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The challenges of pedagogical design and implementation of web-based collaborative learning: A case study at Cape Peninsula university of Technology

S. Xakaza-Kumalo

Cape Peninsula University of Technology, Center for e-Learning, Cape Town, South Africa
kumalos@cput.ac.za

Abstract:

The modern pedagogical practices, evidently influenced by Seven principles of good practice, address the “teacher’s how, not the subject-matter what” (Chickering & Gamson, 1987). This paper reports, but not limited, on challenges faced by lecturers when designing and implementing web based collaborative learning environment for first year students. The case study investigated patterns that emerge when a lecturer design and subsequent implementation of web based collaborative learning environment at a university of technology. The unit of analysis was the case, and the instruments used were questionnaires, group interviews, observation, pre and post focus groups as well as anecdotal entries. Not only students in this university are unfamiliar with web based learning but lecturers are also faced with the challenges of changing their traditional ways of designing teaching. It is for the same reason this paper includes and discusses results of survey previously conducted on university Information and Communication Technology (ICT) usage. Based on socio-cultural approaches, collaborative learning affords students active engagement in information (ideas) sharing, problem solving and new knowledge development. The study employed mixed qualitative and quantitative approach. The pedagogical approach incorporated into the case study was based on the model of Progressive Inquiry (Hakkarainen, 2003). The role of e-learning content in such educational setting is also discussed. The findings offer insights about instructional design thinking and the importance of creating a learning environment that integrates ICTs, learners’ backgrounds, courseware, and most importantly, pedagogic considerations in the process of increasing knowledge levels.

Key words:

Pedagogical design, collaborative, web-based, Interactive learning environment

Introduction

Pedagogical design considers different types of learning styles to students with different levels of background knowledge, experiences and learning preferences, and then creates needed student-centered approach to instruction. This study explored web design and implementation of collaborative learning environment for first year students at a university of technology. Different learning styles embedded in principles of good teaching practice (Chickering & Gamson, 1987) were closely considered during whole process. French et al. (1999) traditionally regarded the “teacher” as “sage on stage”, however, to benefit presented multicultural learning environment, students and the lecturer were to simultaneously be “guides” and “sages” and become progressive learners and peer teachers who adapt rapidly to set learning objectives in light of changing information which Hakkarainen (2003) contends as advancement of knowledge.

Background

This paper discusses challenges of pedagogical design of web based collaborative learning faced by lecturers at a university of technology. The Web as a multimedia system incorporates text, images, graphics, audio, animation, graphics, images, hyperlinks and videos. Learning management systems

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such as Blackboard 0.9 installs “mashups” as its multimedia program that brings the “world” into the classroom. This university has formal and non formal academic/teaching qualification programmes in support for new academic staff. Academic staffing in higher learning is increasingly experiencing subject experts rather than trained educators or better still, the combination of both attributes. The mandatory Higher Diploma in Higher Education and Training (HDHET) is a formal qualification offered to newly appointed lecturers. One of the course modules is “Web based learning”. Students are orientated in design and experience of web based teaching and learning. According to Kearsley (2000) the design of web based learning activity should start with careful analysis of the students, not only to identify their cognitive, affective, and psychomotor skill levels, as traditional designers do, but also to understand the nature of their computing capabilities and learning environment. The Web provides lecturers with more choices of design and presentation methods than are usual in traditional teaching. Overwhelming Web choices may perhaps create challenges to lecturers with less technical skills.

Problem statement

The modern pedagogical practices are evidently influenced by Chickering and Gamson’s, (1987) “*Seven principles of good practice*” and educators have begun considering how these principles may apply to online learning (Ehrmann, 1999). The use of ICT in education has become a trend and online teaching and learning has been adopted as innovative option in many universities. Most students in this university are from disadvantaged background and have never owned computer. The university survey on ICT usage which was conducted by Center for e-learning and Fundani, (2010) is also discussed for more insight and for the purpose of this paper. The problem is that students are unfamiliar with web based learning and lecturers are faced with the challenges of changing their traditional ways of designing teaching. The study intends to explore challenges that emerge during pedagogic design and implementation of a web-based collaborative learning environment.

Rationale

The use of ICT in education has become a trend and online teaching and learning has been adopted as innovative option in many universities. According to Garrison, et. al (2000) researchers have developed theoretical models of effective web-based course and program design. However, these frameworks have had limited influence on the empirical study of web-based courses. This study builds up on the survey (2010) conducted on the use of ICT with special reference to Blackboard as learning management system used to facilitate teaching and learning at this university.

Challenges

Curriculum designers including academic staff in general may have experiences using the Internet for social and even limited professional activities, however many of them still need to reconsider the use of the Internet and Web for the development of individual courses or subjects. It is common that studies of this kind wanting to solicit responses on direct teaching practice (pedagogic) challenges get more feedback about technical problems instead. While students are unfamiliar with web based learning, lecturers are faced with the challenges of changing their traditional ways of designing teaching. According to Cornell (1999) faculty members feel concern and anxiety about engaging in online teaching due to its unique status and as the most-talked-about but often least-experienced pedagogical practice. The study applies Instructional System Design (ISD) model for design, development and implementation of web based collaborative learning. Although, the pedagogic framework is model of

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Progressive Inquiry (Hakkarainen, 2003), the *Seven principles of good teaching practice* (Chickering & Gamson, 1987) are also considered.

Collaborative learning

Research agrees that ‘collaboration’ refers to working together for a goal. Collaboration can be defined as a coordinated, synchronous process of participating in knowledge communities and “Collaborative learning” an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together (Smith & MacGregor: 1992). Learning, according to Scardamalia and Bereiter, (2003), is an internal, unobservable process that results in changes of values and belief, attitude, knowledge, or skill.

Learning styles and different teaching approaches are as crucial as pedagogic content in any successful teaching and learning event. The study involved multicultural group with individuals from different backgrounds and principles of good teaching practice were closely considered for two week duration of the study. Common concern at universities includes students’ retention and how to improve undergraduate education. Chickering and Gamson, (1987) suggest *Seven principles of good teaching practice* as guidelines on good practice in undergraduate education as follow:

1. encourages contact between students and faculty,
2. develops reciprocity and cooperation among students,
3. encourages active learning,
4. gives prompt feedback,
5. emphasizes time on task,
6. communicates high expectations, and
7. respects diverse talents and ways of learning.

The objective of the study designed web based *interactive activity* in “Oral presentation skills” course. Students were *expected to cooperatively* complete given task within due date. All involved with the project were accountable and observed different learning styles however students also had responsibility to respect diverse talents of fellow group mates during collaborative learning encounter. Chickering and Gamson, (1987) further assert that when all seven principles are present, the effects of learning multiply. Together they all employ six powerful forces in education;

- activity
- expectations
- cooperation
- interaction
- diversity, and
- responsibility.

According to Vygotsky, (1978) social interaction plays a fundamental role in the process of cognitive development. He disputes Jean Piaget’s understanding that child’s development precedes learning. In contrast, Vygotsky and (Crawford, 1996) focus on connections between people in their sociocultural context and conclude that social learning precedes development.

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Progressive Inquiry (PI-Model)

Progressive inquiry is a pedagogical model which aims at facilitating the same kind of productive knowledge practices of working with knowledge in education that characterize scientific research communities. It was developed by Kai Hakkarainen and his colleagues in the University of Helsinki (Muukkonen, Hakkarainen & Lakkala, 2004) as a pedagogical and epistemological framework to support teachers and students in organizing their activities for facilitating expert-like working with knowledge. The model has evolved from the initial cognitively oriented into versions that highlight pragmatic and socio-cultural aspects of inquiry. It relies on cognitive research on education and is closely associated with the knowledge building approach of Scardamalia and Bereiter and the Interrogative Model of Inquiry introduced by Hintikka.

For the purpose of this study participation in progressive inquiry was embedded in development collaborative learning environment with Blackboard LMS as delivery platform that features various tools such as wikis, discussion forum, chat and blog as some of collaborative tools supporting the inquiry process as well as sharing of knowledge and expertise. Characteristic of Progressive Inquiry, amongst others is; it is made of systematic elements that guide and engage students in progressive generation of subordinate questions and new working theories as the process goes on (Hakkarainen, 1998; Hakkarainen & Sintonen, 1999). Ideas are synthesized in a concise framework that describes six essential elements of progressive inquiry such as; a) Presenting Research Problems b) Creating Working Theories c) Critical evaluation of knowledge advancement d) Searching new scientific information e) Engagement in deepening inquiry, and f) Shared expertise.

What follow is research methodology and a discussion of the ISD model also known as ADDIE (Analysis, Design, Development, Implement, Evaluate) in Web-based learning design.

ADDIE model and methodology

Methodology

The study employed mixed qualitative and quantitative approaches. The case study explored challenges that emerged during the process of design and the implementation of web based collaborative learning environment for first year students at a university of technology.. The pedagogical *design* was based on the model of Progressive Inquiry (Hakkarainen, 2003) and the *implementation* framework, the Seven Principles of Good Practice in Education (Chickering & Gamson, 1987) was systematically incorporated into the case study. The study did not investigate Communication skills course but only the design and the implementation of collaborative learning event. This paper therefore, presents systematic application of Chickering and Gamson's framework in web based collaborative learning environment. These seven principles focus on contact between students and faculty, consideration of multiple approaches and styles to learning, and engagement of students in learning. The unit of analysis was a case and the instruments included questionnaires, group interviews, observation, pre and post focus groups as well as anecdotal entries. The case study consisted of an instructional designer, a lecturer, a group of thirty Communication Skills1 full time undergraduate students and a technician for technical intervention. This study builds on a university survey report "ICT study: *Staff and Student perceptions* (2010) which investigated the usage of ICT to facilitate teaching and learning. For the purpose of this paper the survey on usage of ICT for teaching and learning across the university was revisited for insight discussion and for added value purpose.

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ADDIE model

The ADDIE model is a systematic instructional design model with five phases: (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation. Instructional design models such as the Dick & Carey (2004) and Kemp (Gustafson, Branch, 1997) models are based on ADDIE as generic and simplified instructional systems design (ISD) model. Similar to lesson design, each step in ADDIE (Analysis, Design, Development, Implement, Evaluate) has an outcome that feeds into the next step in the sequence. During the study the lecturer, the instructional designer (⁶ID) and the technician collaborated and followed ADDIE process in Communication Skills 1 course design.

The ADDIE five-phase design process was applied as follow

Analysis

During analysis, the lecturer briefed the designer about identified *learning problem* as lack of web based pedagogic design skills to afford collaborative learning. The *goals* and *objectives* were to co-design Communication Skills 1 including week-4 learning activity *Oral Presentation Skills* on Blackboard (LMS) platform. The audience's needs included a web based interactive collaborative teaching and learning experience thus learning environment and any anticipated constraints like internet access were highly considered during analysis. The timeline for the project was two weeks and additional delivery options were considered.

Design

The subject or course outline and detailed study guides are commonly uploaded by lecturers for students' access and retrieval as the required minimal web presence. While considering seven good teaching practices (Chickering & Gamson, 1987) the course development followed instructional design principles and necessary directive lesson prototype. The look and feel, graphic design, user-interface and content were determined by tools and features available on Blackboard 0.9 LMS.

Development

The lecturer as a subject expert in collaboration with instructional designer co-designed the *Oral Presentation Skills* collaborative learning event. The technician was also on standby to intervene upon technical design challenges. The instructional designer populated the Course: COM105S and enrolled all relevant in different privileged roles. The lecturer created modules and uploaded all relevant content files. Both the lecturer and ID agreed on the content of this specific collaborative learning event. The lesson plan presentation thereafter was planned by the lecturer. The instructional designer assisted in selecting suitable tools and applied features to develop that specific collaborative learning event. She also added enhancing multimedia such as image maps and videos on same lesson topic. The ID further reinforced collaboration by creating a discussion forum as an additional collaborative tool. The whole process was intense with continuous testing and evaluation, and the design was finally ready for implementation.

Implementation

The *Oral Presentation Skills* course was developed and ready for implementation. This course was mainly developed for the purpose of facilitating the implementation of web based learning event. The study focus and purpose was implementation of collaborative learning environment. The online

⁶ Instructional designer

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collaborative teaching and learning design experience was thereafter demonstrated and shared among faculty members. Face-to-face teaching and learning was enhanced by students engaging in online learning in their eclassroom i.e. learning management system environment. Evaluation and recorded interviews were conducted on students and lecturer during this implementation phase.

consideration of multiple approaches to learning, and engagement of students in learning by encouraging contact between students and faculty Faculty staff was also invited to test and evaluate the learning environment for added value purpose.

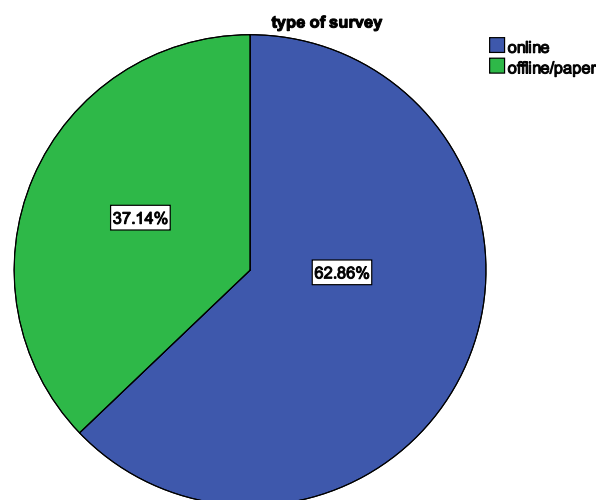
Evaluation

Perception from the lecturers on challenges regarding design and development of a web based collaborative learning event was crucial at this design phase. Focus interviews were also conducted to solicit students' views and perceptions on this online learning experience. The questionnaire also intended to harvest data on how academic staff generally use Information technology and communication (ICT) to enhance teaching. All revisions were made as needed and next are findings on data analysed.

Findings

In the beginning the students' enquiry was more focused on construction of their own intuitive understanding and the search for additional scientific knowledge. Progress in inquiry culture as suggested by Hakkarainen and Sintonen, (2002) was extended and evidently expanded students' practices of progressive inquiry. A group discussion debate in *discussion forum* triggered knowledge-based questions. Explanations further increased understanding thus advancing and building knowledge. It was also evident that some lecturers are more of subject expert than qualified teachers. These findings provided additional support for the idea that the interpersonal and behavioral aspects of conducting collaborative learning online may be more important than technological prowess for producing a positive learning environment (Arbaugh, 2005; Brower, 2003).

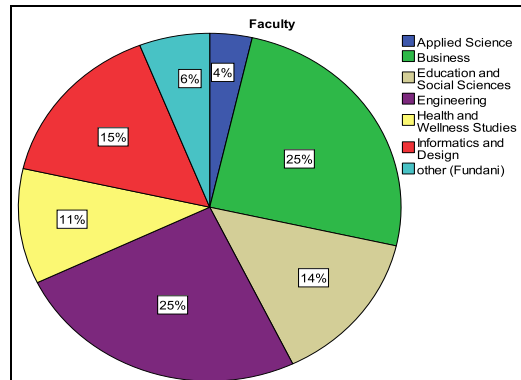
Figure 1: Number of staff who undertook the survey in print and online



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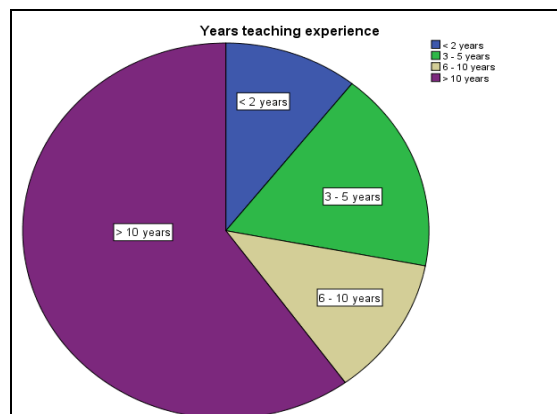
The invitation to complete the survey was sent out to all academic staff at CPUT through Newsflash and internal mailing lists. Valid questionnaires collected were 63% online and 31% on paper.

Figure 2: Responses per Faculty



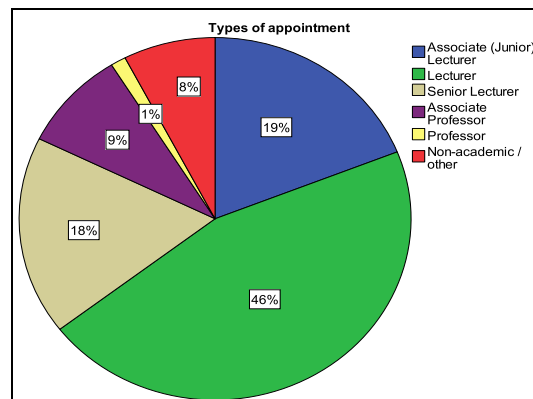
Staff from all six Faculties replied to the survey. Most replies came from Business and Engineering (both 25%), followed by Informatics and Design (16%), Education (14%), Health and Wellness (11%), Fundani (6%) and Applied Sciences (4%).

Figure 3: Teaching experience



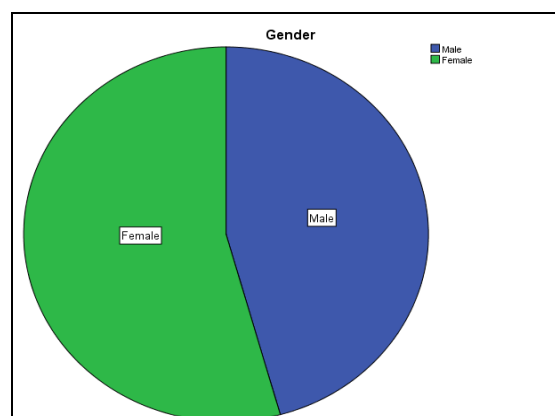
The majority of respondents have taught for more than 10 years (60%) and 11% less than 2 years

Figure 4: Types of appointment



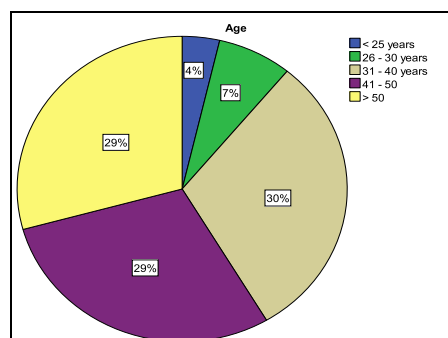
The majority of respondents are appointed on a junior lecturer or lecturer position (64%), with only 10% of staff appointed on associate professor or professor level.

Figure 5: Gender



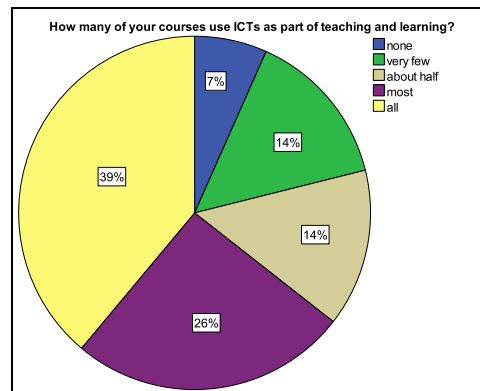
Gender was interestingly more female than male respondents

Figure 6: Age



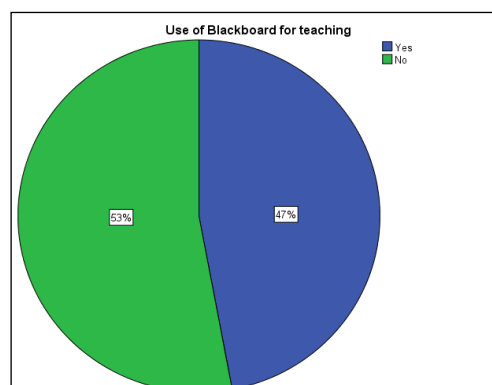
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Only 10% of respondent staff are under 30, with 60% of staff being older than 40 years old
Figure 7: ICT use in teaching and learning



Most lecturers use blended teaching and learning.

Figure 8: Active Blackboard users



Below were the reasons why lecturers use Blackboard

- ease of access to resources (anytime, anywhere)
- assignments/assessments, e.g. managing submissions, safeassign
- additional interactivity, communication with students
- diversity of learning styles (visual, self-learning)
- institutional policy

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Non-negotiable tenets of Instructional Design ... and ADDIE, too