems are influenced by interdependent socio-cultural changes, technological changes and economical changes that occur in parallel over time. The ideal scenario would be that developing countries learn from the experiences of developed countries and, in so doing, avoid the pitfalls. Some examples of technologies that have evidenced a phoenix-like life form are game controllers and object oriented databases. In 1998 Microsoft released the Sidewinder Freestyle Pro game controller. Unfortunately it had to be connected to a PC and the usage paradigm was much the same as that of a keyboard. They did not sell many of these and eventually abandoned them. In 2007 Nintendo produced a game console with a controller which communicated wirelessly with the console, could be held easily in the hand, and could be used as easily as one used a tennis racquet. This meant the interaction was more natural and the fact that Nintendo sold millions confirms the overwhelming uptake of this erstwhile failed game controller technology.

When Object oriented databases were launched in the 1990s, on the back of the hugely successful object-oriented programming languages, they were a spectacular failure. Various reasons have been suggested: difficulty querying and reporting the data, difficulty ensuring ACID properties of transactions, lack of scalability and robustness. Another primary reason is that the tabular model of relational databases was understandable and familiar and users simply did not want to invest the considerable time and effort required to convert to the less intuitive object oriented databases. The protagonists changed tack, adding object capabilities to relational databases, and these are very useful for particular applications such as navigational and geographical databases.

These examples show that it is essential to consider the needs of the users when releasing a technology. Traditional learning has been done with a paper and pen, assisted by books and lectures. It is possible that technology can simply not replace or augment the old ways of doing things, and LMSs are doomed to failure. On the other hand, it is possible that we can meet the needs of our students well enough that they will adopt and accept LMSs and that these will assist their learning. To this end we carried out a survey of a number of distance education students to gain an understanding of their needs.

SURVEY DESIGN AND EXECUTION

The survey was advertised by means of an email sent to all students registered for a particular course at a distance education University. The university uses a LMS running on an open-source Sakai platform. Participation was optional and anonymous. The survey comprised 14 questions that captured demographic details as well as eliciting opinions and attitudes related to the use of LMSs.

RESULTS AND CONCLUSION

The questionnaire contained three sections: the first section contained autobiographical questions, the second contained questions on factors that influence the adoption of learning managements systems and the third contained questions on cultural dimensions. The online questionnaire was sent to a group of third level database students. We received 75 responses (out of 641 students registered for the course), five of the questionnaires were discarded due to missing information so that the analysis is based on 70 responses. The profile included 50 male and 20 females. The age range was as follows:

- 20-29 : 34 students (49 %)
- 30-39 : 26 students (37 %)
- 40-49 : 9 students (13 %)
- 50-59 : 1 student (1 %)

On the question of computer usage, 6 % rated themselves as relatively confident computer users, 16% rated themselves as confident while the rest (78 %) rated themselves as experts. The respondents work experience was more evenly distributed as follows:

- Less that 3 years: 13 students (19%)
- 3-6 years of work experience: 14 students (20%)
- 6-10 years of work experience: 19 students (27%)
- More than 10 years: 24 students (34%)
-

Towards capturing the importance of technology adoption factors, the importance of Ease of use (EOU), Usefulness, Social influence and Web connectedness was captured, as depicted in Table 2. It follows 90% or more, of the respondents found *usefulness* and *ease of use* important to very important. Social connectedness (whether other students were using it) was found important to very important by 44.2 % of the respondents.

Table 2: Importance attributed to factors that influence adoption

	FACTORS					
	Usefulness		Ease of use		Social connectedness	
RANGE	Frequency	%	Frequency	%	Frequency	%
Completely unimportant	1	1.4	2	2.9	13	18.6
Unimportant	1	1.4	2	2.9	12	17.1
Undecided	3	4.3	3	4.3	14	20.0
Important	25	35.7	31	44.3	26	37.1

Table 2: Importance attributed to factors that influence adoption						
	FACTORS					
Very important	39	55.7	32	45.7	5	7.1
Total	69	98.6	70	100	70	100
Missing values	1	1.4	0	0	0	0

In Table 3 the Pearson correlation between some of the responses captured are depicted. The responses all refer to the importance of the feature in a LMS. From inspection it can be said that *age* is negatively correlated to the importance of social networking as facilitated by F*acebook*. Ease of use has a highly significant positive correlation with usefulness and a significant positive correlation with social connectedness (whether other students use it) and web connectedness in a LMS. Usefulness has a highly significant positive correlation with web connectedness and social networking as facilitated by F*acebook.*. Finally, social connectedness has a highly significant positive correlation with Web.

Table 3: Pearson correlations

		AGE	EOU	Usefulness	Social	Web	Facebook
AGE (N=70)	Pearson Correlation	1.000					
	Sig. (2-tailed)						
EOU (N=70)	Pearson Correlation	-.059	1.000				
	Sig. (2-tailed)	.629					
Usefulness (N=69)	Pearson Correlation	-.141	.616**	1.000			
	Sig. (2-tailed)	.248	.000				
Social (N=70)	Pearson Correlation	.051	.237*	.147	1.000		
	Sig. (2-tailed)	.676	.049	.227			
Web (N=70)	Pearson Correlation	-.135	.275*	.494**	.322**	1.000	
	Sig. (2-tailed)	.264	.021	.000	.007		
Facebook (N=69)	Pearson Correlation	-.243*	.166	.067	.392**	.094	1.000
	Sig. (2-tailed)	.044	.172	.585	.001	.444	

The Cronbach's coefficient alpha (degree of reliability) for the three questionaire items on *power distance* was 0.52. A Cronbach's Alpha value of above 0.7 is acceptable for social science research (Hair *et al.*, 1998) , hence the measure of 0.52 indicates problems with internal consistency of the questionnaire items on power distance. Therefore it was not possible to do any further analysis on the influence of the cultural dimension, *power distance* on technology acceptance.

Discussion

The demographic details have a bias towards younger males. Most students regarded themselves as computer experts, as can be expected for this group of third year database systems students. The work experience was more evenly distributed with most students having more than 3 years of work experience. The analysis of preferences on ease of use, usefulness and social influence confirmed the findings of LMS-based research in developed countries. These are clearly important determinants in technology adoption. The high positive correlations between social connectedness, web connectedness and social networking sites was not surprising but what was interesting is the major importance placed on these activities that relate to the characteristics of the Net-generations that constitutes a culture of its own. Despite the fact that our study makes no contribution to supporting the existence of dimensions of subjective culture we have to acknowledge that South Africa is a country of cultural diversity, as measured by Hofstede's dimensions (van Greunen & Yeratziotis, 2008). Culture, especially ethnic culture, has been a controversial issue in South African education where the legacy of apartheid still casts a shadow. The issue of culture is often side-stepped in order to avoid the controversy of cultural differences but it cannot be assumed there are no meaningful cultural differences that can influence learning management. More research is needed to understand how subjective culture affects the adoption of e-learning and LMSs in developing countries.

The generalisability of the study is limited by the small percentage of students that responded and the argument can be made that there may be a link between the respondents and technological advancement since the notification of the web survey was sent out by email only. However, given the phenomenon of globalization, the dramatic proliferation of Internet-based technology and the rapid adoption of mobile phones in the past decade it seems unlikely that technology adoption will decrease. Therefore the group that responded could be representative of future distance education students. Veen (2008) cautions that new educational systems should be designed by thinking ahead rather than backwards into the past, so it may be essential to consider the advanced technological skills of the students in designing educational systems.
Figure 3 depicts a summary of the findings on the attributes of students and learning managements systems that influence the adoption of learning management systems. Net-adaptivity is a proposed new attribute, added as a result on the findings of this study on the influence of the Net-generation. Net-adaptivity refers to functionality that allows for personalisation, expression of the self, connecting with peers and learning through sharing ideas. Future research will focus on investigating and verifying these factors (through alternative data gathering methods) towards presenting a model of the factors that influence the adoption and use of distance learning in developing countries.

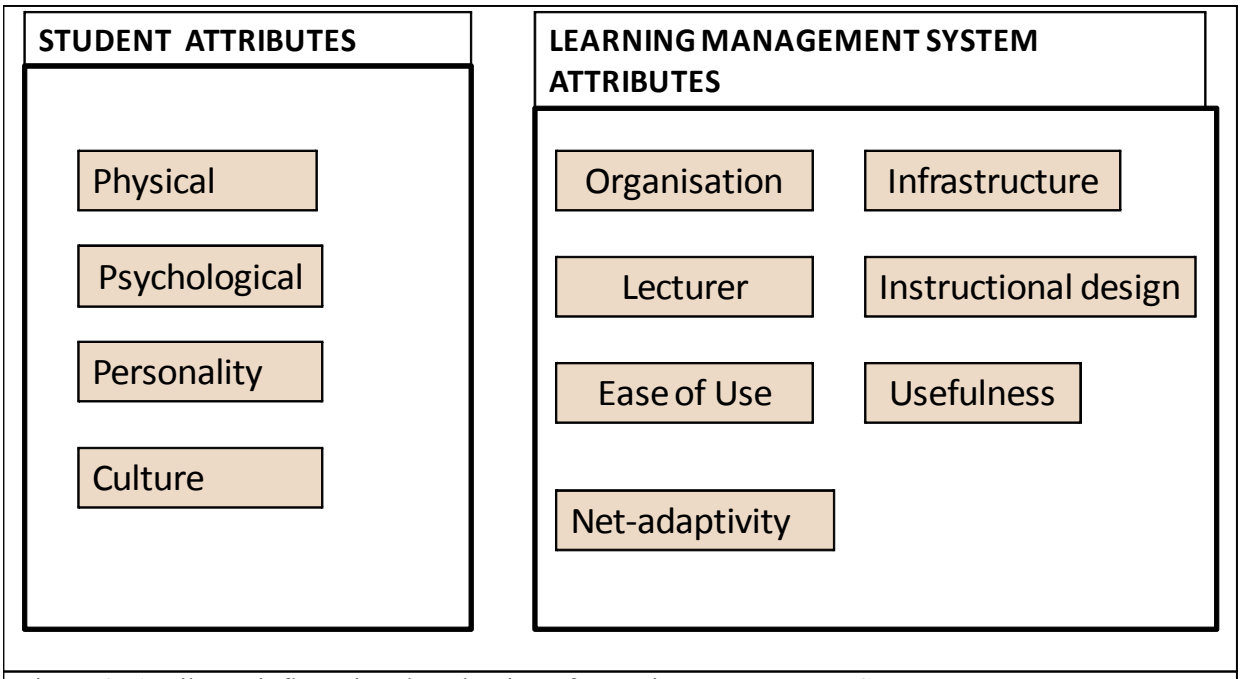

Figure 3: Attributes influencing the adoption of Learning Management Systems

CONCLUSION

This paper investigated the adoption of ICT supported education by focusing on the problems, needs and expectations of distance education students. We then did a survey to find out if the determinants identified in developed countries apply to the context of a distance education university in South Africa. According to our findings ease of use, usefulness and social factors are also important in the South African context. Furthermore our findings show that the respondents do indeed exhibit characteristics of the Net-generation, i.e. focus on personalisation, sharing information, social connectedness and ease with technology.

The dilemma remains that the goals of designing and planning for open access in distance education is contradictory to profiling. Considering the emerging trends relating to technology adoption the solution may well lie in tapping into the characteristics of the Net-generation - students with a large capacity for adoption and conversion of technology to suit their needs. This means that LMSs should provide the basic facilities but that the customisation and conversion of the technology should be left to students rather than trying to predict what they would want on subjective levels. Acknowledging the Net-generation by designing for their needs and tapping into their strengths could be the key to leapfrogging over the hurdles of Distributed Learning Management Systems' acceptance and eventually adoption, i.e. allow the Phoenix to stay in flight.

REFERENCES