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30. Sophie van der Walt
31. Dalize van Heerden & Mac van der Merwe
32. Corne van Staden, Judy van Biljon & Jan Kroeze
33. Hentie Wilson & Mathias Mujinga
MESSAGE FROM THE EXECUTIVE DEAN

Prof. IOG Moche

Executive Dean,
College of Science, Engineering and Technology
UNISA

A warm welcome to the second biennial CSET ODL conference!

The College of Science, Engineering, and Technology believes that teaching Science in an ODeL environment requires thorough understanding of the modality. We note that as a college we do not only have a history of delivering science, engineering, and technology at a distance, but that during that period we have generated a lot of knowledge that needs to be shared, strengthened, and used in ways that influences discourses on ODeL pedagogy. We are also cognizant of technological developments and innovations that require our interrogation.

We are, thus, proud to host our second ODL conference. The theme of the conference is deliberate as it intends to infuse our practice with sound theoretical frames. A review of the extended abstracts received, suggests that the upcoming two days of the conference will be lively, informative, and engaging. On behalf of the college leadership, we thank you for attending the conference. We look forward to your contributions.
COMMITTEES

Organizing committee
Prof Hugo Lotriet (Chair)
Prof Gugu Moche
Dr Eeva Rapoo
Thembeka Ntuli
Matshidiso Manale
Tsholofelo Raseroka

Scientific committee
Dr. Eeva Rapoo (Chair)
Prof. Gugu Moche
Prof Hugo Lotriet
Prof Leilani Goosen
Prof Francois Ilunga
Prof Inderasan Naidoo
Mr Rudi Pretorius
Mr Mark Smith
Prof Moses Strydom
Dr Linda Price

The Open University UK, Institute of Educational Technology

Linda is a pioneer in the research and development of online learning and support in open and distance learning. She has conducted many evaluations of online learning and have specialized in understanding how online context mediates students' perceptions. She is currently working for both Open University in UK and Lund University in Sweden in the development of scholarly practices to using technology in learning and teaching. Her particular interest is on how technologies can be pedagogically harnessed to support learning and teaching. She is also interested in improving the nexus between research and practice and in using research findings to underpin education and professional development programmes that support learning and teaching.

Her main area of responsibly at the OU is supporting the professional development needs of those involved in learning and teaching. Her work focuses on helping colleagues to consider how new technologies can be pedagogically employed effectively to enhance the student experience in an open distance learning. Linda has been an educational consultant on numerous online learning courses in the OU and has contributed to the development of innovative uses of technology in the support of student-centred learning. Additionally, she advises other universities on how effective e-learning could be realized in their courses. Linda has published extensively in the area and has presented in numerous and international and national conferences.
Dr Dolf Steyn

Midrand Graduate Institute

Dr Dolf Steyn, is the Principal and Managing Director of Midrand Graduate Institute which is South Africa’s largest comprehensive private university with its 13 campuses nationally. Additionally Dolf serves as non-executive board member and educational advisor to CHC and Vela Learning Trust. He serves on working committees for DBE, CHE and DHET and is part of an international working-group on mobile devices for education. Formal studies resulted in a number of minor qualifications besides from which he has a DPhil, MEd, HDE and an FDE.

Until recently Dolf was Director of Teaching and Learning with Technology at TUT and his work spectrum covers education, higher education, public, private and corporate sectors. He is experienced in working within teams, commissions, volunteer groups as well as in the running of projects as an individual. While working in the corporate and private sectors his publications took the form of reports, strategies and business plans while in Higher Education he has also published in local and international peer reviewed journals. He is a frequent contributor to workshops, training sessions and conferences. He served on examination boards, advisory commissions and industry work teams across 3 continents. Dolf worked amongst multiple cultures and receives equal appreciation from people at various levels and from multiple contexts. In the training context this experience spans from service level staff (ABET) through to post graduate work as well as deep rural African students to first world top ranked University staff. In the consultation environment his experience ranges from illiterate miners through to international executives.

Yet in essence, Dolf is married, has three children and enjoys the quiet of the Bushveld.
Prof Trish Alexander
University of Pretoria

Prof Trish (PM) Alexander spent the first ten years of her working life in the 1970s as a software developer both in Johannesburg and in London, working at computer bureaus on extremely large main frame computers, for business organizations using very limited “mini-computers”, and for suppliers of the computers. She then moved to the academic world, teaching and doing research at Unisa for more than twenty years and then at the University of Pretoria for just over ten years. While at Unisa she spent at least five years developing interactive multimedia courseware as part of CENSE.

She is a Professor Emeritus (University of Pretoria) having retired at the end of March 2013. She has also been appointed as Professor Extraordinarius at Unisa. Since she does not like the idea of retirement she has also chosen to work for the School of Computing, Unisa as an independent contractor starting in April 2013.

Prof Trish is interested in ICT-triggered change in organisations with associated interests in change management and technology adoption. She has done a lot of research into factors related to choice of ICT careers. And she is interested in the use of technology in order to address everyday teaching and learning challenges. As if all of that is not enough she has also some experience in ICT for Development issues. As you will find out, this apparently fragmented set of issues all come together in the presentation.
INVITED TALKS

1. Dr Linda Price
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Learning and teaching with technology in the 21st Century

While technology has increasing influence throughout higher education, there is still much to be learned about its effective educational contribution. However many teaching interventions appear to be technology-led rather than responding to identified teaching and learning issues. This technologically deterministic view tends to mask important issues such as our role as educators in the 21st century and what we expect our students to be capable of as graduates in an increasingly global world. University teachers’ views about and approaches to teaching are more influential in the success of a technological application than knowledge about how a specific technology works. Thus developing a scholarly approach to using technology is more essential than technical competence. Fundamental to this is an understanding of teaching and learning. Transforming learning is a complex activity. It requires sophisticated reasoning about the goals and purpose of any intervention and how an educational programme may be designed. So although technology can enable new forms of teaching and learning to take place, it cannot ensure that effective and appropriate learning outcomes are achieved. Instead, we need to reflect on our views about teaching and learning and whether our approach helps students achieve appropriate goals. While technology makes a valuable contribution to supporting student learning, it is not the technology itself that is the agent of change: it is the teacher.
Using ICT to address some of the challenges in supervising groups of postgraduate ODL students

The challenges encountered in supervising groups of postgraduate ODL students are not found in this environment exclusively but they may be exacerbated by it. The symptoms of the problem are: excessively long completion times and high dropout rates; and have a number of underlying causes, such as, conflicting expectations between student and supervisor, misconceptions regarding standards and time required, being underprepared. This presentation will explore ways in which new but commonly available computer-mediated communication tools can assist us in addressing these issues. The presentation will also consider the essential aspect of getting sufficient uptake of these tools in order for them to achieve the critical mass needed for effective use. Hence the issues of “change management” in an educational environment will also be raised.
3. Dr Dolf Steyn

Midrand Graduate Institute
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*Timeproofing: Teaching beyond the ceiling*

*Sometimes when things get kind of frantic, it helps to call my husband Steve, because I think he’s got a real good sense of where everything’s gonna be in a few years.*

Christa McAuliffe (The late first teacher in space travel)

You will not find the word timeproof in a dictionary, yet in a world changing so fast that some information which students learn in their first year is outdated by the time they qualify, we need to find a learning solution which will be sufficiently rigorous to weather the impact of rapid and continued change. Yet on any given day Steve McAuliffe and all of us can at best only *know* that which is known from the past. How can we expect lecturers to enable the learning of facts not yet known. Therefore, should the current level of knowledge known to man – or more realistically, the level of knowledge currently known to a lecturer be metaphorically seen as the ceiling capping the extent of learning, then clearly there is a need for teaching beyond that ceiling.

*I touch the future. I teach.*

Christa McAuliffe
SUBMITTED TALKS

4. Leila Goosen
School of Computing, UNISA, goosel@unisa.ac.za

*Integrating theory on myITLab with practice: technology-enhanced learning, academic student support and innovative assessment in ODL*

Universities are increasingly making use of technology-enhanced learning and innovative assessment for academic student support. Nash (2009:88-91) pointed out that first-year students entering South African universities therefore “need a basic level of computer proficiency” in terms of skills to be able to communicate with academics and their peers, perform calculations and complete administrative functions. However, many of these students are not adequately equipped with what is needed for working in the rapidly changing environment of technology-enhanced learning. Along with Kitahara, Westfall and Mankelwicz (2011:2), it is acknowledged that this “is a large and growing problem in most universities”. However, this research was not intended to examine the nature and causes of such problems. Rather, the premise of this research paper is to identify tools “and procedures to minimize them”. This is especially true in light of new, multi-faceted approaches to ensuring academic integrity against the background of academic student support.

Students can access electronic subject content and materials conveniently via the Web, research academic topics, complete their assignments and/or even write tests and examinations. However, Dednam (2009:23) agreed that many of them “still do not have sufficient” knowledge about technology and competencies with regard to computer and software skills that they will need “to apply during their studies and later in the work place.” She therefore argued around issues related to whether we should be doing away with computer literacy subjects at universities. Based on their pilot study, Payne, Kolb and Augustyn (2012:58), in a similar vein asked whether graduates from universities “are adequately meeting the expectations of potential employers” in terms of industry expectations for entry level Information Technology employees. In a preliminary study of business school students’ job preparedness regarding spreadsheet proficiency, Treadwell, Estep, Smith and Merritt (2013:87) concurred that if students graduate from a university programme without the “skills required for the performance of their job, it could negatively impact” not only the graduate, but also the university.

The research addressed in this paper touches on an increasing awareness of the remarkable range in terms of readiness of a large number of students currently coming into universities for the first time (Cooper, 2011:1). The purpose of the research that this paper presentation showcases and engages with centers on how theory on myITLab is being integrated with practice by facilitating technology-enhanced learning and innovative assessment for academic student support, especially with teaching of the subject occurring in an Open Distance Learning (ODL) environment. The research reported on in this presentation does have some aspects similar to that of Cooper (2011:1), who described how myITLab was integrated into an introductory computer applications subject. In a similar subject scenario, Goosen and Breedt (2012:57) presented on teaching in the changing environment of computer applications and technology-enhanced learning.

The paper proceeds to reference other research into optimizing the affordances of technology-enhanced learning, which “create opportunities for more collaboration and interaction between” students and allows for feedback from teaching assistants. Cloete, de Villiers and Roodt (2009:16) described how academics could use tools like Facebook for academic student support - they were adamant that such technology-enhanced learning and innovative assessments are crucial for increasing the effectiveness of online academic student support. An example of how the impact of such an intervention to increase student satisfaction was measured is also supplied. Finally, I will briefly touch on applicable aspects related to students’ learning styles and preferences, as well as the role that self-efficacy plays in academic student support.

This research paper explores academics’ and teaching assistants’ experiences and perceptions of how theory on myITLab can be integrated with
practice for computing subjects in the 21st century. They also share how working with the available features uses technology-enhanced learning and innovative assessment for academic student support. Some of the main arguments presented centre on formulating and situating significant concepts within the theoretical foundations of the field and an appropriate conceptual framework.

Similar to Goosen and Breedt (2013:57), the “research design is described, including the consideration of issues related to the” methodology used for data collection, “as well as the population and sampling”. A series of workshops were offered for full-time (secondary) academics and part-time teaching assistants who would potentially be involved in teaching the new subject. Due to the Open Distance Learning environment in which the subject is taught, our teaching assistants were allowed to complete their online training over a period of about six weeks. At the end of their training, teaching assistants were required to hand in a portfolio for assessment. One of the aspects included was a reflective blog post on their experiences of using myITLab, both as students trying to learn a new environment, as well as teaching assistants who would need to teach it to students. The “research approach that was used” reflects some of the qualitative data thus obtained.

Results are presented from academics “on both traditional and non-traditional educational programs”, together with discussions on “multi-faceted approaches to dealing with key issues” related to “new, state-of-the-art hardware and software” technology-enhanced learning (Kitahara, Westfall, & Mankelwicz, 2011:2). The research paper also includes discussions on what advantages myITLab provides for academics, teaching assistants and universities to empower successful 21st century graduates. “The merit of the study reported on, and relevance to this conference,” is thus further “justified in terms of frequent changes associated with” technology-enhanced learning that academics have to contend with (Goosen & Breedt, 2013:57). The changing roles of academics, especially in an ODL environment, have interesting implications in terms of academic student support.

Finally, conclusions are presented, including a summary of the most important results. I show how this research paper presentation could make a significant and original contribution to the field of research into open and distance learning - particularly with regard to integrating theory on myITLab with practice with regard to technology-enhanced learning and innovative assessment for academic student support, mainly in the domain of Information Technology.

References


5. Leila Goosen & Theopista Musaka-Lwanga
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Computing Academics Using Technology-Enhanced Learning for Academic Student Support in an Open Distance Learning Environment

The intention of this paper presentation is to showcase and engage with research in teaching Computing subjects in an Open Distance Learning (ODL) environment. More specifically, it relates to exploring academics’ use of technology-enhanced learning towards academic student support in the School of Computing (SoC) at the University of South Africa (UNISA). Pityana (2009) referred to trends, progress and challenges relating to Open Distance Learning in the developing world. He specifically mentioned a contributing factor to this research interest: the constant pressure that is put on Higher Education Institutions (HEIs) to increase their throughput rates, in order to attract funding from the national government. This would be because the improvement of throughput rates is a priority of the national government (Sondlo & Subtozky, 2010) - the latter being the main funding agency for HEIs.

The paper proceeds to referencing other research in the field, into how academics use technology-enhanced learning towards academic student support, in order to thus increase throughput rates, in some cases in Open Distance Learning environments. Mabunda (2010) investigated the challenges and implications of using technology-enhanced learning to assist with academic student support at Open Distance Learning HEIs. Botha (2010) explained how each individual academic has a role to play in student throughput - if academics work towards increasing pass rates in their respective modules, this could eventually lead to increased throughput in the programmes of study. Based on academics’ perspectives on technology-enhanced learning (Cant & Bothma, 2010), a view is developed of how it could be used for academic student support, in order to escalate throughput rates. Another viewpoint was offered by Nichols (2010), who contemplated student perceptions of academic student support services and the influence of targeted interventions on retention in ODL. Similarly based on student feedback, Ferreira and Venter (2011) considered barriers to technology-enhanced learning in an Open Distance Learning environment.

Related literature, which in each case presented opportunities for further investigation, included:

- Maathuis-Smith et al. (2010) studied how improved retention and completion rates could be obtained in a New Zealand Open Distance Learning environment
- Although Ergul (2004) investigated the relationship between student characteristics and academic achievement in an Open Distance Learning environment, this was for students of Anadolu University
- While Davis and Venter (2010) looked at drivers of performance in an Open Distance Learning environment, their students were postgraduate ones in a business course
- Even though Hörne and Naudé (2002) did investigate suggestions for increasing the throughput rate of ODL students in the School of Computing, the more than a decade since the publication of their study is likely to have seen large changes in the use of technology-enhanced learning.

Main arguments presented centre on formulating and situating significant concepts within the theoretical foundations of the field in an appropriate theoretical framework. Subotzky and Prinsloo (2011) presented a socio-critical model and framework for understanding, predicting and enhancing academic student support developed at the University of South Africa in an Open Distance Learning environment. Some of the concepts explained include, for example, Dreyer (2010) presenting a case study on dropout in a South African Open Distance Learning environment, and Fan and Lee (2007), who examined factors and practices improving student completion rates.

The research design and methodology used is described in terms of especially quantitative institutional data collection, which describe the pass rates of 30 modules across six years, together with use-figures of the institutional learning management system by the academics of these same modules.
The paper also includes discussions on how results relate to academics’ use of technology-enhanced learning towards academic student support in an Open Distance Learning Computing environment, and the implications that the changing roles of Computing academics have for academic student support, affectively and administratively. “The merit of the study reported on, and relevance to this conference,” are thus further “justified in terms of frequent changes associated with” technology-enhanced learning that Computing academics have to contend with (Goosen & Breedt, 2013, p. 57).

Finally, conclusions are presented, including a summary of the most important results. Similar to certain aspects of the article by Mbatha and Naidoo (2010), we show how the results of the research reported in this paper presentation significantly and originally contribute to the field of research into open and distance learning regarding emerging trends in, and the promotion and development of knowledge in fields related to, academics’ use of technology-enhanced learning towards academic student support in an Open Distance Learning Computing environment.

References


Ergül, H. (2004). Relationship between student characteristics and academic achievement in distance education and application on students of Anadolu University. Turkish Online Journal of Distance Education, 5(22), 81 – 90.


Nichols, M. (2010). Student perceptions of support services and the influence of targeted interventions on retention in distance education. Distance Education, 31(1), 93 – 113.

Pityana, B. N. (2009). Open distance learning in the developing world: Trends, progress and challenges. Keynote speech delivered on the occasion of the M-2009 23rd ICDE World Conference on Open Learning and Distance Education, Maastricht, the Netherlands.


The Changing Role of Academics in ODL with regard to Academic Student Support using Technology-Enhanced Learning

The intention of this paper is to showcase and engage with research on teaching Information Technology (IT) in an Open Distance Learning (ODL) environment. Research addressing themes relating to the changing role of academics with regard to academic student support using technology-enhanced learning will be presented.

Most universities have adopted technology-enhanced learning environments to facilitate academic student support. While other institutions across the country implement systems such as ClickUP (University of Pretoria) and eFundi (North-West University), the Learning Management System (LMS) used at the University of South Africa (UNISA) is known as myUNISA. However, from academics’ perspectives, technology-enhanced learning is not always implemented equally throughout various colleges, schools and departments (Cant & Bothma, 2010: 56).

An article by Mbatha and Naidoo (2010:171) set out to investigate problems hampering the collapse of distance in an ODL environment, and specifically the use of technology-enhanced learning from a student perspective. However, the purpose of our research had more in common with aspects from an article by Cant and Bothma (2010:55), who engaged with technology-enhanced learning from academics’ perspectives. Our research interrogates these related to the contexts of the changing day-to-day experiences of academics in ODL; we wanted to engage with the influence these have on academics’ ability to implement technology-enhanced learning for academic student support (Hart, 2008: 88).

The research questions around which we centred our inquiry therefore asked academics from the School of Computing to shape the first of their responses around whether they felt that their active involvement with technology-enhanced learning had them see any difference with regard to academic student support. They were also queried about the value they got from using technology-enhanced learning - was it beneficial in their teaching of IT subjects? Finally, they were requested to share their reflections on the changing role of academics in ODL, in terms of their use of technology-enhanced learning for academic student support in their subjects.

In order to begin engaging with the research questions set for this study, the remainder of this paper is organised by starting to refer to the latest and most relevant other research results in related fields, with a look at the so-called Net Generation of students. In 2010, the student profile in the College of Science, Engineering and Technology at UNISA, under which the School of Computing falls, consisted of 58.2% students between the ages of 25 and 39 years. According to an article by Barnes, Marateo and Ferris (2007:1), this profile is consistent with Net Generation students. These authors indicated that when teaching such students, it is important to note that they learn in different ways from their predecessors, since they are familiar with technology-enhanced learning.

In his paper, Hart (2008:91) pointed out that Net Generation students had grown up with the Internet and make intensive use of it in everyday life - it was established that people in the group similarly aged 25-34 are normally very computer savvy and virtually constantly online. This age group therefore exhibits particular online behaviour and attitudes, such as towards aspects like web personalisation. These students consciously choose in favour of teaching and learning techniques that suit them best, including doing most of their reading online, and this generation therefore need technology-enhanced learning environments (Barnes et al., 2007: 1). They also show a preference for collaborative academic student support, as relationships drive their learning processes and for them, social interaction is important when engaging with technology-enhanced learning.

Our review of references to other research in the field continues with an overview of the myUNISA LMS, together with a discussion of a selection of the tools available for technology-enhanced learning. This is followed by a section providing an indication of the extent to which students make use of myUNISA. Literature relevant to the topic of academics’ adoption of new technologies is also interrogated. The study is then located in relation to the theoretical foundations of the field and a
A conceptual framework that clarifies issues around a selection of the tools available within the institutional LMS. The research design and execution of the methodology used is outlined, in terms of describing the importance of interpretation for qualitative parts of the research design and considering issues of reliability and validity for quantitative designs. Both the quantitative and qualitative results obtained are described and discussed, providing insight into academics’ responses - these are in some instances connected back to references to other research in the field. We indicate the possible implications of the results of our study for the changing role of academics in ODL.

In conclusion, results are organised to answer the original research questions posed. The importance of this research paper is justified and options for future research identified. It is made clear how our results as reflected in this paper presentation will originally contribute towards scholarly debate in the field of research into open and distance learning – specifically, the contribution it could make with regard to the changing role of academics, by encouraging them to increase their use of technology-enhanced learning for academic student support (Mbatha & Naidoo, 2010:172).

Along with De Hart et al. (2011:171), we acknowledge that not all results obtained in this way can necessarily be addressed in an academic programme. However, recommendations are made about how these could be applicable and useful, by assisting academics in their changing ODL roles for improving academic student support using technology-enhanced learning.

**References**


**7. Bester Chimbo & Memory Tekere**

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**Use, knowledge, and adoption of emerging technologies by academics in the Schools of Arts, Science and Computing at UNISA**

The realisation of the advantages offered by e-learning accompanied by the use of various emerging information technologies has resulted in the extensive move by the academia towards e-learning (AlShemmary, Niir and Katheeth 2012). Advantages of e-learning include instant access to global resources, continuous quick and easy way to update curriculum, among others. The University of South Africa (UNISA), as a mega Open and distance learning institution in Africa has joined into this race and is putting in place systems to offer its tuition fully online in the near future. UNISA has advocated for e-learning requiring the use of emerging e-learning technology tools in all its academic aspects including administration, courseware delivery, and formative and summative assessment. Emerging technologies can be defined as tools, concepts, innovations, and advancements utilized in diverse educational settings to serve varied education-related purposes such as organisational, instructional and
Technology is always in upgrade for new applications and users despite being already established and as emerging technologies should be seen as such within a specific context. Emerging e-learning technologies are therefore not necessarily new but can be old and new innovations that are still in their infancy or are evolving, or coming into being in terms of their application or adoption for certain purposes (Ng’ambi et al., 2012; Veletsianos, 2010).

An analysis of the use, knowledge and adoption of emerging e-learning technology by academics in at UNISA, case of the Schools of Science, Computing and Arts was undertaken in this study. The academics in the Schools of Arts, Computing and Science were purposively selected in order to draw on views and experiences of academics from different teaching and educational backgrounds. Questionnaires distributed both electronically and manually were used for data collection. The results showed that academics in all the Schools were competent at the use of information technology tools and applications such as emailing, word-processing, Internet, myUnisa (UNISA’s online teaching platform), PowerPoint and Excel. An evaluation of the awareness of different emerging technological tools showed high awareness of Open Access Technologies (e.g myUNISA (92.9%), Social networking sites e.g. Facebook (89.9%), Blogs (85.9%), Video games (81.8%) and Microblogging platforms e.g. Twitter (80.8%).

While the level of awareness was high for these technologies, the use was low for most of the technologies except for Open Access Technologies (e.g myUNISA) and Cell/mobile phones and devices. A high proportion of the academics (62.3%) indicated willingness to migrate to online teaching completely and also indicated the need for further training on new technologies. The need for further training cannot be over emphasised as indicated by 82.0% of the academics indicating willingness to learn new technological approaches for teaching and 63.0% requiring online tutorial training. Also 26.3% of the academics indicated lack of competence in preparing material for online teaching. Some academics (15.3%) indicated a lack of knowledge as to the opportunities offered by technology to their teaching and this goes on to show there is a knowledge gap amongst academics as to what is technologically possible in different subject matter. A comparison of the different schools showed no statistically significant difference in the use, knowledge and willingness to adopt technology amongst the academics.

From the results of this study, it can be seen that the respondent academics are not opposed to adopting e-learning and use of the various tools available for e-learning. There is a good technology knowledge base amongst the studied academics and the understanding of the benefits, and willingness to learn and adopt emerging technologies in teaching is also high. Also it would appear that the usage of technology was not related to the academic school or teaching area of the respondents, but the choice and use of some technologies could be linked to the School in which the academics were for example Web 2.0 was most used by respondents from the School of Computing.

References


Teaching Civil Engineering Structural Course (Theory of structures) in an Open Distance Learning (ODL) Environment

University of South Africa (UNISA), an ODL institution, offers Civil Engineering at Diploma and Bachelor of Technology (Structural, Water, Environmental and Urban) levels. One of the key courses at diploma level is Theory of Structures, which is offered at the 2nd year. The course is the pre-requisite for most structural courses, for examples, Structural analysis, Structural steel and timber design and Reinforced concrete and masonry design. It is noteworthy that the course (Theory of Structures) is the bedrock of structural engineering courses, which covers basics structural analysis and mechanics. Civil Engineering is an aspect of broader engineering enterprise that deals directly with urbanisation. Most visible proof of urbanisation is structural infrastructure, good road networks and excellent public structures. Civil Engineers design, construct and maintain all forms of infrastructure, which include public structures, water structures and transportations. Civil Engineering is a broad field and it is further divided into specializations, which are: Environmental Engineering, Geotechnical Engineering, Highway Engineering, Hydraulic Engineering, Structural Engineering, Transportation Engineering and Urban Engineering. This paper focuses more on Structural Engineering which is an aspect of Civil Engineering that deals with analysis, design and construction of structures. Learning structural Engineering in an open distance learning (ODL) environment might be challenging for weak students because of the rigorous work involved.

Scholars from different discipline have defined distance learning (DL) and open distance learning (ODL) in different ways based on their individual perspectives and academics context (Greenberg 1998; Teaster and Blieszner 1999; Heydenrych and Prinsloo 2010). Distant learning has been defined as a teaching and learning environment in which the teacher and student are physically separated in space and possibly time. Open distance learning (ODL) on the other hand, gives open access to different kinds of learners with no restriction on age, social status, marital status and number. It is noteworthy that distant learning has both benefits and challenges. The benefits of distant learning include learning from wherever you are, at whatever time you want and the ability to work and study at the same time. The challenges can be capitalised on the sacrifice needed from the students to study after hours leading to having limited time to socialise and limited contact with fellow students and lecturers. Studying at an ODL institution requires great discipline.

Scholars, particularly engineers, have been asking questions about effective ways and methods to teaching engineering courses in an open distance learning (ODL) environment. Different teaching methods have been applied by different engineering teachers to facilitate engineering courses in an open distant learning environment. However, this paper is based on my personal experiences as an engineering teacher in an open distant learning institution (University of South Africa). This paper aims to show some of the teaching methods I used to teach a Civil Engineering Structural course, Theory of Structure II (TST271Z) in an open distance learning environment within the space of four years (2009-2012) and students output in terms of their academic performances. Improvement plans on the teaching methods are also put forward.

The teaching methods used and highlighted in the paper are telephone conversation, emails, Usage of myUnisa, discussion classes, video conferencing/DVD and personal appointment. Analysis and discussion were based on the teaching methods for the course, response from students and students' performance outcome over the past four years (2009-2012). Table 1 below shows the distribution of teaching methods used over four years. Increased use of myUnisa was adopted in 2012, with more interaction with students in terms of discussion forums, posting announcement and posting recorded video clip. The number of students that came for consultation was also increased in 2012.
Table 1: Distribution of teaching methods used.

<table>
<thead>
<tr>
<th>Year</th>
<th>Telephone</th>
<th>Emails</th>
<th>myUnisa</th>
<th>Discussion class</th>
<th>Video conference/DVD</th>
<th>Personal appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>25%</td>
<td>40%</td>
<td>20%</td>
<td>-</td>
<td>-</td>
<td>15%</td>
</tr>
<tr>
<td>2010</td>
<td>20%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>2011</td>
<td>20%</td>
<td>30%</td>
<td>20%</td>
<td>15%</td>
<td>5%</td>
<td>15%</td>
</tr>
<tr>
<td>2012</td>
<td>15%</td>
<td>25%</td>
<td>25%</td>
<td>15%</td>
<td>-</td>
<td>20%</td>
</tr>
</tbody>
</table>

Face to face interaction between lecturer and the students is vital; this is the main reason for discussion classes. Discussion class is one of the strong tools to bridge student-lecturer gap, however, UNISA being an ODL institution, students are scattered all over the globe and this makes it difficult to achieve the aim of discussion class without video conferencing. Table 2 shows the discussion classes attendance over the reported four years. Less than 25% attendance was recorded in all the classes organised. Therefore, a system should be put in place such that face to face contact is enhanced without being physically present.

Table 2: Discussion classes attendance.

<table>
<thead>
<tr>
<th>Year</th>
<th>April</th>
<th>September</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>2009</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2010</td>
<td>34</td>
<td>19%</td>
</tr>
<tr>
<td>2011</td>
<td>28</td>
<td>14%</td>
</tr>
<tr>
<td>2012</td>
<td>23</td>
<td>12%</td>
</tr>
</tbody>
</table>

The Percentage pass rate results shown in Figure 1 revealed that students’ performance increase in supplementary examination than the main examination. Increased in pass rate was observed for 2012 main examination compared to other years (2009, 2010 and 2011) main examinations. Also, the average final mark in 2012 was higher than for the other years’ main examination (Figure 2). This might be as a result of improved support given to students during the year 2012.
Figure 2: Average percentage final mark.

Personal improvement plans to assist the students’ pass rate are highlighted below:

- Preparing lecture series to be uploaded on myUnisa and other available UNISA online system, which will be accessible to students at any time and wherever they are.

- Adopting e-learning teaching method; this is advanced now at UNISA.

- Using online marking tools for quick assessment and feedback to students.

- Setting up self-assessment tutorials on a regular basis, which will be available to students anytime of the day.

- Designing of virtual practical session for students before attempting the real practicals.

References


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Towards a multidimensional framework for postgraduate supervision – an open and distance e-learning (ODeL) perspective

Teaching in an open and distance learning (ODL) environment has received ample attention in the past; however, there is still room for improvement with regard to postgraduate supervision. The problem at hand is the fact that South Africa is currently only producing 27 PhDs per million of the population annually. This research examines postgraduate studies within ODL and identifies key parameters that will enhance the quality of postgraduate supervision, which in turn should increase the production of postgraduates. A multidimensional framework is proposed that integrates the different key parameters. The goal of the proposed framework is to provide guidance on how to supervise effectively in an ODL environment.
environment. The first dimension focuses on ODL and the three core parameters within ODL, namely open, distance and learning. The second dimension focuses on the human aspects of postgraduate supervision. Aspects such as graduateness, motivation, technology view and more are grouped in this dimension. Thirdly, the strategic dimension is motivation. This dimension is subdivided into six enrichment factors, namely technology, milestones, contact, course, leadership and pedagogy. Each enrichment factor has one or more countermeasures, used during the implementation phase of the supervision process, to optimise the human aspect within an ODL environment. This article offers a new conceptualisation of postgraduate supervision in an ODL environment.

Introduction

South Africa can no longer hide behind the fact that it is an emerging economy when it comes to delivering PhDs because even compared with other emerging economies, South Africa is still under-performing. Its 27 PhDs annually per million people compares with 42 in Brazil, 172 in South Korea, 240 in Australia and 259 in the UK (MacGregor, 2009). Supervision of postgraduate students is an important issue within the educational environment all across the globe (Edwards, 2002, Lee, 2009). Apart from the need to guide students to obtain a postgraduate qualification successfully within the minimum study period, institutions are also dependent on the subsidies generated by these students when they graduate. Postgraduate completion success not only contributes to the education institutions' funding formula it also improves the reputation of the institution (IEASA, 2011). These subsidies form a substantial income stream, paid by government to any educational institution that sees postgraduate students through to the completion of their studies. It is therefore vital that all educational institutions ensure that, through proper postgraduate supervision, students complete their studies within an acceptable time frame (Mlambo, 2010, Wingfield, 2010). The South African strategy is to increase and accelerate human capital development, including postgraduate education to a large degree (CREST, 2009). This national strategy to increase the number of postgraduate qualifications within South Africa is directly linked to the economic development and global competitiveness of South Africa (ASSAf, 2010). It is vital for South Africa to remain competitive and to be able to generate knowledge that is responsive to a wide range of social needs (CREST, 2009). According to the Academy of Science of South Africa (ASSAf), 27 PhD graduates are produced per year per million of the South African population (ASSAf, 2010).

A large part of any postgraduate studies is dedicated to research activities. These research activities are by nature activities that cause students to work on their own, which can create problems, one of which being that they can experience isolation during their studies. ODL institutions often emphasise the guidance of these activities, while neglecting the post-graduate student as a person. These research activities can be made more “human” through, for example, more communication or contact, of all forms and kinds, between lecturers and students and also between peers. If this human aspect can be extended, it can be applied to the benefit of the students by helping them to become more successful in their studies, which may results in a better completion rate.

This article relates to enhanced throughput of postgraduate students at an open and distance learning (ODL) university and proposes a multidimensional framework specifically for postgraduate supervision, with a strong emphasis on the human aspect of this framework.

Background

The learning environment of an ODL institution is rooted in the primary functions of student support, namely cognitive, affective and systemic. The cognitive function supports the developing of learning, the affective function provides an environment which supports students and the systemic function establishes administrative processes and information management systems (Tait, 2000). By adding to the basic ODL dimension (which concentrates on the cognitive function) a human aspect dimension (which concentrates on the affective function), as suggested by Kritzinger and Loock (2012), as well as a strategic dimension (which concentrates on the systemic function), a more effective postgraduate supervision environment is created. This research is based on the primary functions of student support (Tait, 2000) as well as on the model of success and success factors in Internet-supported learning environments (Bekele, 2008). The current research, however, has moved the human factors in Bekele’s research (Bekele, 2008) to their own dimension, the human aspects dimension, since this research is about supervision at postgraduate level where the one-on-one factor is not a natural occurrence. Another dimension is then suggested for the multidimensional framework
called the strategic dimension. The rest of Bekele’s success factors (Bekele, 2008), namely technology, pedagogic, leadership and course factors, are incorporated into the third dimension. However, milestone and contact factors are also added to this dimension. These six factors are called enrichment factors within the strategic dimension. Each of the six strategic enrichment factors has one or more countermeasures, used when the supervision process is implemented. To be able to manage and use all the dimensions, enrichments and countermeasures to their maximum capability, a multidimensional framework is thus proposed.

References

ASSAF 2010. The PhD Study: An Evidence-based Study on how to meet the Demands for High-level Skills in an Emerging Economy. Consensus Report


IEASA. Year. In: 15th Annual International Education Association of South Africa Conference: The Impact of Internationalisation on the Quality of Higher Education, 31 August to 03 September 2011 Durban University of Technology, Durban, South Africa.

References

ASSAF 2010. The PhD Study: An Evidence-based Study on how to meet the Demands for High-level Skills in an Emerging Economy. Consensus Report


IEASA. Year. In: 15th Annual International Education Association of South Africa Conference: The Impact of Internationalisation on the Quality of Higher Education, 31 August to 03 September 2011 Durban University of Technology, Durban, South Africa.

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Supporting students by arranging field trips in engineering – a case study in Geology

This paper presents scientific literature and empirical data substantiating the use of field trips in mine engineering as a tool to integrate theory with practice for engineering students in Mining Geology 2. Empirical data is collected in the form of questionnaires to ascertain mine engineering student perceptions on field trips. An exploratory study involving qualitative analysis is used to try to ascertain key benefits and challenges faced by students engaging in this activity. A few recommendations are made as to how field trips may be managed in order to enhance the teaching and learning of African engineering students.

Introduction

Higher educational institutions in South Africa are currently experiencing low throughput rates in many of their educational programmes, including engineering (Scott et al., 2007). This has a negative impact on the number of competent engineering graduates, the government subsidies received from the Department of Higher Education and Training (DoHET) and on the socio-economic growth of communities in South Africa. Many factors contribute to this low throughput rate, including lack of student motivation, not aligning theory and practical within the curriculum and not exposing students to real world situation (Tschirner et al., 2001). Research has shown that science and
engineering students encounter difficulties in conceptualising theory due to a lack of direct hands-on experience (Orion, 1993). Students from ODL institutions often lack background knowledge and experience of their chosen career or expected working environment and subsequently experience numerous challenges in the design of new models or principles which are expected from graduate engineers. This paper subsequently addresses one possible student support system in an effort to improve the teaching and learning of engineering students, namely field trips. One module in Mining Geology 2 is presented as the case study for this research.

The importance of field trips in engineering

Engineering is an applied endeavour which interacts with society; therefore engineering education has to change continually as society changes in order to keep abreast on new developments (Pantazidou & Marinos, 2011). Changes in society require constant research and fieldwork by scientists and engineers in order to conceptualise and design solutions for the changes in society. One area of fieldwork in science and engineering education includes field trips which is an educational tool for students to interact with changes in society and as a tool to help students conceptualise theory with reality (Engelder, 2006). In Mining Geology at UNISA, field trips are used as a tool to help integrate theory and practical. The purpose of using field trips in Mining Geology is to help engineering students understand the important principals of Geology, as well as the importance of decision making in designing appropriate engineering structures. The University of Athens (Greece) has used field trips since 1992 in Civil Engineering for Engineering Geology. The purpose of the trip was to demonstrate the importance of Engineering Geology in engineering, and expose students to real world concepts and principles as presented in the theoretical literature (Pantazidou & Marinos, 2011).

Physical exposure gives a student an opportunity for hands-on experience, encouraging the student to become self-motivated to work towards a higher position (Nazier, 1993). In most cases students with practical knowledge are more sought after in industry than students with just theoretical knowledge. Physical exposure to real world scenarios gives students the opportunity to engage both their cognitive and gross motor skills, helping them to become competent, self-motivated and significant contributors to the advancement of humanity. Industry is searching for individuals that require less practical training and supervision and more initiative and logical reasoning.

The use of field trips appeal to a number of learning styles identified by Felder and Silverman (1988) and include active learners (learn by doing and working with others), visual learners (learn by what they see), verbal learners (learn by what they hear or read) and sensing learners (gathers facts, data and procedures through their senses).

Integrating theory and practical in an engineering curriculum is mandated by a number of accreditation bodies in the world, including the Engineering Council of South Africa (ECSA) (Swart & Sutherland, 2007). Some of the exit level outcomes prescribed by ECSA requires engineering students to apply scientific and engineering knowledge (number 2), to communicate effectively (number 4), to demonstrate engineering management abilities (number 5) and to be aware of the impact of engineering activities on the industrial and physical environment (number 6). Communicating occurs when the students interact with the facilitator on the field trips while they observe first-hand the effect of mining operations on the physical environment.

Students from ODL based institutions often falter in this as they are not given the desired exposure and opportunity to work in a well-equipped laboratory as provided by more traditional residential universities. Students in Mine Engineering have actually gone so far in establishing their own society in an effort to help tackle these issues (UMS, 2012). Other initiatives include close collaboration with universities equipped with mine engineering laboratories or then the use of field trips.

Methodology and results

Descriptive statistics of a mainly qualitative study using an exploratory design is used. The exploratory design seeks to establish key benefits and challenges experienced by engineering students partaking in the field trip. Results indicate that the students really enjoyed the field trip, as they were able to associate theoretical terms with practical field equipment, thereby reinforcing their mental images of the equipment with which they are to work one day. Numerous challenges were also identified and include assembling at one point of departure, logistics associated with the mine being visited and the planning of the trip. As most of the College of Science, Engineering and Technology is based in Pretoria and the Department of Electrical and Mining based in Pretoria.
Florida, most of the students based in Pretoria have to travel to the Florida campus, and this proves challenging for many, especially due to financial constraints. Other economic factors impacting on the field trip includes the fact that the mine being visited is an old non-operating mine which does not holistically give students the exposure to a fully operating mining environment. The field trip is not compulsory and neither is a written report of what experience was gained by the students.

Conclusions

Using field trips in science and engineering is a tool which may reinforce student motivation to engage more fully with the subject material, leading them to integrate theory and practical within an engineering curriculum. It may further enable students to change their mind-set towards mining related operations, giving guidance as to how they need to deal with changes in society. These, and other student support systems, may help engineering students to achieve academic success, impacting positively on the throughput rates of institutions and subsequently on teaching output grants awarded by the DoHET in the RSA.

References


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Chemistry post-graduate student training from an ODL perspective

ODL is considered nowadays as the most viable means for broadening educational access while improving the quality of education, advocating peer to-peer collaboration and giving the learners a greater sense of autonomy and responsibility for learning (Calvert, 2006). At times there appears to be confusion between open distance learning (ODL) and online distance learning (ODL) (Mphahlele, M.J.; Tafesse, F. 2012). Distance learning includes e-learning, online learning, open distance electronic learning (ODEL), text-based learning and courses offered via written correspondence. Moreover, direct contact with students forms an integral part of any laboratory-based training in disciplines such as chemistry, which requires routine and sustainable access to laboratory and analytical equipment. Therefore the admission of students into postgraduate program in chemistry depends on the availability of adequate research infrastructure (laboratory space and analytical equipment), funds for consumables and analysis (service rendering) and availability of suitably qualifies staff. For admission into BSc Honours degree in chemistry, students must possess an accredited BSc degree with chemistry as a major or equivalent qualification (within the past five years) with an average of 60%. The study program is structured as a combination of course work (65%) and limited research work (35%). The course work may be accomplished in ODEL mode...
while the laboratory component demands a face-to-face contact and access to a working chemical laboratory. For admission into an MSc program a student must possess an honours degree in chemistry with an average of 60% or above. The department may recommend that the student concurrently register and pass some selected honours module/s. The MSc study is a research program (100%) and culminates into a dissertation or thesis which may lead to a publication in an accredited chemistry journal. On the other hand, a student may be admitted to a PhD program if he possesses an MSc degree in chemistry with a minimum average of 60% for the MSc thesis. The PhD program is entirely research-based and culminates into a dissertation/thesis, which should lead to publication/s in accredited chemistry journal/s. In addition to meeting these minimum requirements for admission into MSc and PhD programs in chemistry, it is clearly stated in the Department of Chemistry Postgraduate Brochures that the students must:

(a) have a suitable research topic selected in consultation with the Department;
(b) agree to utilise the laboratory facilities at UNISA or have access to a laboratory facility suitable for the envisaged research work; and
(c) select or have access to a suitably qualified supervisor or joint supervisor (with at least a PhD degree qualification) under whose direct guidance the research work can be carried out.

(d) Final admission into masters and doctoral programs depend on passing research proposal module.

Students who have sustained access to laboratories such as in academia or chemical industries can do their practical work in their respective institutions and work place at their own pace. For the other group of students who don't have access to laboratory and analytical facilities, the training may be accomplished on full time basis in the facilities of the Department of Chemistry at UNISA. A number of intra governmental attempts to launch split-site postgraduate programs in laboratory-based disciplines such as chemistry did not materialize to the satisfaction of both parties as the above crucial points (admission criteria; availability of infrastructure, capacity on both sides; etc.) were not considered before inviting students to apply for the study.

Although the department has a history and culture of research and postgraduate student training dating back to the correspondence era, the profile of the pipeline students has since changed in terms of demographics and to-date it is dominated by relatively younger candidates with no attachment to industry or any other accredited laboratory facility. The question is- how does the Department of Chemistry at UNISA continue to conduct and sustain high quality research and postgraduate student training program? The most applicable model currently employed by the Department of Chemistry at UNISA involves in-house training of postgraduate students on research. The authors wish to extend their experience to various types of split-site models applicable for laboratory-based postgraduate student training within the ODL framework. These models, which emphasize mutual cooperation (Sooryamoorthy, R., 2013) between all stakeholders may be adopted by other laboratory-based science disciplines that plan to venture into the business of postgraduate student training within the ODL context. Moreover, it is hoped that the models proposed will enable authorities at UNISA to set realistic goals (through benchmarking) and to create sound postgraduate admission and research policies that also cater for laboratory-based disciplines.

References


The explosive growth of information technology is forcing universities into structural paradigmatic shifts that affect their core business. At the core of the transformative processes lies the continuous alignment and strict adherence to their tuition and learning policies. Information and communication technology (ICT) innovations combined with the ubiquity of learning management systems, is reconfiguring and strengthening current teaching and learning delivery modes in Mathematics education.

The use of ICT in mathematics education has been faced by various challenges. One of these challenges includes the standardization of theoretical frameworks, methodologies and constructs when using ICTs in mathematics education. The European Technology Enhanced Learning in Mathematics (TELMA) project identified a “fragmentation of theoretical frameworks” in mathematics education research when using ICTs from six research teams involved in the project (Bottino & Kynigos, 2009). Pedagogical theories in mathematics education have been developed independently in different parts of the world, taking into account different cultural contexts that include different classroom practices, values and diverse institutional contexts (Prediger, Bikner-Ahsbahs and Arzarello, 2008). There are several plausible explanations for the presence of multiple theories of mathematical learning, including the diverging, epistemological perspectives about what constitutes mathematical knowledge.

A spiking thorn in most mathematics education environments is the design of ICT tools that accommodate a diversity of students, in terms of culture, learning preparedness and socio-demographic contexts. The reason being that of the prevalence of diverse mathematical concepts and lack of a composite of didactical skills on how lecturers can design, develop and implement ICT enriched learning materials, including a scarcity of electronic learning environments that have valuable mathematical epistemological affordances for the students.

Lecturers might have rich and strong untapped teaching skills and experiences of what learning means in their courses. This entails that they might have skills to develop ICT tools for the teaching of mathematical concepts. The question is whether the ICT tools are developed using an informed pedagogy or they just serve as mere technological innovations. Should mathematics educators embrace a comprehensive pedagogical theoretical framework including software engineering practices, when designing, developing, and deploying ICT tools for mathematics teaching and learning? If so, how do they know that the pedagogy used is relevant, useful and is of epistemological value? This paper unravels cognitive apprenticeship as an instructional approach to develop, deliver and evaluate function transformation learning objects developed using GeoGebra. The learning objects delivered in the form of applets have significant epistemological affordances (Sierpńska & Lerman, 1996) for students learning online or at a distance.

Although most of pedagogical frameworks do not promote the use of ICT in Mathematics education, in the majority of cases computational tools have been used to explore students’ learning experiences or as an evidence of technological innovation. Technological tools have been used mainly for the visualization of mathematical relationships (Metexas & Karagiannidou, 2010; Hitt & Kieran, 2009). Some research studies focussed more on the didactical use of the theories rather than fusing these theories in the design of the computational tools to be used in mathematics education, and these theories include, Realistic Mathematics Education, the Task-Technique-Theory (T-T-T) theoretical framework (Hitt & Kieran, 2009), integrative theoretical frameworks (Artigue, Cerulli, Haspekian & Maracci, 2009), a taxonomy of pedagogical opportunities (Pierce & Stacey, 2010), the framework of a knowledge manifold (Naive and Nilson, 2004), the semiotic framework (Yen and Nason, 2008). The different learning theories produce a set of antagonistic results which are diverging and unconnected. Most of these theories have been implemented in classroom situations not in an ODL setup like UNISA’s context. In an ODL setup the research
results maybe different as students learn at their own paces and limited guidance from the lecturer.

There is a large volume of research in mathematics education involving the use of ICT tools in the teaching and learning process (Bokhove & Drijvers, 2010; Metaxas & Karagiannidou, 2010; Hitt & Kieran, 2009; Durmus & Karakirik, 2006). The literature mainly deals with developing particular mathematical abilities in the students for example algebraic expertise (Bokhove & Drivers, 2010; Kidron & Drefus, 2010; Trgalova, Bouhineau & Nicaud, 2009), geometry expertise (Dubinsky & McDonald, 2001; Metaxas & Karagiannidou, 2010; Pierce & Stacey, 2010; Todd, Lyublinskaya & Ryzhik, 2010). The complexity of the field of mathematics education may require that mathematical concepts to be explained or described by a diverse of connected and intertwined theoretical perspectives, rather than a single, or monolithic approach. This research study took into account such complexities and use cognitive apprenticeship as its instructional strategy of choice. The reason being that cognitive apprenticeship strategies are a blend of methods optimal for teaching complex and ill-structured topics in which students need to solve problems and make decisions (Collins and Brown, 1999). The literature shows that cognitive apprenticeship environments have been applied in online educational settings, but not heavily in open and distance learning environments. The research studies in mathematics education that involved cognitive apprenticeship are mainly face-to-face and majority do not include undergraduate mathematics courses. The majority of the researchers in mathematics education only specify the theories of learning or the theoretical approach behind the design, learning facilitation and inclusion of technological tools in their teaching strategy. The process of the analysis and selection of the computing tools used in their research is in some cases are not tied with particular pedagogical theoretical approaches. We think that analysing and selecting computing tools for teaching mathematics concepts using a theoretical framework make these tools to be viewed as pedagogy and not as technological innovations only. A supportive theoretical framework is necessary to help in the selection, design and analysis of the ICT tools for the teaching of the transformation of functions using an online environment. The analysis, selection and design of the ICT tools for this research is based on Laurillard’s Conversational Framework (Laurillard, 2004).

REFERENCES


Master’s and doctoral studies: Fully online or blended approach

Open Distance Learning (ODL) institutions have a vital role to play within the higher education sector in South Africa. The University of South Africa (UNISA) is South Africa’s biggest ODL institution and strive to be an academic leader within South Africa, Africa and beyond. The past 140 years UNISA positioned itself as the leading provider of higher education opportunities within the ODL arena. One challenge UNISA is currently facing is the growing use of information technology in the modern world. Information and Communication Technology (ICT) is vital within the ODL environment to ensure that the “distance gap” is bridged between lecturers, students and the institution.

UNISA is keeping peace with internal ODL institutions and is on the verge to change the teaching and learning process to be fully online within the next few years. Some questions that should be asked in this research are: Is UNISA ready for this change? Is there necessary ICT in place to support the lectures and students? Is UNISA ready for fully online education? Will masters and doctoral student’s special needs be catered for?

The primary goal of this research is to investigate the link between postgraduate studies (masters and doctoral studies), research and related ICTs. ICTs play a crucial role in enhancing research engagement (teaching and learning) between masters and doctoral students and their supervisors in an ODL institution such as UNISA. Given a plethora of ICT technologies available to users, and also given the fact that Africa is technologically challenged, choosing which technology to use for the students by UNISA or supervisors might differ from the students' preferred technologies or technologies at their reach. As such reaching a consensus as to which technologies students and supervisors should use for engagement might lead to efficient delivery of education in the UNISA “fully online” ODL environment.

A mixed methods study of students/supervisor communication technology preferences and those offered by UNISA can aid UNISA in adopting or improving the technologies it has available for use by students and their supervisors. This is in order to achieve their purpose, improve and sustain the quality of education which in a long run might have positive contribution towards addressing masters and doctoral low throughput rate.

This research study will investigate the technology preferences of masters / doctoral students and those of their supervisors compared to those offered by UNISA in order to bridge the distance gap that exists between students and their supervisor at Unisa.

References


Mbatha, B.T & Manana, K.P.P. 2012. ‘Students’ perceptions of the use of Facebook’ Progressio, 34 (1) 113-126.

Unisa Open Distance Learning Policy Approved – Council – 03.10.08. Pretoria: UNISA.
First year UNISA students: Who are they? What are their expectations? Where are they from? Why UNISA?

What do we know about today’s student?

For the academic year 2012, there were 5 171 first year students registered for the Diploma in Information Technology, School of Computing. Of the 5 171, 151 were under 19, 1 255 between the age 30 to 39, 21 between the age 50 to 59 and 3 that were over the age of 60. Students belonging to a particular age group have different expectations and needs. One of the greatest challenges facing UNISA is how to deal with such a variety of ‘new’ students (Oblinger, 2003). Not only is the profile of today’s student body different, but the life experiences that shaped today’s students are quite different from those of previous eras. Each generation is defined by its life experiences, giving rise to different attitudes, beliefs, and sensitivities (Oblinger, 2003). Of the 5 171 there were 3 530 students between the ages of 20 to 29. The Millennial generation, who were born in or after the year 1982. Their learning preferences tend toward team, experiential activities, structure, and the use of technology. Their strengths include multitasking, goal orientation, positive attitudes and a collaborative style (Oblinger, 2003). Technology for this age group is assumed to be a natural part of their environment. Instant messaging and e-mail seem to be natural communication and socialization mechanisms. Oblinger (2003) mentions author Jason Frand’s ten attributes of an information-age mind-set; Computers aren’t technology, they are an assumed part of life; The Internet is better than TV; Reality is no longer real; Doing is much more important than knowing; learning more closely resembles Nintendo than logic; Multitasking is a way of life; Typing is preferred to handwriting; Staying connected is essential; there is zero tolerance for delays and consumer and creator roles are blurring with file-sharing, cut-and-paste world, distinctions between creator, owner, and consumer of information are fading (Oblinger, 2003). This research aims to understand the generation of students we service. To understand them is to improve student retention and reduce the number of students that drop out in their first year of studies. An essential component of facilitating learning is understanding the students we teach (Oblinger, 2003). Their learning styles, attitudes, and approaches of high school students differ from adult learners...how well do we understand these differences? How often do we take these differences into account when designing our modules (Oblinger, 2003)? How well are our learner’s views represented in institutional decisions about courses, curricula, programs, and services? Does the institution have a mechanism that balances student’s preferences with the opinions of academics and administrators? (Oblinger, 2003)

Onyancha mentions authors Schenck and Chiaravalle (2007), who argue that ‘by knowing your customer geographics, you know who to reach; and based on their behaviour patterns, you know how to reach them’. He also mentions author Hosey (2008) who suggests that one needs to ask oneself questions such as the following: Who exactly are one’s customers? What are their behaviours? What issues or challenges do they face? What is the best medium to reach them? And, what are their profiles?

At higher institutions of learning, the student is portrayed as the customer.

Wilson and Gerber’s essay on Generational Theory and how academics can improve teaching states that the Millennial generation is a new ‘Great Generation’. This generation of students display ambition, confidence, optimism, and a capacity for high-level cooperative work, however they measure high on scales of stress, conventionality, and over-reliance on parents (Wilson and Gerber, 2008). Wilson and Gerber (2008) mentions authors Strauss and Howe (2000), these authors state that Millennials have been ‘buckled, watched, fusses over, and fenced in by wall-to-wall rules and chaperones’. Another characteristic of the Millennial generation is that they work in task groups and are skilled in collaborative efforts. Strauss and Howe (2000: 44) comments ‘From Barney and soccer to school uniforms and a new classroom emphasis on group...
learning, Millennials are developing strong team
instincts and tighter peer bonds’.

Generational theory has been studied as a source
of new insights on teaching and learning. It also
provides a possible reason as to why there is a
high dropout rate in the first year Diploma:
Information Technology. Maybe we do not
understand the generation of students we teach,
we are not reaching them on their level of
understanding and comprehension.

Our skills as instructors / academics need to
advance in traditional, on-line and hybrid contexts.
We need to offer a set of teaching strategies
derived from the interaction of this theoretical
four pedagogical ‘adaptations’ to the Millennial
‘personality’: (1) strive for greater clarity in course
structure, assignments, and grading expectations;
(2) provide significant opportunities for student
initiative, participation and choice; (3) incorporate
stress-reduction mechanisms; and (4) rigorous
attention to the ethics of learning.

Academics need to replace independent study with
collaborative learning and peer review of
performance (Twenge: 180-211).

A demographic profile of student’s gender, past
education, school subjects completed and trends
in terms of age groups over the years will be done
using UNISA’s institutional information and
analysis portal maintained by the Department of
Information and Strategic analysis (DISA). A
questionnaire will also be sent out to students
using survey monkey.

Based on the information gathered it can be
recommended that a website for first-year students
be created, the School management committee
send out a basic questionnaire to all first year IT
students with the aim of getting to know them
better, that all academics get access (linkage) to
UNISA’s information portal and that DISA send a
report at the end of each registration period, on
student’s profiles.

UNISA must find a variety of ways to meet
student’s expectations for service, immediacy,
interactivity and group activities. There is no
single formula, particularly since students often
span broad ranges of ages, learning styles, and
communication preferences (Oblinger, 2003). In a
24x7, customer-service culture, delays cause
dissatisfaction and disengagement, UNISA must
find ways to eliminate delays in processes that
range from admission to academic support
(Oblinger, 2003). For today’s learners, customer
service is an expectation, not an exception.
Customer service is more than a preference – it is
a prerequisite to retention and effective learning
(Oblinger, 2003).

References


Wilson, M & Gerber L.E. 2008. ‘How Generational
Theory can improve teaching: Strategies for working with
Millenials’, Current in Teaching and Learning, 1  (1):
29-44.

Onyancha, O. B. 2010. ‘Profiling students using an
institutional information portal: a descriptive study of the
Bachelor of Arts degree students, University of South
Using Adaptive eLearning Technologies to Improve Student Retention and Throughput

eLearning has the potential to transform the way in which lecturers teach and the way in which students learn. It can address many of the key challenges and frustrations faced by lecturers, particularly notably high failure rates; and the inability to assess students regularly and give them personalised feedback.

Adaptive learning technologies provide lecturers with tools they can use to engage students, and to customise the learning experience for them. It also allows us to move from the traditional "one size fits all" mode of education to one that is tailored to each individual learner.

In my presentation I will examine examples of South African institutions using adaptive learning technologies and discuss the impact they are having on the lecturers' teaching methods and on the students' performance.

Technology enhanced learning in electrical engineering education

This paper presents scientific literature and empirical data substantiating the use of technology enhanced learning in electrical engineering education. Technology enhanced learning (or technology education) is defined in this paper as the use of electrical and electronic equipment to help students acquire needed practical skills and to reinforce their theoretical knowledge. Empirical data is collected in the form of questionnaires to ascertain electrical engineering student perceptions of this type of learning. An exploratory study involving qualitative analysis is used to try to ascertain key benefits and challenges faced by students engaging with technology enhanced learning. Key recommendations are made as to how technology enhanced learning may improve the success rates of African engineering students.

Introduction

Higher educational institutions in South Africa are currently experiencing low throughput rates in many of their educational programmes, including electrical engineering. This has a negative impact on government subsidies received from the Department of Higher Education and Training (DoHET), and subsequently on the purchasing of new equipment and technologies required in engineering education. Many factors contribute to this low throughput rate, including lack of student motivation, not aligning theory and practical within the curriculum and not exposing students to real world situation (Tschirner, Ramaswamy, & Harris, 2001). Furthermore, “The undergraduate engineering curriculum shapes and constrains the learning experience for every engineering student (ECSA, 2011, p. 82)”.

Subsequently, “Media-based and online learning could potentially play an important complementary role in supporting
teaching and learning for two main reasons. Firstly, changes in society and increasingly media rich interactive and online modes of communication require that universities move beyond traditional chalk and talk approaches. Secondly, there is a need to manage and support individual, self-paced learning in the context of large classes and student diversity and under-preparedness (ECSA, 2011, p. 94). This paper will address the use of media-based learning (in the form of technology education) as a means to integrate theory with practical in an electrical engineering curriculum. Two modules are presented where technology was used to reinforce the theoretical knowledge through practical work.

**Integrating theory with practical in electrical engineering education**

Two modules were considered, Process Instrumentation 4 and Radio Engineering 4. These modules form part of the BTech: Engineering: Electrical qualification which comprises a minimum of 7 modules and 1 project (each module is worth 12 credits while the project is 36 credits, resulting in a total of 120 credits required to complete this qualification).

One of the theoretical aspects in Process Instrumentation 4 which needs to be reinforced by practical work involves programming a logic controller (termed a PLC) for use in the automation of industrial processes in industry. Basic concepts are introduced in the first year of study, and then built on and expanded through each subsequent level. Students must therefore progress to a stage where they are able to complete actual industrial tasks making use of the PLC equipment, software instructions and addresses used in Industry. This leads to constructive alignment (Biggs, 2001) of the various modules (Process Instrumentation 1 – 4). One of the theoretical sections requires students to write a PLC program that will control the liquid storage within two separate tanks. The filling process is triggered by means of an empty signal and stopped by a full signal which is sent to the control units (connected to a PC) by float switches. Students are supplied with the PLC simulation software where they can verify the correct operation of their program. The practical part or laboratory work now involves downloading their program to an actual system and seeing its operation in a real life scenario. This laboratory work is becoming a reality at the Florida Campus, where students are already working with the PLC simulation software in a controlled environment.

Radio Engineering 4 assists students to comprehend time and frequency domain analysis where they get to design a number of Radio-Frequency (RF) circuits. This module builds on previously acquired knowledge in Radio Engineering 3 and Electronics 1-3. One of the theoretical sections in Radio Engineering 4 involves phase-lock-loops, where students need to understand the operating principles of frequency generation and actual design two different RF generators. Students are then required to physically build these two RF generators on an electronic circuit board, which must be submitted for assessment. Theoretical design procedures and mathematical calculations form the theory where the construction and fault-finding techniques form the practical which must complement each other. The electronic circuit board must work and is evaluated using an electronic oscilloscope and a frequency counter, forming part of project-based learning.

Fusing theory and practical in an engineering curriculum is mandated by a number of accreditation bodies in the world, including the Engineering Council of South Africa (ECSA) (Swart & Sutherland, 2007). Some of the exist level outcomes prescribed by ECSA requires engineering students to apply scientific, engineering and complementary knowledge (number 2 and 6), perform engineering procedural design (number 3), and demonstrate engineering management abilities (5). These exist level outcomes exist in the modules described above.

**Methodology and results**

Descriptive statistics of a mainly qualitative study using an exploratory design is used. The exploratory design seeks to establish key benefits and challenges experienced by students involved with technology enhanced learning within the two stated modules. These qualitative results represent relatively new perceptions of students in the Department of Electrical and Mining Engineering who has just recently acquired new laboratories at the Florida Campus for practical training. Results indicate that students really enjoy this form of practical training (either by attending the practical work in the laboratory or submitting their electronic circuit board) while acquiring necessary practical skills required by Industry.

**Conclusions**

Using project-based learning and computer simulations (both inclusive of technology education) exposes engineering students to numerous fine motor skills, cognitive skills and social skills as they engage their hands, thoughts
and voice in demonstrating the achievement of specific learning outcomes in these two modules. These and other interventions may help students to achieve academic success, impacting positively on the throughput rates of institutions and subsequently on teaching output grants awarded by the DoHET in the RSA.

References


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**Sustainable knowledge of ODL technologies on academic student support in distance learning in South Africa**

**Background**

Conventional education is experiencing classical challenges among many nations of the world, hence the growing importance of educational technologies in teaching and learning. Critical impediments in the planning, changing societal needs and the local conditions have limited progress towards the achievement of developmental goals. Educational reform drive in many countries is of economic security and viability resulting to a paradigm shift from an instruction centred academic institutions model to a learner centred integrated network model which is based on student-support initiative.

Educational accessibility is increasingly a millennium phenomenon, providing access to education without constraining learners to the four walls of the conventional school system. Open and Distance Learning (ODL) is quickly immersing in technological systems making it an emerging alternative mode of learning. It is seen to be an acceptable mode of extending the outreach of educational opportunities globally, ranging from developed to developing nations. It is also viewed as a promising effective channel to help overcome barriers of time and space for students studying through the distance mode. Effective use of technology for both transformation and enhancement of teaching and learning in (ODL) has recently attracted the interest of many researchers in distance education literature, (Prinsloo, 2011, Nyandara, 2012). Distance education providers across the globe rely on these technologies for the delivery and implementation of various ODL pedagogical strategies. Due to the increased reliance of technology as a teaching and learning delivery system in distance education, it is imperative that distance education institutions adopt academic learner support models that enable learners gain formal knowledge of ODL technologies. We motivate the incorporation of structures that support formal learning of ODL technologies as part of academic learner support.

The main Objective of the study is to motivate formal learning of ODL technologies as part of learner support, collect and analyse information on how formal learning of ODL technologies is implemented in distance education institutions. The key aspects of learner support in ODL that deals with the use of educational technologies are examined.

**Methods**

Policies on academic learner support, teaching and learning of educational technologies in ODL institutions were reviewed. A web-based survey of strategic plans of universities was conducted. A total of 8 universities world-wide (South Africa, one; United states, two; Spain, one; United Kingdom, two; Canada, one; Australia, one) were considered as case studies. We collected and
analyse information across the studies over a period of 15 years, starting from 1998 to 2013.

Results

The preliminary studies indicate that, most distance education institutions require students to be familiar with the use of educational technologies. The nature of learner support that deals with the teaching and learning of educational technologies is ‘informal’ in these institutions. The acquisition of the knowledge, exposure and skills on how to use educational technologies by students to enhance their learning experience is not incorporated in the curriculum as a core requirement. In most cases students are merely introduced to the potential uses of these technologies without proper structures on how they can integrate into distance education pedagogical strategies. In other cases, where there are little structure or some form of formal teaching and learning of these technologies, students are charged extra exorbitant fees (Nyandara 2012). The information and analysis drawn from the case studies, indicate that adopting a learner support model that incorporate formal teaching and learning of educational technologies, (where a formal module /course on educational technologies is developed and included as part of the curriculum of every student intending to study through Open and Distance learning environment) is inevitable.

Conclusion

We have used a variety of sources in the analysis of the evidence that supports the incorporation of formal teaching and learning of ODL technologies as part of learner support. We have drawn from the literature and particularly from the formal case studies in motivating the need for learners to be taught the use of ODL technologies through academic support initiatives.

References


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Towards linking diagnostic assessments’ results to academic support programmes’ development

Historical background

The recent developments in the curriculum development, implementation and recurruculation of the South African Basic Education system have created a situation of ‘panic’ in the Higher Education (HE) sector of the country. This situation emanates from the uncertainty relating to the meaning of school leaving certificate in terms of being predictive of future academic achievement. There is also a growing concern that “the school system still does not adequately prepare students for the demands of the higher education study and curriculum structures are not able to address the needs of the majority of students wishing to embark on tertiary study” (Yeld & Prince, 2012).

As a response to this ‘panic’, there was a frenzy of test development initiatives by many universities and other education consortia in the country (Boughey, 2010). Some of these tests were referred to as ‘entrance/selection/admission/placement’ assessment tools. In view of this conglomeration of assessment activities, Higher Education South Africa (HESA) commissioned the University of Cape Town (UCT)’s Centre for Higher Education Development (CHED) in 2005 to champion a national diagnostic assessment initiative. National Benchmark Tests (NBT’s) were thus developed and administered to address this need and to
streamline pre-HE selection and/or placement initiatives in a bid to centralise and nationalise the process.

The University of South Africa (Unisa) does not participate in the NBT’s, firstly due to a general vague view that these tests are pitched at too high a level for the profile¹ of this university (Prinsloo & van Rooyen, 2007). Secondly, NBT’s are viewed as providing information that does not seem to be very different from that provided by the school leaving certificate, except for categorising participants into three broad streams according to achievement on the tool (Yeld, 2009). The two views led to Unisa commissioning the university’s Directorate for Counselling, Career and Academic Development (DCCAD) to engage in a pilot study that entailed development of an online diagnostic assessment tool that would generate information about essential academic literacies skills with or without which students are coming into the university. The identification of such skills would help in directing the development of intervention activities towards closing “the so-called articulation gap between schooling and Higher education, which continues to pose a challenge” (Yeld & Prince, 2012).

Presentation outline
This presentation has an objective of sharing the ‘on-going, work-in-progress’ of the four ensuing studies which were conducted with different cohorts of the Colleges for Economic and Management Sciences (CEMS); Science Engineering and Technology (CSET) as well as Animal and Environmental Sciences (CAES) of Unisa.

It hopes to take the audience through the test development process, administration, analysis of students’ results as well as the analysis of the tool’s performance for each cycle of assessment. The methodologies employed and the theoretical underpinnings of the studies will form part of the discussion.

The presentation will also highlight the parallel study, that is, the tools’ evaluation of predictive validity for the different cohorts who were subjected to it.

The statistical methods used as well as the challenges experienced will be highlighted.

Literature reviewed will be shared, with the hope of drawing there from some tips that may be useful in future assessment tool developmental cycles.

The concluding section of the presentation will be a provision of the studies’ strengths, limitations and recommendations for the next phases of the pilot. As part of the concluding section, it is hoped that an allusion towards linking the development of student academic support programmes with the results of diagnostic assessments, with special emphasis on sub-scoring.

REFERENCES


¹ The Unisa student profile is described in an article by Prinsloo and van Rooyen (2007) although this article had particular focus on those students who had registered for the module ACN202-R in 2004.
Introduction

Broussard (2008) posits that the use of computing tools by students at all levels of study continues to increase, and that students are not only computer literate, but are completely at ease with online information and online learning tools. How well this familiarity with online environments translates into the online collaborative learning space is the topic of this paper, especially as it relates to shared document creation.

Online environments offer lecturers in higher education a variety of new opportunities for extending their teaching into collaborative modes (Matheson, 2012). Also, the social software of Web 2.0 allows students to be connected in ways not previously possible, and allows them to produce content collaboratively online (Parker & Chao, 2007). In this presentation we will consider how ODL students choose a collaborative tool, what their perceptions of collaborative work are, and the value of using such approaches to design survey questionnaires and interview questions.

Collaborative learning

Collaboration could be defined as a project where two or more people work together to create an artefact (Lomas, Burke, & Page, 2008). It is a cornerstone of Vygotsky’s social constructivist approaches to learning where the core understanding of learning is that students construct knowledge rather than simply acquire it, and that this construction of knowledge happens through interaction, co-construction, and negotiation with peers (among others) (Kearney, 2004; Powell & Kalina, 2009; Schreiber & Valle, 2013). It has also been argued that such collaborative learning leads to more effective internalisation of knowledge (Powell & Kalina, 2009). In the process of reaching a consensus, students have to critically articulate and examine their own views, respond to the multiple and challenging views of others, and negotiate shared understandings (Kearney, 2004; Schreiber & Valle, 2013).

Advantages and disadvantages

It has been widely noted that collaboration leads to the demonstration of, and sharing of, content knowledge, as well as to the building of teamwork competencies expected in the workplace (Capdeferro & Romero, 2012; Garcia, 2012; Matheson, 2012). Further, collaborative writing is a skill that is required in both academia and industry as it combines cognitive, communication, and social skills (Southavilay, Yacef, Reimann, & Calvo, 2013). Interestingly, even though the advantages of collaborative work are acknowledged, it is rarely practiced in higher education (Roberts, 2004).

However, it has its drawbacks. Frustration is a common complaint by students undertaking online collaborative work (Capdeferro & Romero, 2012). The sources of this frustration are finding time for all group members to get together online, time lags between successive contributions, differences in levels of commitment and effort, Internet connectivity, and the free rider and sucker effects (Capdeferro & Romero, 2012; Garcia, 2012; Parker & Chao, 2007; Roberts, 2004).
Collaboration tools

Collaborative tools often attempt to mimic traditional face-to-face collaborative approaches, and so are based on forms of video and audio conferencing (Lomas et al., 2008). Online collaborative approaches to document creation have often happened asynchronously where a document is passed backwards and forwards between participants (via e-mail) as comments and revisions are built into the evolving text (Anisetty & Young, 2011; Parker & Chao, 2007; Tam & Greenberg, 2004). This process is, however, tedious and error prone (Lomas et al., 2008). Attempts to mitigate this can be seen in Microsoft Word’s track changes feature, or users can simply use highlighting or coloured text (with added comments) to show changes; version control systems also help here (Tam & Greenberg, 2004). Discussion forums and blogs have both been suggested as tools for online collaborative document creation, but their chronological structure does not lend itself to the creation of questionnaires or interview questions (Broussard, 2008; Matheson, 2012; McLoughlin & Mynard, 2009).

Where collaborative document creation is concerned, a tool should allow a “peering over each other’s shoulders” (Lomas et al., 2008: 7). Two such tools could be considered.

Wikis are often pointed to as tools that promote shared inputs and peer editing, enabling communication and the collaborative shaping of content and knowledge, and reducing the amount of time spent passing documents back and forth (Broussard, 2008; de Pedro et al., 2006; Parker & Chao, 2007). There have even been reports of improvement in the quality of work where wikis have been used (De Pedro et al., 2006). Google Docs are also often used as an example of a tool that allows several people to simultaneously work on a single, shared document, enabling seamless collaboration (Anisetty & Young, 2011; Lomas et al., 2008; Southavilay et al., 2013). Advantages of Google Docs include its ability to store revisions along with a record of who and when changes were made – data which could well be used in assessing various individual’s contributions (Anisetty & Young, 2011; Southavilay et al., 2013), and that it mimics a word processor (making it very accessible). Overall, it provides excellent collaborative capabilities for the creation of text-based documents (Anisetty & Young, 2011).

Collaborative document creation task

Twelve Honours students (in HRCOS82) are undertaking research into the value of introducing HTML into the Grade 11 Computer Applications Technology syllabus. As part of their research they will each be expected to administer a questionnaire to Grade 11 CAT learners at a school, and interview the teacher. As a first step, the students are expected to individually design a survey questionnaire and interview questions. The students will then receive an anonymised copy of each questionnaire, and will be expected to work collaboratively to design a single survey questionnaire and a set of interview questions. The students were not given any direction as to which tool they should use for their collaboration, or on how to set up the collaborative process. This differs from a project that used a similar approach (students working individually and then setting up a collaborative document) where guidance concerning the virtual meetings and tools to be used was provided (Garcia, 2012).

On completion of the process, the students will have to answer a set of reflective questions. These questions would cover areas around setting up the collaborative process, how decisions were made, and the extent to which the student felt comfortable with the process and its advantages, disadvantages, and outcome.

Analysis

As the students’ responses are in written format, a qualitative and inductive content analysis will be used to identify common concepts and themes and the relationships between them to gain an understanding of the value of online collaborative document creation and students’ attitudes to it (Creswell, 2009; Mouton, 2001; Woodrum, 1984). Even though the responses of all students who give permission for their responses to be used will be analysed, the small number involved may limit the extent to which the results can be interpreted more widely. However, the small number of responses will mean that a single coder could do the initial analysis, thus reducing inter-rater reliability errors (Mouton, 2001). Although the benefits of this approach relate to using the writings of the students themselves and the unobtrusiveness of the research approach, it may be limited by the expressiveness and honesty of the students supplying the responses (Creswell, 2009).

The results of this analysis will be presented.

Conclusion

Even though it is believed that, in higher education, collaboration is “synonymous with effective scholarship and collegiality” (Lomas et al., 2008: 3), there is also the recognition that online
collaborative learning "is not for everyone" (Garcia, 2012: 10). This research will hopefully point to a middle road where online collaborative document creation can be used as part of a larger learning process.

References


A critical narrative of e-learning spaces for environmental sustainability in the Global South

Contextual background

Using information and communication technology (ICT), specifically referring to e-learning, is becoming the accepted norm in higher education and has the potential to support, improve and expand education for sustainability (EfS). The reality however, is that implementation of e-learning poses several challenges for teaching staff, students and administrators in contexts such as the Global South - a collective for emerging and developing nations (Wright, Dhanarajan & Reju 2009). Although these challenges vary from country to country, limited access to the Internet - even among university students, as shown by Oyedemi (2012) for South Africa - remains a barrier for the effective roll-out of education to exactly those segments of the community needing it the most. Associated issues include, but are not limited to: the rationale behind implementation of e-learning, recognition that e-learning is only part of the learning process, limited educational resources in general, validity of quality assurance systems and negative perceptions of open and distance learning (ODL). Since EfS per definition cannot exclude certain community segments, implementation of e-learning in contexts as the Global South should proceed with due consideration of matters such as the latter. E-learning is indeed not the panacea for all the ills in the educational system.

Aim and objectives

Following the contextual setting, which links EfS, e-learning and the Global South, this paper presents two case studies of implementation experience with e-learning for modules which the author is directly involved with. These modules are both offered in the Department of Geography at the University of South Africa (Unisa). Unisa is a major ODL provider in the Global South, and is currently embarking on a major roll-out to create an increased e-presence for its course offerings. In addition, the Department of Geography is involved in several EfS initiatives and regarded as one of the institutional leaders in implementation of alternative learning approaches. The module offerings of the Department of Geography are currently in various stages of transformation to e-learning. The first case study is for an undergraduate module in which e-learning is gradually phased in. The second case study is for a postgraduate (honours) module, in which an immediate and direct change-over to e-learning is implemented.

Methodological considerations

The two case studies are presented in a narrative format, closely related to the technique of reflective writing (Jasper 2005). A reflexive position is taken to objectively as possible consider the strategies being used and the experiences of various role players. The narratives on the two case studies include reference to the personal experience of the author as well as perceptions of how students are experiencing e-learning. Challenges as well as possible ways to deal with these are presented. Due to the importance of assessment as driver of the learning process (Kirkwood & Price 2008), more so in the ODL context, the aspect of onscreen marking, which forms an important component of the e-learning experience, will be reflected on in more depth.

Preliminary conclusions

This paper provides sufficient evidence in favour of a gradual, phased approach to implementation of e-learning. Such an approach suits the context of EfS in the Global South better than would be case for an abrupt change over to e-learning. Since the literature abounds with evidence of technologically based innovations that fail to achieve the expectations of educators, the change-over to e-learning needs to be research based and approached with care. This is in line with the findings of Lynch et al (2008), envisaging the e-learning landscape as a continuum, dependant on context and relying on selection of pedagogically and socially appropriate technologies.

References

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Rich environments for active Open Distance Learning: Looks good in theory but is it what learners really want?

This study investigates the impact of approaches and activities aimed at enhancing student engagement, motivation and interactivity in Open Distance Learning (ODL) in order to provide a rich environment for active learning. The medium used to apply the ethos and present authentic activities is a study guide for a fourth-year module hosted by the Department of Transport Economics, Logistics and Tourism in the College of Economic and Management Sciences at Unisa, entitled ‘Advanced tourism development and ecotourism’. The research, designed by applying key concepts gleaned from literature, was conducted in 2011 (based on a traditional study guide) and again in 2012 (when a new innovative study guide was used).

The importance of engagement, motivation and interactivity in ODL

It is widely known that learning takes place through active engagement rather than passive transmission (Brown & King, 2000; Dobrovolny, 2006) and that such engagement is an antidote to declining academic motivation and achievement (Fredricks, Blumenfeld & Paris, 2004). Active engagement with either concepts or agents is often labelled as ‘interaction’ (Rhode, 2009), which is a key determinant of student success rate (Ambe-Uva, 2006). Taylor & Parsons (2011) note that research on student engagement has undergone a paradigm shift from focussing on disengaged students (who are not learning) and attempting to restore them to a situation of learning to changing learning to suit the needs of students (thus creating engaged learners who are learning). This recent shift aims at enhancing all students’ abilities to learn how to learn. Most current authors embrace the concept of evolving and flexible education, and advocate changes within curriculum, pedagogy and assessment strategies to adapt to contemporary learners (Hsi & Soloway, 1998; Willms, 2003). Glenn (2000:2) posits that ‘Net Geners’ or ‘Millenials’ (born roughly between 1980 and 1994) “need self-directed learning opportunities, interactive environments, multiple forms of feedback, and assignment choices that use different resources to create personally meaningful learning experiences”. Learners do not adjust as easily as professionals, therefore learning material should hold their attention and encourage them to focus (Carlson, 2005; Hsi & Soloway, 1998). Grabinger and Dunlap (1995) encourage rich environments for active learning (REAL’s) where activities are consistent with the constructivist paradigm; tap into authentic, real-world information-rich contexts; and where learners take responsibility and initiative.

Research methodology
The research was quantitative via a questionnaire administered online to two consecutive cohorts, who used different versions of the study guide. The
2011, more traditional study guide used icons to denote learning objectives, questions for self-assessment, definitions, references and the occasional case study. In contrast, the 2012 study guide contained updated, innovative material; far more examples and case studies; was written in first person conversational style, and incorporated the following learner engagement tools denoted by icons: Reflect, Question/s, Definition, Activity, News Flash!, Watch this!, Case Study, Website to Browse, Example and Quote. Because the opinions of the 2011 learners were sought on engagement tools not present in their study material, they were asked (using a 5 point Likert scale), their opinions on these and to what extent they might support learning. The 2012 cohort were asked their opinions/experiences of having had the actual above-mentioned tools.

In 2011, the learner population was 51, of whom 24 responded (47% response rate), while in 2012, the population was 47, of whom 25 responded (53%).

Learning theory applied in the generation of research instruments

Pertinent theory on engagement, interactivity and motivation was used to inform the production of the research instruments for this study. The terms highlighted below in bold were used to develop questions testing students’ associated opinions, desires and experiences of these aspects (or the lack thereof) for the 2011 cohort (who used a traditional study guide with few engagement tools) and the 2012 cohort (who had the new guide with more such tools).

Course design should be coherent and should facilitate motivation, meaningful learning, satisfaction and performance (Moley, Bandré & George, 2011; Paechter & Maier, 2010). The social dimension is relevant, since in the ODL context, interaction between lecturer and student and between fellow-students, is a key determinant of success and cognitive presence, and also supports participation and deep and meaningful learning (Ambe-Uva, 2006; Schaeffer & Konetes, 2010; Shea & Bidjeron, 2009).

The researchers tested two types of engagement. Emotional engagement relates to attitudes (interest, boredom, etc) and is enhanced by individual needs (Fredricks et al, 2004). Cognitive engagement is relevant for the lower levels of Blooms Taxonomy through to the higher levels – from gaining factual or conceptual knowledge (Oud, 2009; Paechter & Maier, 2010) through to efforts towards comprehending complex ideas or mastery of difficult skills, investment in learning, and regulation of one’s self (Fredricks et al, 2004). Relevance and application was investigated because engagement is enhanced by personal relevance (Fredricks et al, 2004) and the application of learning to real-life scenarios (Baniulis, Kersiene, Petreikiene & Sliokiene, 2010; Grabinger & Dunlap, 1995). Autonomy and learner control also influence engagement (Fredricks et al, 2004; Paechter & Maier, 2010) and can be implemented by providing learners with more choices.

Chi (2009) distinguishes between active (Oud, 2009), constructive (Ng’ambi & Johnston, 2006; Taylor & Parsons, 2011) and interactive (Rhode, 2009) activities, so preferences and opinions on these were integrated into the surveys. According to Tabbers, Martens & van Merriënboer (2010), the modality effect (replacing text with the spoken word by providing video clips) improves learning and engagement. Bonding with the module was also relevant because authors such as Fredricks et al (2004) and Taylor & Parsons (2011) propose that deeper immersion with study material enhances engagement. A further important aspect of engagement and interactivity is feedback (Reece, 2007), hence opinions and experiences of this were probed. Critical thinking and reflectivity as a tool for better retention and application to real-life situations is also tested (Oud, 2009). Finally, with a view to the module going online in 2014, learners’ opinions on online learning are solicited, informed by the work of Ambe-Uva (2006).

This foray into applying theory to create and test innovative REAL study material for an ODL context is a venture into a new form of student support, using a demanding, yet more motivating approach that encourages cognitive engagement and contributes to preparation for the workplace. It acknowledges the changing role of academics in ODL, moving away from being mere providers of knowledge, towards serving more as facilitators and presenting multiple perspectives on learning content, thus encouraging students to engage deeply and independently.

Data collection and analysis

The studies data has been statistically analysed and results suggest in several instances that learners do learn better with richer learning material. However, the results have several interesting and unexpected outcomes, most notably that not all aspects of the new approach were as well received as anticipated. Learners may, in fact, like the idea of engagement tools
more than they like their actual use and application. It would appear that the familiarity, predictability and ease of use of traditional learning materials transcend the desire for more exciting innovative material that fosters a rich environment for active learning. This has interesting implications in the tertiary ODL context where lecturers are being encouraged to innovate for the sake of better learning.

The authors acknowledge the need for further research to probe these results, such as in-depth exploratory interviews with a sample of learners and a repeat of the survey for the 2013 cohort.

Conclusion

Learning in an ODL context is a complex phenomenon. The findings suggest that academics should discerningly regulate the richness and depth of learning material when aiming to enhance engagement, motivation and interactivity in the ODL context. Overload of isolated learners should be avoided, taking cognizance that they study outside conventional class-based situations and that their lives are impacted by factors such as employment and family responsibilities. Alternatively, students may gradually adapt to the new approach as such learning activities become increasingly familiar. Future research should be undertaken to determine whether such results recur and to gauge how students’ opinions and experiences vary between the 2012 and 2013 cohorts (innovative hard-copy study guide) when compared with 2014 learners (innovative online material). Similar research can also be undertaken on other modules at different levels.

References


Hsi, S. & Soloway, E. 1998. Learner-centered design: addressing, finally, the unique needs of learners, CHI 98, 18-23 April.


Graphs are used extensively in mathematics and science, since they can display an overview of relationships of variables of a function at a glance in a way that equations and tabular representations cannot. While a genuine understanding of functions is assumed to be indicated by the ease with which the learner is able to move between graphs, equations and tables of values, understanding and interpreting graphical representations of functions is not an obvious task for learners. They are required to deal with the cognitive processes that relate to graphs which include interpretation and inference, reading off, curve fitting, sketching, and transposition (e.g. Leinhardt, Zaslavsky, & Stein, 1990). Of interest to this study is how well learners in ODL environment are equipped to read off graphs.

Reading off graphs requires that students understand and interpret the graphical representation of a given function. Studies in mathematics education show that students are proficient at manipulation and investigation of functions given in algebraic form, but are struggling to conceptualize graphical implications of analytical properties (Baker, Cooley, Trigureros 2000). Leinhardt et al. (1990) attribute part of the difficulty students have in connecting functions and their graphical representations to traditional instructional methods. These methods tend to emphasize the construction of graphs from algebraic forms or tables, but do little in the way of the reverse – from graphs to algebraic forms or tables. This reverse process should involve reading values from the graph and making connections with values in the tables and in the algebraic forms, which requires a different way of viewing the representations. Even in technology-enhanced classrooms which use graphing calculators and computer algebra software, most of the time is spent in moving from algebraic forms to graphs (see, for instance, O’Callaghan 1998).

Recent research into students’ understanding and interpreting of graphs of functions implies that learners need to learn what they should be looking for in a graph to accomplish a given task (e.g., Roth, Bowen, & Masciotra, 2002). The details on how this learning is meant to happen are scanty. A perusal of the mathematics education research literature, which makes its observations in the traditional face to face classroom or lecture setting, gives us many concrete examples on how this can happen. In the face to face setting, the presence of a teacher and the learners and the ensuing communication facilitates learners’ conceptual growth of reading off graphs. For example, a teacher illustrates the translation from one representation to the other by pointing at section of a graph and relating it to the alternative representation.

However, a detailed literature search does not reveal studies that address students’ understanding and interpretation of graphical representations in open and distance learning (ODL) environments. Many distance educations institutions which offer mathematics incorporate face to face components, for instance tutorials in the case of the Open University in the United Kingdom. Indeed, UNISA seems to be unique in that it offers mathematics in effect in a pure correspondence setting as a default mode, with face to face interaction being an exception. The question then arises of how learners are taught how to read a graph in the absence of the face to face dynamics.

UNISA’s current mode of teaching is through print media. In this study, we shall investigate what instructional designs have been incorporated in UNISA’s mathematics printed study materials with the aim of guiding learners to an understanding of graphs of functions, in particular how to read off the graph. This research is inspired by observations over many years of how ODL mathematics students at UNISA struggle to read off values of function graphs effectively to complete various tasks. The findings will contribute
to the very limited literature on how the mathematics education research is to be applied in the distance education setting.

In this content analysis research, we investigate

1. How does current study material assist learners to understand and interpret graphical representations of functions in print media?

2. What do our findings mean for teaching and learning of graphical representations of functions in an ODL environment?

Our analysis is through the distance education framework of Holmberg’s (2005) didactic interaction theory, which is suitable for analyzing ODL teaching and learning in a correspondence setting. Holmberg’s theory on distance education assumes a cognitive and/or psychomotor and affective domains approach to teaching-learning of an individual learner and a supporting organization. However, with the current “social turn” in ways of learning and teaching, future studies should explore how learning encounters dealing with functions and their representations can be designed in an e-learning environment which UNISA envisages.

References


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**Knowledge Visualisation in Postgraduate Assessment: Is a picture worth a thousand words?**

Over the last decade there has been a world-wide increase in the number of students doing postgraduate research (Taylor, 2002, Kruss, 2006) and South Africa is no exception (Bitzer, 2011). This poses a challenge to examiners’ ability to assess dissertations consistently, accurately and fairly. The conundrum is: how can examiners manage increasing volume while maintaining standards? Ideally, what is needed is a mechanism to ease assessment without impacting the efficiency and integrity of the process. Albertyn, Kapp and Frick(2007) propose a framework to support the objective and fair assessment of postgraduate research. The use of that framework could increase effectiveness but it does not address efficiency, namely optimising resources to cope with increased student numbers and the time required to assess dissertations of variable quality.

The purpose of this paper is to investigate the use of knowledge visualisation as a mechanism to improve the efficiency of postgraduate assessment while maintaining effectiveness in terms of accuracy, fairness and consistency. The majority of the sighted brain’s activity deals with processing and analysing visual images. Images are pre-attentive which means that they are processed before text and consume less energy (Marciniak and Plaga, 2006). Given this inherent human capability of comprehending and remembering visual representations as well as the technological developments which make such visualisations possible even for the non-artistic, it seems that discourse on deployment of knowledge visualisation in research reporting is long overdue. Bresciani, Eppler, Kaul, and Ylinen (2011) report a growing interest and use of knowledge visualization for communicating ideas and insights in business communication but the use of knowledge visualisation in postgraduate assessment seems unexplored.
Given the fact that our focus is on the utilisation of knowledge visualisation, we need first to make a clear distinction between data, information and knowledge. According to the data, information, knowledge and wisdom (DIKW) hierarchy, measurements provide data, processed data becomes information, processed information leads to knowledge and processed knowledge builds wisdom (Chen et al., 2009). In most fields a researcher poses a question, generates data to answer the question, attributes meaning to the data, and interprets the resulting information and gains insight which results in new knowledge. In postgraduate study such knowledge is communicated in writing, most commonly in a dissertation. This dissertation is the most important artefact for supporting assessment and in open distance learning it constitutes the only artefact that supports assessment.

Consider the triangle depicted in Figure 1. The student carries out research under the supervisor’s guidance. He or she writes a dissertation, which is assessed by the examiners. Here we argue that the inclusion of knowledge visualisations will ease the assessment process.

This paper investigates how knowledge visualisation should be used by the following groups (numbers shown in Figure 1):

1. **students**: to raise their level of conceptual thinking about their research, and an awareness of how visualisations ease the reporting process;

2. **supervisors**: to raise awareness of how they can assist their research students in producing useful visualisations for inclusion in their dissertation;

3. **examiners** — to raise appreciation of the value of visualisations in research reporting.

This investigation into the use of visualisation for assessment in postgraduate dissertations is motivated by the following question: “To what extent are visualisations used in postgraduate dissertations, and how does the use of visualisation currently influence the assessment?”

We analysed 73% of the masters’ dissertations of Information Systems’ students who obtained their qualification between 2002 and 2012 in the School of Computing at the University of South Africa. Based on the number of visualisations (figures and tables), the candidate’s final mark and the distributions of the visualisations we are able to provide some insights into the use and usefulness of visualisations in supporting postgraduate assessment.
Our results provide evidence that visualisations are used extensively and that specific distribution of the visualisation in the dissertation correlates with the final marks. A wide variation in the use and usefulness was reported. This is to be expected since the use of knowledge visualisation (tables and figures) are not mandatory or even encouraged in some research domains. The decision to use knowledge visualisation seems to be a personal/subjective choice. It does not seem to be either actively encouraged or specifically rewarded.

Our findings suggest that visualisations could provide an efficient mechanism to facilitate and support unbiased assessment of postgraduate research if the use is standardised. We will present recommendations about the preferred type and placement of the visualisations in the dissertations and provide those as extensions to existing evaluation guidelines. The main contribution of this paper is to open a discourse on the notion of the explicit use of visualisation in postgraduate assessment. We consolidate and integrated literature from the knowledge visualisation perspective with that from the research reporting perspective to offer a more thorough appreciation of its role and function and best practices for use.

Furthermore, this research serves to create an appreciation of the use of visualisations, i.e. chapter maps, literature overview diagrams and visual mappings of research objectives to outcomes to enhance communication, understanding and knowledge transfer.

References:


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The positive impact of compulsory internet-based formative assessment on examination results in Chemistry

Introduction

Problems which have previously been identified as key factors affecting the pass rate in the first-year general chemistry module at the University of South Africa include: students not using the prescribed textbook, non-submission of formative assessment assignments, limited number of formative assessments and delays in feedback due to the postal system, are all aspects which are commonly encountered in distance-learning institutions (Keegan 1996).

In this paper we show that compulsory internet-based formative assessment, aimed at reducing transactional distance, resulted in a significantly higher percentage of students accessing the prescribed textbook, greatly increased dialogue and activity of students within the first year general chemistry module, resulting in an enhanced
Student pass rate. Student feedback indicated that the majority of students registered for this module preferred the prescribed compulsory e-learning programme to the more traditional paper based assessments which were previously offered in the module.

Background

Transactional distance has always been of concern in distance-learning institutions (Moore 1993). Previous research has shown that web-based learning, where the number of formative assessment assignments were increased from two paper based assignments to four or more web-based assignments, enhanced student performance in first year general chemistry. (Clayton and Smith 2013). However, in the research by these authors, students were given a choice between doing traditional paper-based assignments or completing optional internet-based assessments which provided immediate feedback to the student with an increased number of assignments.

In the research presented in this paper, first year general chemistry students were no longer given the option of paper-based assignments, but were required to complete a number of compulsory internet-based formative assessment tasks. Students were required to purchase a license code (obtained either bundled with the textbook, or purchased separately which also afforded access to an online e-textbook) to access the e-based assessment product. Information from the publishers of the prescribed textbook indicated that over the past three years, only ca. 30% of the students registered for this module purchased the prescribed textbook. It is also a common perception that, in South Africa, where internet access is expensive, that students would not be able to access the prescribed tasks and material if formative assessment was offered only on the internet.

Research Questions

- In the research done by Clayton and Smith, student performance was greatly enhanced when students opted to participate in an e-learning programme. Will the same trend be observed across the entire student population of the module when compulsory e-learning is imposed?
- In the South African context, where textbooks and internet access are expensive, will the introduction of compulsory internet-based assessment, which requires the purchase of a license code, and requires regular internet access, have an overall positive or negative effect on the student throughput, or pass rate?
- Finally, will students respond positively or negatively to compulsory e-based assessment?

Methodology

In this study, 615 students were registered for first-year general chemistry module CHE1501 and were required to obtain a license code to access the prescribed internet-based assessment product MasteringChemistry, by Pearson). MasteringChemistry is an online assessment application which requires the student to complete a number of tasks (assignments, quizzes and class tests) set by the lecturers and which provides the student with immediate and personalized feedback. Students were required to complete four internet-based tasks set by the lecturers, which contributed 20% towards their year-mark. In addition, a questionnaire was completed by the students to indicate whether they preferred the compulsory e-learning programme or traditional paper-based assessment. The students’s formative and summative assessment results were analyzed and are presented here.

Results and Conclusions

Of the 615 registered students, 356 students (58%) accessed MasteringChemistry, which gave them access to the online assignments as well as the e-textbook. This compared to approximately 30% of students who, historically, purchased the textbook. The remaining students wrote the final examination without doing the e-based assessments. Of the 356 students who accessed MasteringChemistry, all 356 students did at least one of the four prescribed internet-based assignments, and 290 of those students attempted all four assignments. This indicates a substantial increase in activity by the majority of students compared to what has been previously observed in the module.

The final pass rate of those who attempted the internet-based assignments was 81%, compared to a 44% pass rate for those students who did not access MasteringChemistry.

The overall pass rate for all 615 registered students was 66%, compared to the traditional overall historical pass rate for the module, which is between 40 and 56%, indicating that compulsory
internet-based formative assessment aimed at increasing dialogue and decreasing transactional distance is more effective than the traditional paper-based formative assessments.

The students who attempted one, two, three and four of the assessment tasks set on MasteringChemistry obtained 57%, 69%, 72% and 84%, respectively, in their final examination mark. These figures are similar to those observed in the previous research by us, where participation in the e-learning programme was voluntarily, rather than compulsory.

Finally, in the satisfaction survey, 64% of students found the e-learning programme much more effective than written assignments, 7% though it was a slightly better assessment method, 3% though that there was no difference between e-learning and paper-based assessment, and only 15% prefered paper-based assessment.

In conclusion, a compulsory internet-based assessment component to the course significantly enhances student performance and pass rate, compared to paper-based formative assessment. The requirements to purchase a license and have regular access to the internet were not found to impede usage of the online tuition programme.

Students also are of the opinion that e-based learning is more effective that paper based formative assessment.

References


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New in an ODL Environment: Recommendations for inducting ODL academic staff in the college of Science and Engineering

Distance education is spreading to all areas of education, formal and informal. And the emergence of worldwide communications networks and powerful computer technologies has redefined the concept of distance learning and delivery of educational content. The influence and predilection of many governments has led to the transformation of various distance learning environment, into open distance learning (ODL) pedagogical officialdoms. ODL presents a challenge in management and application, since in an ODL technologically enhanced environment traditional pedagogical tools and techniques become derisory and scant in the delivery of tuition and learning. Depending on the organizations context within which the pedagogical frame work and educational setting are created and developed, there are numerous factors impelling attempts to deliver courses and programs.

The focus of this paper is to illuminate the educational setting experience of new academics in the College of Science and Engineering (CSET), in an ODL environment. And compare that experience to Institutional policy postulates, institutional documents, literature and institutional pedagogical policy that formulate the educational setting. The educational setting that exists within Unisa, as experience by new academics, will be described in terms of the real-world, concrete activities, processes, people and artefacts involved in a learning activity, as experienced by new academics in the college of Science and Engineering. Recognition of the effects of the organizational context is mainly by conditioning in (i) design and management of the educational setting and (ii) the processes through which a pedagogical framework feed into the design and management of an educational setting.

The paper will ultimately address the gap that
exists between the postulates of the pedagogical context settings and the desired mission, in Unisa’s CSET, and the heuristic experience of new academic staff. Recommendations for closing the gap and implications for practice will be tendered.

Introduction

Open distance education system is based on the philosophy that institutional policy provides the basis for almost all activities associated with providing education and training. These policies are normally framed within national policies and an institutional mandate and, or mission which translate to an institution education technology stack. Note that the policies that govern an institution’s relationship with its main components, id est. faculty and students, are established by the institution itself. As is in conventional education, the platform to deliver tuition and learning effectively or no so effectively is inherent with the policy frame work and its executions in the institution. Therefore the experience of new academics in Unisa is resultant to the policy framework setting.

Policies in Unisa recognize that the nature of distance education often necessitates a view of teaching and learning, and supporting activities as being very different from that adopted by resident, face-to-face and conventional universities. It is therefore significant that the induction of new academic staff in Unisa’s CSET, must at its mainstay, appreciate the unique silhouette of this institution. Therefore the induction program must be a spring board, appropriate and relevant for launching a new academic in this institution and the extent to which the new staff member assimilates is the direct consequence of the induction program. It is therefore the aim of this research to answer the questions what is the gap? And why is the current institutional setting, in Unisa not surpassing these expectations?

Conceptual framework

This research will adopt a mixed methods research approach, since this framework is usually compared with mono-method research. Teddlie and Tashakkori (2003) pointed out two main areas in which mixed methods studies may be superior to mono-method approaches. Firstly, mixed methods research can answer research questions that the other methodologies cannot. Although there is no necessary and perfect connection between purpose and approach, quantitative research has typically been more directed at theory testing or verification, whereas qualitative research has typically been more concerned with theory building or generation (Punch, 2005). A major advantage of mixed methods research for this particular research is that it enables us to simultaneously generate and verify theory in the same study. Second, mixed methods research will provide stronger inferences in the summation and interpretation of our research findings and research questionnaire. Several authors have postulated that using mixed methods can offset the disadvantages that certain of the methods have by themselves. Johnson and Turner (2003) refer to this as the fundamental principle of mixed methods research: Methods should be mixed in a way that has complementary strengths and non-overlapping weaknesses.

A transactional theory paradigm is adopted because it requires a break with entrenched habits of thinking, which is a requirement for this research. The old stimulus–response, subject–object, individual–social dualisms give way to recognition of transactional relationships. The employee is seen as part of natural contest within the institution, continuously in transaction with the environment context. The transactional mode of thinking has perhaps been most clearly assimilated in ecology. Employee activities and relationships are seen as transactions in which the individual new academics and social context elements fuse with cultural and natural and functional elements. It is therefore core to this research to adopt a transactional theory approach in this research.

Literature Review

The literature review will be a scanning of global employee induction best practices sampled across varied industries, especially those organisation reputed to be leaders in their business sector. There shall be a review of UNISA’s documented ODL policies and procedures, and what published authors and researchers are saying about employee induction in an ODL, industry, residential academia, and other industry sectors. In particular the literature review shall be investigating what researchers have to say about best practice induction models in terms of 1) what these organisations/models do to induct their employees, 2) how they do it, 3) where they do it, 4) when they do it and 5) why they do it that way.

Methodology

The methodology to be followed in this study will be to identify CSET staff that joined UNISA in the past five years and conduct structured interviews based on a questionnaire template to ascertain their experiences and impressions when they initially joined UNISA. The data gathered shall be used to draw a learning curve graph for the
sampled CSET staff against which to benchmark and measure the effectiveness of the proposed Role Based Induction (RBI) model. Data collected from the interviews shall also be used to perform gap analysis to identify key short comings in the existing CSET induction practices in order to better bridge these gaps. Proposed RBI model shall be trialed on all new incoming CSET academics for two to three successive years and data to be gathered for same number of years to measure effectiveness of the proposed RBI model. This data shall be captured using the selfsame interview questionnaire used to gather data on learning curve of new CSET academics before introduction of RBI model. The results of before-and-after RBI model implementation to be published annually in suitable journals for the three year duration of the study in typical action research style.

The Role Based Induction (RBI) model to be proposed shall be based on the adaptation of induction best practice from a variety of industries and academic institutions as informed by our literature review.

Findings, Recommendations and Implications to Practice
The key findings and discussions of this study will be to 1) provide the means of inducting new ODL academics in to their specific post requirements in as optimal a fashion as possible and to 2) provide the means of ensuring professional success for new ODL academics. Furthermore the recommendations will be based on data gathered over the three year duration of the study and the analysis thereof.

References
The changing work and higher educational environments challenge traditional approaches to postgraduate supervision (Webster et al., 2000). Universities are under pressure because of the growing number of students doing research and the emphasis on completion rates (McFarlane, 2010). This is even more applicable to the University of South Africa (Dietz et al.) where the definition of open distance learning (ODL) is aimed at 'bridging the time, geographical, economic, social, educational and communication distance between student and institution, student and academics, student and courseware and student and peers' (UNISA 2008, 2). The definition implies that, in the context of minimal contact teaching, ODL is focused on removing barriers to accessing learning, flexible means of providing learning, student-centricity, student support, and constructing learning programs aimed at helping students to succeed. The 'open' concept has led to drastically increased student numbers while supervision capacity has not increased correspondingly. Consequently, Dietz, Jansen & Wadee (2004) identified the uncontrolled growth of student numbers and the corresponding lack of supervision capacity as one of the systemic problems at UNISA. Besides increasing the number of students to be supervised, the ODL concept and the realities of the South African society lead to the admittance of student cohorts who vary in preparedness for post graduate study with those from disadvantaged areas and schools lacking training and experience in writing logically and correctly (McFarlane, 2010). It is thus essential to find ways to address the problem of added pressure on the supervision capacity of universities both in terms of student numbers and supervision experience and that is the rationale of this study.

The supervision model has been identified an important factor impacting postgraduate students' progress (de Lange et al., 2011, Bitzer, 2011), even as the most significant factor (Dysthe et al., June 2006). Besides addressing student numbers, it is important to realize that supervision capacity is impacted by student numbers as well as the supervisors' experience since the experienced supervisors are essential in providing mentoring to novice supervisors (Pillay and Balfour, 2011). The purpose of this paper is to investigate how a postgraduate supervision model can addresses capacity increase both in terms of the number of students and the number of experienced supervisors.

Cohort supervision was selected as the underlying model for PCM due to the benefits of peer-support, networking, shared resources, motivation, and creating responsibility as listed by van Heerden and Le Roux (2009). Cohort supervision also have known challenges such as students working at different paces and time efficiency to name a few (McFarlane, 2010) and therefore the PCM is designed to mitigate some of these challenges as described in Table 1.

The learning principles relevant to postgraduate cohort supervision are inherent to the theory of constructivist learning, namely constructivist learning as an active process which is social and create meaning based on individual and shared experiences (McFarlane, 2010). This is augmented by co-operative learning which assumes a positive interdependence between group members while retaining individual accountability (McFarlane, 2010). Murtagh and Webster (2010) propose scaffolding feedback as a mechanism to positively impact on students' ability to engage in self-regulated learning and academic achievement. Given the reality that many South African postgraduate students are not adequately prepared, scaffolding is an important mechanism in this context both for students and supervisors.

Methodologically, the development of the pyramid supervision model fits the design-science paradigm which seeks to extend the boundaries of human and organizational capabilities by creating new and innovative artefacts (Hevner and Ram, 2004). Design science research is an embodiment of three cycles of activities (namely the Relevance, Design and Rigour Cycles) as explained by Hevner (2007).
The scaffolding actions and responsibilities of the Pyramid Cohort Model are depicted in Table 1.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>RESPONSIBILITY</th>
</tr>
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<tbody>
<tr>
<td>Setting learning objectives, cohort organisation and sharing resources</td>
<td>Group project: Students are organised in groups of NS/NG where NS = number of students and NG = number of group leader. A lecturer is assigned to each group as the group leader. Students do and submit their literature review as a group project, the group members are connected online, resources are provided on a Wiki and the use of social media is encouraged.</td>
</tr>
<tr>
<td>Scaffolding 1</td>
<td>Group leaders assess their group’s assignment and provide feedback. The cohort leader does a meta-evaluation of the assignments and the feedback and provides a meta-review.</td>
</tr>
<tr>
<td>Research Design</td>
<td>Group project: Students design and submit the questionnaire using the feedback provided and resources placed on the Wiki.</td>
</tr>
<tr>
<td>Scaffolding 2: Common questionnaire</td>
<td>Cohort leader and group leaders interact to evaluate the questions and then compile a common questionnaire (CQ) of fixed response questions to be sent to all students.</td>
</tr>
<tr>
<td>Interviews</td>
<td>Students do a minimum of five interviews using the CQ and a set of open-ended questions which they compile individually. They submit the responses to the common questionnaire but not to their own set of open ended questions.</td>
</tr>
<tr>
<td>Scaffolding 3: Common dataset and video conference discussion on data analysis</td>
<td>Group leaders collate responses to create the common dataset. In 2013 the project was capped at 12 so this meant 60 responses.</td>
</tr>
<tr>
<td>Final report</td>
<td>Individual report based on the literature, questionnaire design, the common dataset and their individual open-ended questions.</td>
</tr>
<tr>
<td>Scaffolding 4: Final feedback</td>
<td>Group leaders mark the final report and provide feedback to be applied before submission to external examiner. Students reflect and complete an evaluation on the implementation of the PCM.</td>
</tr>
</tbody>
</table>

The PCM allows for timely, detailed and descriptive feedback that focuses on ‘learning’ rather than praise in line with the scaffolding objectives set by Murtagh and Webster (Murtagh and Webster, 2010)). PCM aligns the process of teaching, learning and assessment; students are scaffold in moving through their zone of proximal development (Vygotsky, 1978). This is a work in progress but the initial results confirm that the PCM provides improved students and supervisor support while increasing supervision capacity in terms of supervising more students with fewer experienced, or the same number of in-experienced supervisors. The PCM structure also provides hands-on mentoring to novice supervisors. Given the level of the honours student a simple research design was chosen but with some adjustment to the research design this model could be used for masters and doctoral students who can research the same question in different contexts. This model could be of interest to researchers, supervisors and managers confronted with the challenge of providing quality supervision to large numbers of students within the constraints of supervision capacity.

**References**


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Towards a Mobile Learning Curriculum Framework for Open Distance Learning: A study with school teachers

The rapid diffusion of mobile technology in society continues to transform the ICT landscape with major potential implications for education (Botha et al., 2012). Besides the many opportunities created, mobile technology has also created new challenges for educationalists. One of these challenges is the optimal use of mobile technology for teaching and learning and the development of 21st century information and communication technology skills (Ford and Botha, 2010). According to a study performed in Zimbabwe, the optimal use of technology is a key factor in the success of Open Distance learning (Mupa et al., 2013)- but only if the students and educators have the skills to use the technology. The tension between the potential of using mobile technology in ODL and the constraints of having the appropriate skills to use the technology provides the rationale for this study. The purpose is to investigate a mobile learning curriculum in the context of the program qualification mix offered by the University of South Africa (UNISA) as an open and distance learning university.

UNISA’s definition of open distance learning (ODL) is a multi-dimensional concept aimed at bridging the time, geographical, economic, social, educational and communication distance between student and institution, student and academics, student and courseware and student and peers’ (UNISA, 2008). The definition implies that, in the context of minimal contact teaching, ODL is focused on removing barriers to accessing learning, flexible means of providing learning, student-centricity, student support, and constructing learning programs aimed at helping students to succeed. Given the diversity in programs offered at UNISA it is not possible to design a one size fits all solution in terms of a mobile technology curriculum. Therefore we focus this investigation on designing a mobile learning curriculum for primary and secondary school teachers to be offered in a community engagement program and later developed into an online open course.

The objective of this paper is to describe how a mobile learning curriculum for primary and secondary school teachers can be designed as an instance of the mobile learning framework (MLF) proposed by Botha, Batchelor, Traxler, De Waard and Herselman (2012). The MLF was chosen as a point of departure since it is based on both theory and practice about mobile learning and it presents a snapshot of the vast and dynamic field that is useful in scoping our investigation. Using the constructs and methodology from MLF we developed a mobile learning curriculum framework as an instantiation of the MLF customised.
according to the constraints of distance learning and the needs of our target group.

The objective developing an artefact such as a curriculum fits the design-science paradigm which seeks to extend the boundaries of human and organizational capabilities by creating new and innovative artefacts (Hevner and Ram, 2004). Furthermore design is proposed as one of the primary modes for engaging in educational research (Sloane, 2006) and that justifies our selection of a design science methodology which includes three consecutive design cycles namely the relevance, design and rigour cycles (Hevner, 2007) as now described in more detail:

- Relevance Cycle in which requirements from the contextual environment (in this case the mobile learning curriculum for teachers) are input into the research. This corresponds to Phase 1 where the initial requirements we captured.

- Design Cycle which supports a tight loop of research activity between the construction and evaluation of design artefacts and processes. This corresponds to Phase 2 where the initial mobile learning curriculum was developed.

- Rigor Cycle integrates grounding theories and methods along with domain experience and expertise from the foundations knowledge base and adds the verified new knowledge generated by the research to the extant knowledge base. This relates to phases three and four as follows:
  - Phase 3: a task team was formed through open and targeted invitations to ODL domain experts who volunteered their time and expertise for an expert review. This allowed the inclusion of additional elements that are considered significant within the domain.
  - Phase 4: specific practitioner communities with a track record of applying mobile learning in formal as well as informal settings were targeted for a number of regional workshops to expose the curriculum framework to regional critique by the practitioners (primary and secondary school teachers) who represent the target audience and additionally create some awareness of the collaboration.

The two cycled evaluation cycles allowed us to assess the curriculum on different levels of pedagogy, practicality and usefulness. The contribution of this paper is the customised mobile learning framework. We found the MLF useful in providing a platform for developing mobile learning curricula in specific contexts but also identified some points of criticism. This research has practical value in providing a mobile learning curriculum for school teachers and theoretical value in evaluating the MLF framework for applicability in the ODL context.

References:


Formal Methods Tuition in Computing: Bridging the ODeL Challenges

The ACM/IEEE curriculum for Computing mandates (amongst other things) the teaching of FMs in the education of Computer Science students (ACM/IEEE-CS Joint Task Force, 2013). Fulfilling this task is challenging since the teaching of the mathematical techniques involved centre around concepts of (formal) first-order logic, mathematical set theory and discrete structures. These are topics often not directly taught at undergraduate level. Apart from this challenge at an academic level, the use of FMs for the construction of industrial software systems have been equally criticised for being hard to use by software engineers, being esoteric and of little practical value (van der Poll, 2010, Liu et al., 2009). We believe this view is firmly rooted in the challenges experienced by lecturers and students alike in the teaching of, and the learning of the effective use of FMs in software construction.

The teaching and study of FMs in Computing have traditionally been done at two ends of the spectrum: More recent approaches start with a formal specification (Abrial, 2010; Lightfoot, 2001) at the front end of a development cycle and through successive transformation steps, work forward systematically towards high-level languages like C++, Java, etc. More traditional approaches start implicitly with a natural language specification of the system to be constructed and move "directly" to a high-level language. While the first approach may be preferred, the learning of formal specification techniques usually take up all the notional hours allowed for (typically) a 12-credit module, not allowing much time for teaching subsequent transformation steps to the high-level language. For this reason, more traditional approaches, often going under the title of "Formal Program Verification" may be preferred.

In this paper we discuss a number of specific challenges which the authors and lecturers of a 4th year Formal Program Verification module encountered over many years. These challenges largely manifest in a number of important concepts taught in most traditional program verification (FMs) modules:

- **Pre/Post condition calculation:** The calculation of a precondition to determine the conditions under which a software system is to start off, alternatively, determining the state which a finished program leaves the computing environment in, are vital. Traditional programming constructs each have their own peculiar set of proof rules and students inevitably misinterpret, or incorrectly apply these proof rules. Particularly problematic constructs are if-then-else statements and repetition, i.e. for-statements and while loops (Kourie and Watson, 2012).

- **Proving a construct correct:** Often in verification work the condition under which a program is to start execution (i.e. the precondition) is intuitively known and can be determined by a software engineer. However, of more practical value is the calculation of the weakest (i.e. the most general) precondition. Once such condition has been calculated, one has to show that the intuitive condition implies the calculated (weakest) condition. As with general pre- and postcondition calculation, students find the conceptual idea, as well as the calculation and subsequent proof obligation hard (Backhouse, 2003).

- **Invariant determination:** One of the important steps in constructing a correct looping construct is the determination of the loop invariant. A loop invariant is that part of the system that remains unchanged throughout the entire execution of the loop. The invariant is usually determined through inspection, an activity which students of FMs experience difficulty in getting to grips with. Using a provably-correct approach, the construction of the loop can continue only after the invariant has been determined correctly.

We argue in this paper that the challenges unpacked above inherently stem from the distance component in ODeL. Having analysed the core of the problem in each case, we show how these challenges may, in addition to podcasting and...
Towards a framework for ODL supervision of South African master’s and doctoral students in computing

Contribution of the paper

The contribution of this paper is a conceptual framework for ODL supervision of South African master’s and doctoral students in Computing. Computing in this instance is understood as the discipline that encompasses studies in Computer Science, Information Systems and Information and Communications Technology.

Existing challenges highlighted in literature

Existing literature indicates the existence of a number of generic challenges (experienced by virtually all disciplines) in terms of postgraduate (i.e. master’s and doctoral) supervision. These include the off-campus, part-time character of most current postgraduate students (Pearson, 1999) and the diversity of student populations, with the resulting diverse patterns that characterize the way in which students nowadays study or do their research (Pearson, 1999 op. cit.). The changing landscape of tertiary education with its subsequent impact on work patterns of academics is a significant factor (Bitzer and Albertyn, 2011), which impacts in terms of inter alia higher levels of governance measures increasingly implemented in the tertiary sector (Halse and Malfroy, 2010), as well as the highly visible tensions between teaching and research (Lee and Green, 1995). A further challenge created by the context of current society is the increased popularity of higher degrees in the knowledge economy (Bitzer and Albertyn, 2011).

Challenges raised with specific reference to supervision of postgraduate students in an Open and Distance Learning (ODL) environment include student perceptions of being isolated (Erichsen, 2012) and therefore losing a “sense of immediacy” (Andrew, 2012) and as a consequence the challenges of facilitating “engagement with a research community” and the use of a virtual learning environment to address this (Wikely and Muschamp, 2004). Evans (1995) highlights the fact that postgraduate students at ODL institutions tend to be older, which impacts in specific ways on the student-supervisor relationship. McWilliam and Palmer (1995) argue that another pedagogical challenge in ODL postgraduate supervision is the way in which the use of technology disrupts traditional views of postgraduate pedagogy.

Specific South African challenges that impact on postgraduate supervision include the

References:


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implementation of a transformed educational system, ways of supporting previously disadvantaged students, and improving the throughput rate of postgraduate students in the South African system (Lessing and Schulze, 2002, Schulze, 2012).

Existing views and conceptualisations of postgraduate supervision in literature

The focus of existing literature is mainly on two aspects. Firstly a significant body of literature examines postgraduate experiences from the student’s perspective (Andrew, 2012; Erichsen et al., 2010, Hallett, 2010; Schulze, 2012). Secondly a large body of work exists on various aspects of the pedagogy of postgraduate studies (see for instance Crossouard, 2008, Maxwell & Smyth, 2010; Wikely and Mouschamp, 2004), which for the purposes of this paper shall be collectively referred to as “postgraduate supervision”. The model proposed in this paper for postgraduate supervision in Computing is also situated within this discourse.

The theoretical and conceptual views informing literature on postgraduate supervision include amongst others Self-efficacy Theory (for understanding student experiences) (Schulze, 2012); and various conceptualisations of the supervisory processes and pedagogy, including a management view (Maxwell and Smyth, 2010), conceptualization of supervision as professional work (Halse and Malfroy, 201), seeing supervision as a form of knowledge management (Zhao, 2003), and seeing it as mentorship (Shannon, 1995), and “embodiment” (McWilliam and Palmer, 1995). Green and Lee (1995) also discuss some more “traditional” conceptualisations of postgraduate supervision – these are mainly a view of supervision as “rational science”; and a view of supervision as “teaching”.

Computing as an area of postgraduate studies offers some very specific challenges – notably the extreme diversity of the field, which ranges from exclusive engagement with technology and artifacts to a view of information practices to the implementation of a transformed educational system, ways of supporting previously disadvantaged students, and improving the throughput rate of postgraduate students in the South African system (Lessing and Schulze, 2002, Schulze, 2012).

Computing as an area of postgraduate studies offers some very specific challenges – notably the extreme diversity of the field, which ranges from exclusive engagement with technology and artifacts to a view of information practices to the implementation of a transformed educational system, ways of supporting previously disadvantaged students, and improving the throughput rate of postgraduate students in the South African system (Lessing and Schulze, 2002, Schulze, 2012).

Content of the paper

In this paper the authors critically examine and discuss these challenges and the merits of existing views, conceptualisations and models for postgraduate supervision in literature as these relate to postgraduate supervision of computing students in an ODL environment. They propose a model that is specifically suited to the supervision of computing students in an ODL environment.

References


Technology and library student support in an ODL environment

**Purpose:** The purpose of this paper is to share information on open distance libraries with specific reference of the use of technology in the Unisa Library: Information Resources Distribution (IRD) Services for student support. It seeks to provide practical information and examples of technology used within the Unisa Library: IRD section.

**Design/methodology/approach:**

As the largest academic library in Africa, the Unisa Library strives to support the implementation of the Open Distance Learning policy of the University; not only by a constantly growing collection of electronic resources, but also by utilising technology in the distribution of said resources and information to students and faculty members (Naicker, 2010). It is noted that a technology enabled environment is an integral part not only of a successful ODL institution, but also of an ODL library (Henning, 2010).

In line with ODL principles the IRD Services of the Unisa Library currently utilizes various technologies to ensure that all students receive information requested from the Library timeously and in the format they prefer. These include:

- **Client Content Management System** - This system also serves as a client contact management system, as well as a repository or knowledge base for the administration and retrieval of literature search requests as well as any documentation related to searches, such as, search results, covering letters, training/educational material, etc. All incoming requests are captured and stored in the system which is integrated with the Student System and are allocated a unique reference number for tracking purposes. It is also a mechanism to communicate with our clients via email and text messages. Reports and statistics are automatically generated. (Search Librarians, 2009)

- **Uniflow workflow system** - Performs the following functions in the processing of requests for books, articles (print and electronic) and Inter-Library Loans. Entry points for requests are fax; telephonic requests; e-mail, mobile and web requests from the library catalogue and these are routed to different workstreams. Notices are generated to clients via sms or email and reports and statistics are generated. (Nyamazane, 2011)

- **Self-help technology** – The PreRequest service for Inter Library Loans enables staff, masters or doctoral students of Unisa to complete their own ILL requests via Sabinet (a provider of both library and digital collection management systems). Using LibGuides, librarian created portals to research information within a web 2.0 multimedia guide environment, students and staff can employ self-paced training on research skills and Library resources. Face-to-face training caters for a minority of Unisa clients, and a pressing need exists to massify Library training to reach the larger group of distance students who cannot visit the Library as well. The Library is currently developing an interactive online information literacy programme (IOILP) for all clients who use the Unisa Library, designed to enable clients to collect, analyze, organize and critically evaluate information and to empower them for lifelong learning (Naidu, 2011). A mobile version of the Unisa Library catalogue is available via AirPAC ([http://m.oasis.unisa.ac.za](http://m.oasis.unisa.ac.za)) which detects the type
of mobile device being used and delivers displays formatted for that device (AirPAC puts the Unisa Library Catalogue in your hand, 2013). The South African Post Office's Safemail service is used by IRD's Delivery Office to provide a delivery system for library books to both locally based and international students because it offers full tracking capabilities as well as an audit trail for all library books despatched via the South African Post Office. SAPO makes the electronic file that contains details of all Safemail items in the postal stream available on a daily basis to IRD Services. This information is then added to the Student and SQL Systems (Safemail Post Office Delivery Office Service. nd. :1)

Virtual Reference Services – Although various virtual reference services exist (Dent, 2000: Virutal references services: para. 1), the Unisa Library employs an asynchronous point-to-point service with a librarian virtually available in real time. Students will be able to interact with librarians via the use of QuestionPoint, Facebook and Twitter. QuestionPoint allows virtual chat functionality as well as a knowledge base for Frequently Asked Questions, as well as any Library related documentation, training / educational material.

Originality/Value:

The paper is original in that it captures the experience gained at the Unisa Library on information resource distribution within an ODL environment. Although presented from within a distance education library setting, the information is also of value to residential institution libraries as the boundaries between ODL Library services and online services are blurring.

References:


The influence of knowledge blogs on student marks in a 1st year ODL programming module

Introduction

Many Internet-based tools are available to the Open Distance Learning (ODL) instructor who wishes to enhance his/her online teaching and learning strategies. Of these, the Web-log (or blog) is increasingly being employed as a tool in pursuit of collaborative approaches. A blog is a personal website where all or some combination of text, photo’s, videos, audio and hyperlinks appear in reverse chronological order. Blogs can be classified into different categories namely personal journals, where the authors (or bloggers as they are called), write down their thoughts, feelings and experiences. A next category is knowledge blogs where bloggers make academic observations and record their references related to their specific knowledge domain. Further categories are filters, where bloggers comment on the content of websites, and business, where companies share their thoughts and information (Wee & Hew, 2010).

In responding to an institutional call to embrace new technologies, the current study reports on a recent effort by the authors to employ a knowledge blog as a teaching and learning aid in a module where a low throughput rate demanded alternative approaches.

Literature

Various studies have reported on the value of blogging as a teaching and learning tool in higher education. (Wee & Hew, 2010) have provide proof of how blogging enhances students’ critical thinking, literacy skills and their ability to use the Internet for research purposes. These authors also note that the ability of blogs to publish instantly allows for sharing and collaboration amongst multiple students in a format that can be used in many settings and for a variety of subjects. Other studies have shown blogs to allow for different learning styles of students, thereby improving their academic performance (Saeed, Yang, & Sinnappan, 2009; Demtl & Graf, 2009); and the positive effect using a blog had on understanding of programming concepts (Ramasamy, Vallow, Malathy, & Nadan, 2010; Safran, 2008).

Purpose

The purpose of the current study is to contribute towards discussions on the value and implementation of blog assessment in an ODL context. In doing so, it offers other instructors an opportunity to make decisions on the extent to which they can use student-driven blogs in their own settings.

The specific research question addressed was: What differences, if any, exists between the summative marks of students who used a knowledge blog and students who did not?

Setting

The setting this study reports on is the module Introduction to Interactive Programming (ICT1512), a compulsory first year programming module in the National Diploma Information Technology offered by Unisa. Using the JavaScript scripting language, the module aims to teach basic programming principals. The module is presented online using the myUnisa LMS.

The blog tool of choice used in the module, BlogWOW, is one of several Web 2.0 tools offered by myUnisa. In activating the tool, each student was able to create and manage their own individual-driven knowledge blog in a shared space. As part of their formative assessment, students were tasked to critically reflect on self-study units completed. Such reflections were not intended as summaries of the work studied, but rather a personal reflection on what they found interesting or difficult, and how they dealt with challenges and arrived at solutions.

Method

The data used to answer the research question was the final examination results of 3173 students as extracted from the institutional database for the period between 2010 and 2012. For purposes of confidentiality no individual marks are reported. Descriptive statistics and an unpaired t-Test were employed to determine if there is a significant difference between the mean summative marks of students who used a knowledge blog and students who did not.

Results

Table 1 shows per row, the total number of students who wrote examinations within a given semester and year, the total number of students who blogged (completed the formative blog assessment) and those who did not.
the total number of students who did not blog, the final mean percentage mark of all students, the final mean percentage mark of students who blogged, and the final mean percentage mark of students who did not blog.

<table>
<thead>
<tr>
<th>Year</th>
<th>Write</th>
<th>Blog No</th>
<th>Blog Yes</th>
<th>Final % - All</th>
<th>Final % - Blog Yes</th>
<th>Final % - Blog No</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>528</td>
<td>323</td>
<td>205</td>
<td>34%</td>
<td>26%</td>
<td>47%</td>
</tr>
<tr>
<td>2010</td>
<td>313</td>
<td>176</td>
<td>137</td>
<td>34%</td>
<td>27%</td>
<td>43%</td>
</tr>
<tr>
<td>2011</td>
<td>596</td>
<td>350</td>
<td>246</td>
<td>39%</td>
<td>32%</td>
<td>50%</td>
</tr>
<tr>
<td>2011</td>
<td>474</td>
<td>269</td>
<td>205</td>
<td>40%</td>
<td>33%</td>
<td>49%</td>
</tr>
<tr>
<td>2012</td>
<td>728</td>
<td>401</td>
<td>327</td>
<td>40%</td>
<td>33%</td>
<td>50%</td>
</tr>
<tr>
<td>2012</td>
<td>534</td>
<td>233</td>
<td>301</td>
<td>47%</td>
<td>39%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Table 1. Blogging data 2010 - 2012

For all years, the data shows students who blogged (n=1421, M=48.6%, SD=1.3) to perform consistently better than those who did not blog (n=1752, M=31.6%, SD=1.9). In 2010-S1 their mean final mark was 21% higher, in 2010-S2 it was 16% higher, in 2011-S1 it was 18% higher, in 2011-S2 it was 16% higher, in 2012-S1 it was 17% higher and in 2021-S2 it was 14% higher. It is also evident from the data that the mean examination marks of students who blogged, are much higher than the overall mean of the final examination mark. In 2010-S1 their mean final mark was 13% higher, in 2010-S2 it was 9% higher, in 2011-S1 it was 11% higher, in 2011-S2 it was 9% higher, in 2012-S1 it was 10% higher and in 2021-S2 it was 6% higher.

To evaluate and compare the differences in means between the two groups, an independent T-Test (equal variances) was employed. There was a significant effect for blogging, t(10) = 7.16, p < .001, with groups who blogged receiving higher marks than those who did not.

Conclusion

The results show groups of students who completed the formative blog assessment to significantly and consistently perform better in summative assessment than groups of students who did not complete formative blog assessment.

It can thus be stated with confidence that the implementation of blogging in ODL is particularly well suited for first year programming modules where blogging is defined as reflective activities and continued engagement with the course work.

References


Best practices towards eModeration

The role of academics has changed over the years from face-to-face teaching towards Open Distance Learning (ODL). Teaching, assessment and moderation platforms have evolved to support virtual learning environments (VLE) platforms and moderating frameworks that support teaching and learning outcomes (Salmon 2003). The manual moderation process is still widely used despite being tedious, time-consuming and cost-ineffective; it relies on paperwork and presents problems regarding feedback on the assessment of answer scripts of students (Van Staden, 2010). Online-moderation is an essential emerging technology in the era of online teaching but the application is still novel (Morgan, 2008), and the factors that determine the user experience in using eModeration have not been theorized in any depth.

The purpose of this paper is to investigate the user-experience aspect of eModeration by considering the fundamental realities and challenges faced by users with regard to eModeration information technologies. The research is guided by the following question: How can the electronic moderation of examination scripts provide a better user experience in terms of functionality, usability, flow, interactivity, accessibility, effectiveness, efficiency, safety, learnability, memorability and user satisfaction for moderators and deans when this is compared to the paper-based moderation process? In presenting this argument, different perspectives will be explored with a specific focus on the implementation of an eModeration system that is usable and ensures user experience. Finally, the paper addresses the challenges faced by a Private Higher Education Institution (PHEI) named Midrand Graduate Institute (MGI), in successfully implementing online moderation and how this research can contribute to ensuring satisfactory user experiences from a managerial perspective.

Case studies on eAssessment and how Information Communication Technology (ICT) can support the formative assessment processes have been carried out, e.g. with reference to the submission of assignments online and regarding feedback between the lecturer as the eModerator and students (Bridge and Appleyard, 2008; Morgan, 2008; Vlachopoulos, 2008; Nicol, 2007; Salmon, 2003). According to Bridge and Appleyard (2008) the online submission of assignments and the ability to provide feedback to the student enhanced the learning experience and assisted the lecturer with record keeping of assignments. The focus of this particular study, however, is not automated marking but rather eModeration. Furthermore, the relationship between the eModerator and the dean of the faculty and not between the student and lecturer are investigated.

The context is a Private Higher Education Institution in South Africa, named Midrand Graduate Institute (MGI). MGI decided to investigate the possibility of moving towards an online-moderation system to replace the manual paper-based moderation system. Initially the online moderation system was rolled out only in the Information Technology faculty. MGI used its eLearn virtual learning environments (VLE) platform as a basis for eModeration and the principals of an eModerating framework as suggested by Salmon (2003). The eModerate system is supposed to provide a user interface through which examination answer books can be submitted and graded electronically. For the purpose of the researcher’s study the online moderation system was rolled out across five faculties at the institute to all moderators over a period of two examination sessions.

Creswell (2009) identified four different worldviews: post positivism, constructivism, advocacy participatory and pragmatism. Social constructivism is often combined with interpretivism (Myers, 2009; Creswell, 2009) and is seen as an approach to qualitative research. Social constructivists assume that individuals seek to understand the world in which they live and work (Creswell, 2009). The philosophical worldview proposed in this study will be interpretivism. The research strategy according to Oates (2006) is the overall approach to answering the research question. Case study is one of the strategies that can be used (Myers, 2009; Olivier, 2009; Creswell, 2008; Oates, 2006). Interpretive case studies
generally attempt to understand phenomena through the meanings that people assign to them (Myers, 2009). Therefore the research strategy will involve a case study.

The data generation method is the means by which empirical (field) data or evidence are produced (Oates, 2006). Data can be qualitative or quantitative (Myers, 2009; Olivier, 2009; Creswell, 2008 Oates, 2006). By using more than one data generation method, the researcher will be able to look at the phenomenon of interest in different ways (Oates, 2009). The reason for combining both quantitative and qualitative data is to bring about a better understanding of a research problem (Lazar et al., 2010) by converging both quantitative numeric trends and qualitative detailed views of data and to advocate change (Creswell, 2008; Oates, 2006). The user experience of the electronic moderation process is explored using interviews (qualitative instrument) with three deans from the three faculties at MGI. For the purpose of this paper, however, only the interviews with deans are used as data sources. In these situations, closed-ended quantitative data and open-ended qualitative data have been collected. The results indicated that the proposed change in moderation has a positive impact on the turnaround time of moderators' feedback and afforded moderators more flexibility according to the "I can moderate anywhere and at any time" principle. The paper provides some guidelines towards the development of best practices to ensure a positive user experience of eModeration at an organizational level in an ODL environment. The paper further contributes to the first quadrant of ODL research at UNISA called: research into ODL praxis with a focus on VLE, assessment and changing roles of academics and students.

References:

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Engage! Enter Databases

Online learning brings about a number of benefits to both the learner and the institution. Previous studies identified flexibility as the learner as it allows them to collaborate online without the need to rearrange one’s schedule (Petrides 2002; Schrum 2002), especially for those learners studying part-time and working full-time. Such flexibility is not available in residential institutions. Convenience of choosing the most suitable time to
engages with online learning tools is another strength reported by learners (Poole 2000). Previous online learning experiences of the user, the design of the online course content, and the user interface plays a major role to the success of the current experience with the online learning system. Since quality implications affects the learners’ perceptions negatively on the intention to use, ease of use and usefulness of the model (Liu, Chen, Sun, Wible & Kuo 2010). Getting to know learner profiles is critical to online learning success as Ke & Kwak (2012) reported that older learners recorded higher participation and more time on posting and reading messages online, compared to their younger counterparts. They also alluded that this might be because younger learners are more efficient with performing online learning interactions. Learners identified the social exchanges among themselves and instructors as their favourite aspect of online learning (Boling, Hough, Krinsky, Saleem & Stevens 2012). Therefore it is important to design and develop online material that foster online communities and take advantage of their strengths. These research insights are discussed in context of Gilly Salmon’s e-moderating model (2004).

As much as online learning brings about benefits, it also has its weaknesses. Previous studies have highlighted a number of these drawbacks. Learners complained about delays in responses from facilitators and fellow learners in online discussions and other tools (Petrides 2002). This tends to frustrate learners who bought into the model with promises of prompt feedback. Online learners often feel isolated due to lack of connection with the facilitator (Vonderwell 2003) and faculty (Woods 2002). Song (2004) found that most students prefer an initial face-to-face meeting or even a picture of the instructor to have some form of community connection as learners feel isolated from the faculty.

The purpose of this paper is to report on experiences and events that influenced learning in an online course on Databases as a Unisa ODeL Community, Computers & Education, 54(2), 600-610. Different aspects increased the learners’ online participation and improved the use of online tools. These include expectations, informed use of tools, a theoretical model as guide, and a team approach. Activity statistics from myUnisa tools are used to record activity and this paper describes the activity of students, within the variety of tool spaces. Arguing through the Critical Realist lens, the structural and cultural generating mechanisms becomes visible as explanatory framework for the 100% activity rate which was unique. We reflect how online lecturers could use such generating mechanisms transcending the levels of experiences and events to deeply engage students in e-learning.

REFERENCES


Liu, I. F., Chen, M. C., Sun, Y. S., Wible, D. & Kuo, C. H., 2010, ‘Extending the TAM model to explore the factors that affect Intention to Use an Online Learning Community’, Computers & Education, 54(2), 600-610.


## LIST OF PARTICIPANTS

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<thead>
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