

Assessing How E-learning Implementation has Enhanced the Lecturers' Teaching Practices at a South African University

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ABSTRACT This paper reports on findings of a study carried out at a university in South Africa. The purpose of this study was to investigate how the lecturers' teaching practices improved as a result of e-learning implementation at the university in question. The main problem was that the university had invested so many resources on e-learning implementation and so it was worthwhile investigating the returns on investment. The study followed a case study design that utilized a combination of both quantitative and qualitative approaches. A semi-structured questionnaire was used to collect data from a purposive sample of lecturers who made use of e-learning in their courses. The results suggested that the integration of information and communication technology (ICT) and specifically the Blackboard learning management system, into learning and teaching, had enhanced the lecturers' teaching practices. The study further found that through e-learning, lecturers could upload online materials, communicate with their students and administer/mark online assessments, to mention a few. The students had the opportunity to interact with the online materials, communicate among themselves and with the lecturer, and construct and retain knowledge. Recommendations, limitations of the present study and suggestions for future research were made.

INTRODUCTION

Information and communication technology (ICT) has the potential of enhancing teaching and learning activities in higher education. ICTs have been widely used for these activities with the impression that they can enhance innovative ways of teaching and learning. Numerous studies demonstrate the potential positive impact of ICTs in teaching and learning. For instance, a study conducted in Australia on the impact of ICTs on teaching and learning confirms that ICTs enhance investigating reality and building knowledge, active learning and authentic assessment; engage students by motivation and challenge; provide tools to increase student productivity; provide scaffolding to support higher level thinking; increase learner independence, collaborative and cooperative learning; allow tailoring of learning to the learner; and overcome physical disabilities (Newhouse 2002). Another study conducted in the UK to assess the impact of ICTs on teaching practices indicated that the tutors used ICTs for communication with their students, distributing tutorial handouts, creating and storing student records, responding to student queries and giving feedback on individual and group assignments (Kirkup and Kirkwood 2005). A study conducted at a higher education institution (HEI) in South Africa indicated that ICTs

enhanced the development of mathematical and academic literacy skills among students, enabled the lecturers to manage big diverse classes and influenced the curriculum design of a Film and Media course where, for instance, students of this course were allowed the opportunity to make use of simulations which were difficult to provide in a face-to-face environment (Jaffer et al. 2007). At the Cape Peninsula University of Technology (CPUT) where Blackboard LMS is used, lecturers expressed the fact that the LMS helped them to practise a student-centred approach to teaching, and allowed them the opportunity to control large classes, improve transparency to students, try and keep students interested in the subject, and students could also engage with schoolwork outside the classroom (Ivala 2009). In as much as HEIs have been striving to have state-of-the-art technology infrastructure to support teaching and learning, research indicates that the impact of ICT has not produced the radical change in teaching and learning as was anticipated (Zemsky and Massy 2004; Kirkup and Kirkwood 2005; Blin and Munro 2007; Selwyn 2007).

The study was carried out in a developmental university in South Africa that commits itself to providing technological learner-centred education, innovative teaching and learning, and opportunities for life-long learning. To respond to her vision, the university in question has in-

troduced the use of e-learning to supplement face-to-face instruction (blended learning). In actual fact, South African HEIs are pressurized by the e-Education policy to integrate ICTs into teaching and learning. Prior 2008, few departments at the university in question made use of learning management systems (LMSs) such as WebCT and Moodle for managing the students' learning material, assessment and recording of marks. In 2009, Blackboard was adopted to replace these LMSs.

The problem identified at the university in question is that the university has invested so many resources on e-learning implementation. The purpose of this study is to investigate how the lecturers' teaching practices have improved as a result of the e-learning implementation. It was envisaged that integration of ICT into teaching practices would have the potential of allowing students the opportunity to interact with the online materials, communicate among themselves and with the lecturer, and attempt self-tests/quizzes. This would in turn enhance the university students' learning. Following is the theoretical framework, methodology, results, discussion, conclusion, limitations, recommendations and suggestions for further research.

THEORETICAL FRAMEWORK

Now that the university in question has invested in e-learning resources to try to support the smooth running of e-learning implementation, it is important to investigate whether and how the lecturers' teaching has been enhanced by ICTs. It is without doubt that lecturers adopt e-learning at different paces and make use of various ICT tools. General technology acceptance models (TAMs) suggest that the perceived usefulness of a technological innovation is linked to its ease of use (Petko 2012). This author argues that there are a variety of other factors such as gender, age, experience, the perception of social desirability of the use of an innovation, and a good fit with existing conditions that may influence the use of technological innovations (Petko 2012). Venkatesh (2000) extended the TAM to include the determinants of the perceived ease of use, such as control, intrinsic motivation and emotion, which according to three longitudinal studies, the model explained up to 60% variance in perceived ease of use (p. 357). Govindasamy (2002) outlined

seven e-learning quality benchmarks that could improve instructional technology. These are: institutional support, course development, teaching and learning, course structure, student support, faculty support, evaluation and assessment. Selim's (2005) e-learning critical success factors (CSFs) that enhance e-learning acceptance and success measures were categorised into factors relating to instructor (attitude towards and control of the technology, and teaching style), student (computer competency, interactive collaboration, e-learning course content and design), information technology (ease of access and infrastructure) and university support. An access, competence and motivation model was proposed by Viherä and Nurmela (2001). This model was used by Korte and Hüsing (2006) as an analytical framework for the use of e-learning in European schools. This study reflected positive development in the teachers' use of technology in the classroom, different levels of competence and skills among teachers and increasing ICT user experience. Another model that has been used specifically for teachers is the will, skill and tool model (Petko 2012). This model can explain 90% of the variance in the level of ICT integration in the classroom (Petko 2012). According to this author, it is difficult to determine successful ICT integration at the early stages of ICT adoption hence simpler and less inferential measurements of quality and quantity of ICT use in the classroom, such as the will, skill and tool model, could be used. The same applies to the university in question; it is also at the early stages of e-learning implementation. It is in the light of this, that this study has used this model. The lecturers' ICT access patterns, ICT competence and beliefs have been investigated in order to determine how these have influenced the use of ICTs to enhance the lecturers' teaching practices.

Lecturers' Access and the Will to Use ICT

The above literature informs us that technology integration can improve and develop quality education. Integrating technology into teaching and learning may be influenced by the lecturers' beliefs. *A belief is a subjective element of knowledge that an individual considers true and important in relation to a specific issue* (Petko 2012). The lecturers' beliefs may influence their behaviour. Petko (2012) asserts that

we need to distinguish between the lecturers' ICT-specific beliefs and ICT non-specific beliefs. The ICT-specific beliefs could be positive or negative (Petko 2012) and these sets of beliefs influence lecturers to use or not to use technology. The ICT-specific beliefs need to be viewed in relation to teaching and learning. Ertmer (2005) termed such beliefs about teaching and learning, 'pedagogical beliefs'. *Another factor that has a positive contribution to the use of ICT in teaching and learning is the training of lecturers in the use of ICT* (García-Valcárcel and Tejedor 2009). The lecturers' attitudes toward ICT may also be a significant factor in the implementation of e-learning (Usun 2009). *Knowledge construction teaching and learning (student-centred) approach, teachers' opinion about computer-assisted learning, teachers' opinion about web-based activities, ease of use (perceived difficulty), teachers' previous e-learning environment experience also explain the teachers' actual use of e-learning environments* (Mahdizadeh et al. 2008). On the other hand, there are a number of factors that have a detrimental effect to technology integration. Ertmer (1999) also emphasises that there are factors that hinder technology integration. The author categorises these factors into the 'first-order barriers' such as lack of: access to computers and software, training of lecturers on e-learning, and adequate technological and administrative support; and 'second-order barriers' such as lecturers' beliefs about teaching, beliefs about computers, established classroom practices and resistance to change.

Lecturers' ICT Competence

As for all educational activities, including technology integration, the lecturer is the key role player in planning and developing effective e-learning courses. The lecturer plays an important role in the information society such as helping students find appropriate instructional paths, guiding students' independent learning, helping students to evaluate their own progress and placing high emphasis on communication skills (Pelgrum 2001). At the same time, they need to have the ability to build ICT scaffolding for student learning, and to promote social interaction and development, while maintaining teaching presence in an online environment (Pelgrum 2001). In embracing ICT, lec-

turers have undertaken new roles and adopted a range of new skills and new work practices (such as working in teams to develop learning resources) which are not found in traditional academic work (Pelgrum 2001). The lecturers' competence in these ICT skills enhances the students' learning. The students of the knowledge society are active learners who learn on and off-campus, are engaged in teamwork, ask questions, find answers to questions and always have high interest on subject matter (Pelgrum 2001).

Implementation of the E-learning Strategy at the University in Question

The university in question has piloted e-learning through the Nuffic project, in the Faculty of Science, Engineering and Technology (School of Engineering and School of Computing), and the Centre for Learning and Teaching Development (CLTD) since early 2009. In the second semester of 2009, the other three faculty staff were trained and supported on e-learning as well. The target is as follows:

- Each year there will be 20 lecturers rewarded for their best e-learning practices at the grassroots events
- By 2012, 25% of the lecturers use Blackboard as a learning management tool
- By 2012, 100% of the lecturers put their course outlines on Blackboard
- By 2012, all first year students are introduced to e-learning techniques
- By 2012, 25% of classrooms to have data projectors and also smartboards in all e-learning centres

The four focus areas being:

- Setting up and maintaining the electronic learning environment;
- Promoting awareness of the University stakeholders about the electronic learning environment and possibilities this offers them;
- Capacitating academic staff on e-learning; and
- Ensuring student participation in e-learning

The roll-out plan (3 year plan) for e-learning implementation includes:

- Developing an e-learning strategy
- Establishing a functional e-learning platform and maintaining it
- Promoting awareness of the value of e-learning among lecturers and students

- Training lecturers in computer literacy (those who are not comfortable with their computer skills) and facilitating ICDL accreditation of lecturers
- Identifying the departments who will pilot e-learning implementation
- Identifying and equipping e-learning centres
- Equipping lecture rooms with presentation tools
- Capacitating staff on e-learning, and supporting them in designing and using e-learning courses
- Evaluating the e-learning courses for quality and e-pedagogy (but initially, lecturers are allowed to put whatever material they want onto their courses)
- Evaluating the effectiveness of e-learning (by means of e-learning conference/grass root events)
- Conducting research on the effectiveness of e-learning
- Maximising students' participation in e-learning to enhance learning
- Integrating the learning portal with the support systems

Current successes identified so far regarding the four focus areas of the e-learning strategy are:

- **Setting up and Maintaining the Electronic Learning Environment**
 - 411 desktop computers (in 10 computer labs) have been fitted and the purchasing of 128 computers is in progress
 - Three Staff development laboratories have been established and equipped; the 4th one is in progress, where staff are trained during staff development workshops and prepare online learning materials
 - In 2009, the University adopted Blackboard
- **Promoting Awareness**
 - The CLTD webpage was revamped in 2009 and ongoing updates take place
 - The stakeholders are continuously updated on CLTD developments by means of newsletters, CLTD activities advertised using brochures
 - Five grassroots events and three e-learning conferences have been held where trained lecturers showcased e-learning best practices, and international participants shared knowledge and experience, respectively

• **Capacitating Academic Staff on E-learning**

- Lecturers have been trained at Basic and Intermediate e-learning levels
- There is ongoing support for lecturers where they have mentoring sessions with the e-Learning Specialists

• **Ensuring Student Participation in E-learning**

- There were 328 active courses (in 2010) and 586 (in 2011) (where lecturers have uploaded content and students have interacted with the learning materials)

Table 1 illustrates the Blackboard tools that are frequently used by the lecturers for teaching.

Table 1: Blackboard frequently used tools

<i>WiSeUp tools</i>	<i>Use</i>
E-mail, blogs, journals, discussion forums Announcements	For communication among students and with lecturer To create and post important information for students
Assignment	To create assignments that students submit online and off-line
Assessment tools (built-in and Respondus)	To create online tests and quizzes that students attempt online and marks are automatically updated at the Grade centre
Survey	To create questionnaires for evaluation of teaching. Students attempt these at the end of the semester and Quality Assurance Officers analyse data on SPSS
Safe assign	Built-in tool used to check plagiarism

METHODOLOGY

The study followed a case study design that utilized a combination of both quantitative and qualitative approaches. "A case study is an empirical enquiry that investigates a contemporary phenomenon with its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident" (Yin 2003: 13). "A mixed method approach can simultaneously address a diverse range of confirmatory and exploratory questions, while a single-approach study often addresses one or the other" (Tashakkori and Teddlie 2010: 9). A semi-structured questionnaire was used to collect data from a purposive sample of 44 lecturers from the

Nuffic pilot department. These lecturers already made use of e-learning in their courses. Selecting this sample ensured reliability of the study. The questionnaire was piloted to determine whether it was understandable for the target group. A cover letter explaining the purpose of the research was distributed with the hard copies of the questionnaires to the lecturers.

Questions were designed to determine the respondents' self-reported access to ICT, technology integration techniques, factors influencing their use of technology and their perceived barriers to the use of technology. The questionnaire was composed of three sections, namely ICT infrastructure, integration of ICTs in learning and teaching, and ICT-specific beliefs and challenges of the e-learning initiative. In the section on ICT infrastructure (the tool), the lecturers were asked: if they had access to a computer on a regular basis, at work, did the computer have unlimited internet connectivity, how much time they spent on the internet per week, what problems they encountered when using a computer and internet at work, and what other kinds of ICT infrastructure the lecturers had access to at work.

The lecturers' competence in integrating ICT into teaching (the skill) was investigated by asking the lecturers: what activities they often carried out online, when they first got to know about e-learning, what level of e-learning capacity building workshops they had attended and what they started or stopped doing in their teaching practice as a result of the training, and how they integrated ICT into teaching. The will, skill and tool model advocates that lecturers use technology more when they have positive ICT-specific beliefs. Lecturers were expected to choose from a set of multiple responses provided, to express their ICT-specific beliefs (the will). They were also allowed to include other beliefs that were not in the list. To ensure validity, the instrument was reviewed by a research expert at the university in question.

Permission was sought from the Director of School of these departments to conduct research with these lecturers. Participation was voluntary in answering the questionnaires. Verbal informed consent was negotiated with the lecturers by means of telephonic calls. Lecturers were informed in the cover letter that their responses would remain anonymous and dealt with confidentially. Fifteen (34%) of the lectur-

ers responded. Quantitative data were analysed by use of the SPSS statistical software and presented in frequencies and percentage computation. Themes from the qualitative data were drawn and reported.

RESULTS

Access to ICT

It is important to find out if the lecturers have access to technology for their use. Their responses to the questions regarding access are illustrated in Table 2.

Table 2: Lecturers' access to ICT

<i>ICT infrastructure</i>	<i>Percentage</i>
Have access to a computer on a regular basis	73%
The computer has unlimited internet connectivity	100% – all of those with computers
Time spent on the internet per week	
Less than 7 hours	33%
Between 7 and 14 hours	17%
More than 14 hours but less than 21 hours	60%
More than 21 hours	0%
ICT infrastructure in the office or Department	
Printers	20%
Scanners	13%
Photocopier	80%
Fax and telephone	80%
Communications tools e.g video conferencing	0%
Activities often carried out online	
Check e-mail	100%
Search and download learning materials	80%
Engage in Blackboard	73%
Watch video, listen to music and send SMS	17%
Other – Searching for content to enhance my teaching	33%

Lecturers' ICT Competence

Of the respondents, 27% has undergone the basic e-learning training only and 73% has been trained at both basic and intermediate level. Some even indicated that they had learnt on their own and used e-learning even before the University initiative. The data indicated that as a result of the training, lecturers have uploaded materials, posted announcements, administered online tests, and checked for plagiarism using a built-in tool, Safe Assign. The data also indi-

cated that integration of ICTs into teaching and learning has resulted in improved pedagogical practices that are in turn envisaged to improve the students' pass rates, as some respondents have mentioned in Table 3.

Table 3: Lecturers' ICT integration competence

<i>E-learning has supported the lecturers' teaching in ways such as:</i>	
Promoting collaborative learning	53%
Improving access to rich information from various sources	47%
Allowing students to evaluate one another's responses	40%
Creating a platform for lecturers and students to communicate about the subject matter	60%
Creating the possibility for students to work on their own even when it is impossible to hold classes	60%
<i>E-learning improved the students' learning; it allowed students the opportunity to:</i>	
Interact with learning materials	67%
Construct knowledge more effectively	27%
Engage in group work	40%
Improve their retention of knowledge	33%
Improve their pass rates	13%

Lecturers were also asked what they would start or stop doing as a result of the skills gained in the training. The lecturers responded that they would post the assessment marks in the Grade Centre, allowing students to view their marks anytime instead of posting on departmental notice boards. They promised that they would initiate discussion forums for their students to discuss online and lecturers to monitor group work. They were also motivated to use online surveys for lecturer (without students fearing that they would be victimised by the lecturer), peer and self evaluation. The lecturers also responded that they would easily check for plagiarism in students' assignments using the built-in tool and that lecture material would be delivered easily to students rather than having to print hand-outs.

Lecturers' Beliefs

The lecturers' ICT-specific beliefs of using e-learning included: ease of use, flexibility, ability to work on ones' own courses at own pace and time (73%), and ease of communication and access to online material (60%). Some also said that ICTs could be used in the office and at home (53%), and that they offered cost effective measures for their departments (33%). One of the respondents also indicated that e-learning provided the ability to manage big classes.

The respondents also identified challenges such as the fear of reduction of face-to-face contact with students (13%), materials development was time consuming (53%), lack of IT and technical skills among staff (40%), lack of support from top management in terms of workload distribution (13%), the current state of computers in the offices was not good (20%), and technical problems and challenges in accessing online materials (60%). The latter was a result of internet instability at the university. The respondents also outlined some barriers that could lead to the resistance to change. These included: lack of training of lecturers; sometimes the training coincides with the teaching time, a shortage of computer laboratories that could provide students access to online materials, delayed creation and registration of courses and students on Blackboard, development of online materials was said to be time-consuming, lecturers may be lazy or not motivated to develop and use online materials, internet was unreliable and IT infrastructure was not good.

DISCUSSION

This case study confirms that the use of e-learning has a positive impact on the teaching practices even though the users adopt the technology at different paces and use different tools. This indicates that e-learning environments and communities can provide unique opportunities to use technology to enhance, and not replace, teaching (Parchoma and Dykes 2008). The data indicates that 73% of the respondents accessed a computer on a regular basis and that all of these computers had internet connectivity. This frequency of computer access encouraged lecturers to spend more time on the internet, for instance 60% of them spent between 14 and 21 hours per week. They further indicated that they searched and downloaded learning materials (80%) and engage in Blackboard (73%). The successes were also measured by the number of staff trained and active courses on the LMS. As a result of e-learning implementation, lecturers were able to enhance their teaching practices such as by promoting collaborative learning (53%), creating a platform for lecturers and students to communicate about the subject matter (60%), creating an environment that allows students to work on their own even when it is impossible to hold classes (60%), improving ac-

cess to rich information from various sources (47%) and allowing students to evaluate one another's responses (40%). On the other hand, this improved the students' learning.

This study also proved that lecturers and students' adoption of e-learning may be impeded by a variety of barriers that need attention. However, allocation of sufficient time and resources, combined with managerial support, could help staff through the period of transition (Singh et al. 2005). They emphasise that effective management could help institutions to deal with any increase in lecturer workload by ensuring efficient use of resources (p.22). The findings also indicated that a larger percentage (73%) of the lecturers had been trained at both, the basic and intermediate e-learning level. Although the data also indicated that some had learnt on their own and even used e-learning before the university initiative, the large percentage of lecturers attending training indicated that training of lecturers was essential for the integrating technology in their teaching practices (Wilson and Stacey 2004; Singh et al. 2005; Sappey and Relf 2010). This implies that staff development plays a vital role in the preparation of lecturers for technology integration into their teaching practices. The lecturers ICT-specific beliefs also influenced the lecturers' use of e-learning; they believed that ICT would benefit them (such as working from home, at their own pace and time) and their departments (providing co-effective measures). These opportunities provided by ICT influenced the lecturers' beliefs and attitude which are also reciprocal to the teaching (Guskey 2002). These findings indicate that having access to technology (tool), positive ICT-specific beliefs and being ICT competent (skill) drive the lecturers' willingness (will) to use technology to enhance their teaching practices.

CONCLUSION

E-learning adoption rate is increasing satisfactorily at this university. This study tried to investigate how e-learning implementation enhanced the lecturers' teaching practices. Lecturers have confirmed that the integration of e-learning in their courses has enhanced their teaching practices and subsequently, the students' learning. In light of the barriers identified, improved just-in-time e-learning training, technical support, a reliable stable technology

infrastructure and students' computer centres are vital for successful e-learning implementation at the university in question. Though the university is challenged by some barriers that limit the use of e-learning, lecturers make optimal use of the available resources to enhance their teaching.

The researcher is also aware of the limitations of this study. This is a small scale investigation of six departments of a university (Nuffic Pilot Departments) and with only 34% response rate. This study could be extended to the entire university to measure returns on technology investment and staff training. Secondly, the findings are based on respondents' self reported data that could be subjectively biased. For instance, the integration of technology into the teaching practice reported could be supplemented with student focus groups data. A further study could be conducted to investigate whether the technology integration into the teaching practices are pedagogically sound and to subsequently develop a pedagogically sound technology integration model.

RECOMMENDATIONS

Findings from this study suggest that more computer centres be developed and equipped or even, preferably, the availability of wireless networks could also increase the opportunity for students to interact with learning materials within the designated hotspots on campus; lecturers and students be encouraged to make use of open courseware as lecturers have raised the increased workload resulting from the development of online material and that managerial support be improved in addressing the workload issue. Lecturers could also be incentivized for engaging on blended learning and developing materials. CLTD already rewards lecturers who showcase their e-learning progress at the grass-roots events that are held once per semester.

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