Implementing e-Learning at a University of Technology, South Africa: A qualitative study

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Abstract: Universities, in general, form a critical component of a country’s national system of innovation and intellectual backbone. However, the capacity of many African universities to lead the process of integrating Information and Communication Technologies (ICTs) in education is woefully inadequate. This paper presents a South African university of technology’s (UoT) experience regarding the integration of the Learning Management System (LMS) Blackboard into the teaching and learning environment. In-depth interviews were carried out with lecturers who use Blackboard in their teaching, as well as those who don’t, and in an effort to elicit students’ perceptions concerning the usage of Blackboard, focus group interviews were conducted with students who take one or more courses online. Interviews were also carried out with the staff of the Centre for e-learning, providers of the e-learning services for the University. Significant findings of the study were that an evolutionary and top management driven processes of integrating technology into teaching and learning are utilized in this university; the general uptake of the technology was not very high, with considerable resistance amongst the university teachers to integrate Blackboard into their teaching and learning partly because of the unstable information technology infrastructure in the university, lack of ongoing support after the initiation training, lack of motivation and incentives, and lack of awareness of the potential of Blackboard for teaching and learning amongst other factors. This paper discusses: the approaches of implementation of Blackboard, successes, challenges and lessons learnt, while also providing insights into the way in which higher education institutions in Africa and especially in South Africa can best support academic staff in mainstreaming technology into teaching and learning.

Keywords: learning management system; Blackboard; e-learning; diffusion; Innovation; adoption process and approaches.
1. Introduction
Learning management systems (LMS) grew from a range of multimedia and internet developments in the 1990s, and to date, universities all over the world are using learning management systems (LMS) to support and improve teaching and learning (Coates, James & Baldwin, 2005; Dalsgaard 2006; Snowball & Mostert, 2010). Learning management systems are referred to using different names: virtual learning environments, e-learning systems, learning platforms, distributed learning systems, portals and instructional management systems (such as the commercial platform Blackboard, or the open-source platforms Sakai and Moodle). LMS typically provide tools for course administration and management and pedagogical functions of different complexity and potential:
- Asynchronous and synchronous communication and collaboration (announcement areas, e-mail, chat, instant messaging, discussion forums, blogs, journals and wikis);
- Content development and delivery (learning resources, development of learning object repositories and links to internet resources);
- Formative and summative assessment (submission of assignments, multiple choice testing, collaborative work and feedback, peer review); and
- Class and user management (registering, enrolling, displaying timetables, managing student activities and electronic office hours).

Despite the rapid adoption, on the Africa continent, few studies have documented the implementation, use (Snowball & Mostert, 2010; Van der Merwe & Mouton 2005) and the impact these systems have had on lecturers' teaching and students' performance. The attitudes of faculty and students are seldom examined and there is little effort made to determine what these attitudes are and the way in which they impact on the adoption and use of e-learning. In this regard, this paper attempts to share Cape Peninsula University of Technology (CPUT)'s implementation process, approaches, successes, challenges and lessons learned regarding the implementation of Blackboard. It is hoped that the ideas and insights generated through CPUT's implementation process can provide useful lessons for other institutions planning, or grappling with, the implementation of LMSs.

2. Methodology

In gathering data for this research the methods used were: in-depth interviews, focus group interviews and document reviews. In-depth interviews were carried out with key informants viz: the centre for e-learning staff; 20 interviews with faculty staff that employ Blackboard in their teaching and 20 interviews with faculty staff who do not use Blackboard in their teaching. The key informants used in this study were chosen because they possess exceptional knowledge, status or communicative skills, and were willing to share that knowledge and skill with the researcher (Babbie 1995; Zelditch 1962). These individuals contributed insights into process variables which were not evident to the researcher. They also sensitise the researcher to value dilemmas within the project and implications of specific findings (Goetz and Lecompte 1984).

Five focus group interviews, each comprising of 5 to 6 students, were carried out. The student composition was drawn from above average, average and below average students working towards attaining their certificate and national diplomas in construction, accounting, commercial law and graphic design.

A Literature review based largely on works from developed and developing countries, was conducted along the lines of technology adoption approaches and CPUT's documentation regarding ICTs in teaching and learning, which included its vision, strategic plans and policy documentation.

The researcher then analysed in-depth and focus group interview data using analytical induction strategy which involves scanning the data for categories of phenomena and for relationships between such categories as well as developing working typologies and hypotheses upon an examination of initial cases then modifying and refining typologies and hypotheses on the basis of subsequent cases (Robinson
3. Introduction of Blackboard and adoption approach

3.1 Introduction of Blackboard

The idea of introducing Blackboard was born in 1998 when the Vice Chancellor and the Deputy Vice Chancellor of the former Cape Technikon attended a conference where they were exposed to presentations concerning the use of LMSs for teaching and learning (I Smit, Personal Interview, 22 April 2009). In 1999 the implementation of Blackboard at the Cape Technikon commenced with the aim of improving the effectiveness of teaching and learning. Blackboard, then WebCT was adopted because it was the best LMS in the market and there were no worthwhile open source LMSs. The Cape Technikon subsequently merged with the Peninsula Technikon to form CPUT in 2005, in line with the Higher Education Amendment Act Number 63 of 2002 (Republic of South Africa, 2002), dealing with the transformation of the landscape of South African Higher Education in order to maximize integration and diversity, and promote equity and increase access to higher education. The use of Blackboard was then introduced to all campuses of CPUT (I Smit, Personal Interview, 22 April 2009). The University continues to use Blackboard rather than open source LMS because it works well for the institution in terms of the resources available and is adaptable to the needs of diverse academic cultures and communities.

The use of technology in teaching and learning is embedded in the university’s vision: “to be at the heart of technology education and innovation in Africa”, as well as its strategic plan, teaching and learning plan, e-learning policy, assessment policy and most of the faculty and departmental plans.

Despite the existence of the above documents in support of the use of technology in teaching and learning, most of the lecturers and the Centre for e-Learning felt that the institutional systems did not fully support the e-learning initiative. Firstly, this is, due to the fact that the computer and telecommunications system division (CTS), which provides information technology support for e-learning at CPUT, has been unable to provide adequate support and institutional systems are blamed for not attending to this problem. Secondly, although most faculties and departments have the ‘integration of technology in teaching and learning’ in their plans, findings showed that in some of the departments these plans were not being implemented. Thirdly, CPUT has a computer to student ratios of 6:1 which can be considered to be fairly good. However, it is felt that the infrastructure does not fully support the use of technology in teaching and learning as it is under-utilised, there is no open access to the computer laboratories and there is no system for lecturers to book laboratories for their classes. Lastly, sufficient technical support is not provided to the centre for e-learning. More often than not e-learning staff have to either plead for assistance or log-in calls at the CTS help desk where the calls are not usually prioritised. In spite of these challenges, the implementation of Blackboard at CPUT is still ongoing.

3.2 Adoption process and approaches

There are different theories regarding the integration of ICTs in higher education teaching and learning, the strategies that should be implemented, and the person (or people) that should be responsible for the formulation of the strategies and driving the integration process. Beller and Or (1998) stated that the integration of information technology can either be an evolutionary process that relies mainly on local initiatives and personal motivation of individual faculty members, or it can be a top-management driven process. The result of this study indicated that both of these approaches are employed at CPUT. Top-management invested money in the buying of Blackboard, ensured that the use of the technology is embedded in its guiding documents and policies and gave a directive that every subject should have a minimum web-presence (that is, making the use of the calendar tool; making use of one of the communication tools activated; populating the grade book and making study guides available on the LMS). Lecturers are not obligated to use Blackboard and therefore, most of the lectures that are using it were personally motivated to do so, voluntarily underwent training and started using the LMS to support
their teaching.

Everett Rogers (1995) identifies three types of innovation adoption approaches:

- **Optional innovation-decision approach:** The choices to adopt or reject an innovation are made by an individual, independent of the decisions by other members of a system.
- **Collective innovation-decision approach:** The choices to adopt or reject an innovation are made by consensus among the members of a system.
- **Authority innovation-decision approach:** The choices to adopt or reject an innovation are made by a few individuals (in a system) who possess power, status, or technical expertise.

At CPUT the optional innovation-decision approach is commonly used since it provides maximum flexibility to its users and accommodates individuality in that it allows lecturers to use Blackboard according to their individual needs. The down side of this approach however, is that it places the greatest demands of all the approaches on resources such as support services. The authority innovation-decision approach is also used in CPUT, but to a lesser extent: for instance, the decision to use Blackboard was made by top-management and the regulation that every subject has a minimum web-presence was passed. While this approach leads to rapid adoption, it often produces a high level of resistance from a few individuals.

4. The usage of Blackboard at CPUT: lecturers and students perspectives

The researcher echoes Baker, Boggs and Arabasz (2003) in that attention should be paid to the perspectives of faculty and students concerning e-learning, as these are the individuals who ought to implement the initiatives that administrators are dependent on to drive institutional growth and competitive advantage. To explain the use of Blackboard at CPUT I will utilize Everett Roger’s diffusion of innovations theory (1995). Rogers (1995) explains the categories of innovation adopters as follows: innovators are individuals who tend to be experimentalists and are interested in technology itself; early adopters are individuals who may be technically sophisticated and are interested in technology for solving professional and academic problems; early majority are those who are pragmatists and constitute the first part of the mainstream; late majority are those who are less comfortable with technology and are the skeptical second half of the mainstream and the laggards are those who may never adopt technology and may be antagonistic and critical of its use by others.

Findings in this research indicated that most of the users of Blackboard are innovators, early adopters and a few are early majority. However, findings show that some of these early adopters have stopped using Blackboard in their teaching due to their wariness of new technology (in this case network instability) and lack of continuous support after the training. Rogers (1995) explains the later by indicating that despite careful planning, there will always be unintended and unanticipated consequences when an innovation is diffused.

Factors which encouraged the lecturers to use Blackboard in their teaching varied from lecturer to lecturer and some of these factors were:

- To be able to control large class sizes;
- To help students engage with course work outside the classroom;
- To try to keep students interested in the subject;
- To ensure more transparency in that one can upload assignments and notes and no student may say they lost the handouts;
- The accessibility of a variety of features on Blackboard and
- The love of technology and the fact that they were aware of the advantages of using Blackboard for teaching and learning from a student’s point of view.

Most of the lecturers who use Blackboard for teaching access it from home as well as on-campus, with only a few accessing it from campus only. The majority of the students interviewed, however, accessed Blackboard on-campus, with a few using it from both home and campus or from home and at an Internet café. The majority of the lecturers have used Blackboard for their teaching for more than 5 years and only a few users have used it for a period of 1 to 2 years. Most of the students interviewed have used
Blackboard for 4 months, with a few using it for more than a year.

Blackboard tools utilized for teaching and learning, and lecturers and students use thereof are listed in Table 1 below from the most used to the least used:

**Table 1: Blackboard tools used ranked from the most used to the least used**

<table>
<thead>
<tr>
<th>Blackboard tools</th>
<th>Use</th>
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<tbody>
<tr>
<td>Communication (mostly mail tool)</td>
<td>To send and receive e-mails to and from the students in the course and concerning the course matters.</td>
</tr>
<tr>
<td>Assessment (mostly quizzes and self-tests)</td>
<td>To create quizzes which students complete and submit for marks in order to assess their performance in the course. To create self-tests which students complete in order to assess their understanding of course materials.</td>
</tr>
<tr>
<td>Assignment</td>
<td>To create an inventory of assignments for the course and for students to submit their assignments by attaching their own files.</td>
</tr>
<tr>
<td>Calendar</td>
<td>To post deadlines for e.g. course assignments.</td>
</tr>
<tr>
<td>Learning modules</td>
<td>To organize and deliver course content and extra reference materials to students.</td>
</tr>
<tr>
<td>Grading book</td>
<td>To enter, view and manage grades for all students and auditors.</td>
</tr>
<tr>
<td>Announcements</td>
<td>To create and post important information for students concerning upcoming assignments, tests and other events in their class (linked to calendar).</td>
</tr>
<tr>
<td>Web links</td>
<td>To compile a list of Internet addresses which act as reference materials for the course.</td>
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The most appealing aspects of Blackboard, by both students and lecturers, is the communication tool, in particular e-mail, because it enables one to reach the other from anywhere at any time.

Other benefits of Blackboard, as mentioned by lecturers, are: assisting in the submission and checking of assignments anywhere and at any time; the marking of quizzes and self-tests, the feedback of which helps lecturers develop future lessons and address students’ problems; helping students, especially absentees access course content from anywhere and at any time; acting as a portal for other resources; the grading book helps students view their marks and offers them privacy and lastly, Blackboard helps lecturers practice a student-centered approach to teaching.

Most of the lecturers revealed that students taking courses through Blackboard are in favour of the system because they are able to access course material and information online. This point is best
illustrated by Miriam in the following quotation: “students are quite positive about the subjects offered through Blackboard. They phone to ask why I haven’t put what I promised on the system. There is pressure from the students to use the system”. Most of the students indicated in the interviews that they would like all the lecturers to use Blackboard for their teaching.

Students provided various reasons for their enjoyment in using Blackboard in their learning, these included: getting immediate feedback on formative assessments; being able to review all their marks on the grading book; getting course information from the lecturer; being able to download notes if they happened to miss classes and the privacy it offers since no one else can access their marks.

On the other hand, most of the lecturers and students agreed that the most disliked aspect of Blackboard is the unreliability of the network. The following extract from Pillay may speak for all: “Network failure is problematic. At one time the system went down for two days and it made me make so many copies”. Other aspects which discourage the use of the LMS are slow Internet connection and the lack of time, on the part of the lecturers, to learn how to use the different tools and prepare teaching and learning materials to populate the system.

Most of the lecturers stated that the Centre for e-learning provided them with technical support, but no educational support was forthcoming. The following comment from Whitehead explains it all: “Educational support no. Technical support on Blackboard there is from Centre for e-learning”. Lecturers revealed that they had to train students regarding the use of Blackboard as they were not aware of any support offered to students in Information Technology laboratories. However, the majority of students pointed out that technical support had been provided for them at the Information Technology laboratory by laboratory assistants or fellow students.

5. The Impact of Blackboard on the way lecturers teach and students’ performance

When asked for their views concerning whether Blackboard had made any difference in their teaching and in the students’ performance, the majority of the lecturers reported that it was too early to assess the impact on the students’ performance and the lecturers’ teaching. However, a few of the lecturers interviewed revealed that using Blackboard had influenced the way in which they teach, and some of the thoughts generated in this regard are that: it helps lecturers identify students that are at risk; it forces lecturers to plan thoroughly and consider the link between what happens in the classroom and what happens on the Blackboard system and an improved interest in research in order to provide students with up to date information.

Some of the students interviewed indicated that the use of Blackboard had improved the way in which they learn as communication with the lecturers is enhanced; tutorials on Blackboard helped them when they failed; they accessed course content which was not given in class and which is not in the textbook and Blackboard has changed the manner in which they carry out research and referencing.

6. Perspectives from non-users of Blackboard

Eliciting the non-users’ points of view concerning the use of Blackboard is vital for CPUT because it is important to understand the needs of the faculty members who are not using Blackboard and not just focus on the innovators and the early adopters. This is due to the fact that CPUT’s “technology in teaching and learning” agenda is to accommodate all types of adopters. Data gathered from lecturers who do not use Blackboard in their teaching revealed that the majority of them were not aware of the institutional policy concerning the use of technology in teaching and learning.

Furthermore, most of the interviewees revealed that they were not using Blackboard in their teaching because of a heavy workload resulting in a lack of time to prepare materials to upload onto Blackboard. Sureshi said: “I don’t use Blackboard because I lecture five subjects, I am the coordinator for WIL [Work Integrated Learning] and I am trying to embrace research etc.”. The lack of information regarding
Blackboard and its usefulness, and lack of skill to access and use Blackboard were other reasons given by a good number of the interviewees. Network instability was also cited as one of the reasons for non-use of Blackboard.

However, all the interviewees indicated their willingness to use Blackboard for their teaching and the majority of them indicated that, if they were provided with training on the use of Blackboard; information on the usefulness of Blackboard and time off lecturing to convert teaching materials into e-format, they would start using Blackboard and use it effectively. The need for someone to phone when in need of help was another need highlighted by some of the interviewees.

7. Successes
Since the inception of the implementation of Blackboard, up to 240 lecturers have been trained in the use of Blackboard each year. About 25 to 30 percent of the lecturers who have received training are currently not using Blackboard to support their teaching and learning (I Smit, Personal Communication, 22 April 2009). This can be attributed to the lack of emphasis on the use of the LMS from the institutional systems, the instability of the network and the once off training provided by Centre for e-learning without continuous support at the faculty level. In 2009 around 380 lecturers were actively using the LMS for teaching, this was a decline from the 500 lecturers actively using LMS in 2008. The active number of subjects in Blackboard in 2008 was 998, this figure dropped to 390 in 2009 (I Smit, Personal Communication, 22 April 2009). The decline in the number of active subjects and lecturers was due to network instability. Roughly 50 to 60 percent of CPUT students are taking one or more classes through Blackboard (I Smit, Personal Communication, 22 April 2009). In general, findings confirm that the students’ reaction to the introduction of Blackboard has been favourable and they seem to welcome the increased use of Blackboard by all the lecturers. However, results show that Lecturers use Blackboard primarily for grade administration, e-mail, presenting static content and for the purpose of supplementing face-to-face instruction. Similar findings were found in other institutions (Gastfriend 2005; Snowball & Mostert, 2010).

In summary, results indicate that there has been success albeit limited in the integration of Blackboard in teaching and learning. There is some success in getting the support of the institutional systems and in the institution drawing up the necessary regulations to guide the use of technology at CPUT and success in winning the support of the students in the use of Blackboard for teaching and learning. Success is also shown in the number of lecturers trained on the use of Blackboard per year, although some of these lecturers need continued support in order to embrace the use Blackboard in their teaching.

8. Lessons learnt and solutions for future implementation
In the context of CPUT, the process of implementation has made it clear that the implementation of an innovation is not an event, but rather a process. CPUT takes on all the unanticipated and unintended consequences which emerge from the implementation of a system such as Blackboard and uses these as learning moments which will inform future diffusion of Blackboard. At this stage of the implementation of Blackboard in teaching and learning, CPUT has learnt the following:

Total commitment of the institutional systems is required in order to integrate technology in teaching and learning since efforts of a committed team of lecturers can be undermined by unsupportive management (Phillips 2005). To ensure future diffusion of technology in teaching and learning, CPUT institutional systems needs to formulate a vision and priority areas for mainstreaming technology in teaching and learning, as well as formulate a technology integration forum (formed in March 2009) to oversee the implementation of University policies concerning the use of technology in teaching and learning.
To speed up the diffusion of Blackboard, departments need to embed technology in their normal teaching (Phillips 2005). Faculty buy-in is essential for the success of technology programmes intended to improve teaching and learning. It is now widely understood that faculty themselves must be willing to see that technology-enhanced learning environments are inextricably linked to an institution’s ability to fulfil its mission (NLII, 2003). A needs assessment must be carried out in order to discover the kind of support departments require, and the kind of support that should be provided.

A stable information technology infrastructure is crucial and adequate technical support for faculty staff and the Centre for e-learning are needed (Phillips 2005). The University is in the process of upgrading its servers to ensure a more stable technology environment.

High speed Internet connections are needed to allow Blackboard to be a useful portal for other learning technologies and for easy accessibility by students and lecturers. CPUT plans to increase the bandwidth by using the low cost bandwidth provided by the recently launched Seacom optic fibre cable.

Adequate training in the use of Blackboard and continuous site support for academics is vital. Literature proves that a once-off training or workshop is adequate for introducing new ideas to trainees, but to enable trainees to implement those ideas in practice regular follow-up support is needed (Rude-Parkin and Hancock 1990). This repetition is necessary to enable lecturers to fully integrate the new ideas into their teaching repertoire and ensure that the new approach will not be lost due to disuse (Butler 1992). Therefore, the Centre for e-learning needs to look at its support strategy and ensure that lecturers are provided with ongoing support in their implementation of Blackboard. Both technical and pedagogical training regarding the effective integration of technology in teaching and learning (Ferrazzi 2003) is needed, to avoid, what Phillips (2005) calls, ‘the surface learning, teacher-centered, content-based approach’ which is currently used in many universities where educational technology is widely adopted through the replication of traditional teaching techniques (Reeves 2002). Teaching, learning and pedagogy should be the true heart of e-learning, not the technological specifics.

A rigorous awareness campaign about Blackboard and its usefulness in teaching and learning is required (Sherry, Billig, Tavalin and Gibson 2000; Carr 2006). If the conditions and activities that promote adoption by the early and late majorities and laggards are to prevail, then the Centre for e-learning needs to conduct awareness campaigns concerning the use of Blackboard in teaching and learning. There is also a need to harness experience and expertise within the institution, as well as encourage the sharing of ideas and the propagation of good practices. For many faculties, hearing success stories from colleagues, and working one-on-one with someone “down the hall” can mean the difference between a positive attitude and a negative one (Baker, Boggs and Arabasz 2003).

In order to encourage and sustain the use of technology in teaching and learning, a recognition and acknowledgement system of rewards, parallel and equal to that associated with ‘traditional’ academic pursuits, needs to be in place (Carr 2006). A space needs to be created, to allow lecturers to experiment with innovative practices using technologies. This could be done through the introduction of funding systems for innovative projects or acknowledging innovative practices in performance appraisals.

9. Conclusion
Based on the challenges encountered, and the implementation processes in place at CPUT, the researcher has highlighted the inadequacies of institutional systems which are leading the process of integration of ICTs in education, in this case Blackboard. As a result of the lessons learnt during the implementation of Blackboard in teaching and learning at CPUT, the researcher can conclude that, in order for Universities to lead in the integration of ICTs in education, there is a need for: total commitment by the institutional systems, including management, to the initiative; the provision of an environment conducive to the effective use of technology in teaching and learning; a stable information technology
infrastructure; adequate technical support for faculty and units providing e-learning services; adequate training regarding the use of Blackboard or technology and continuous site support for academics, and the provision of both technical and pedagogical training concerning the effective integration of technology in teaching and learning.
11. References


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