

## **A study of a quality assurance course in an engineering department at an ODeL institution**

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**ABSTRACT:** An investigation was undertaken on the teaching and learning of the quality assurance course to determine what could be done to improve the situation during the years 2012 to 2015. The course was taught using open distance learning (ODL) methods during 2012 to 2014. Developing teaching and learning materials using technology requires different modes of delivery and requires unique approaches to pedagogy compared to traditional quality assurance delivery. This study explores strategies applied by ODL lecturers in the designing and communication of the course to optimise student engagement and scores. The quantitative data consisted of all students in the 2012-2014 and 2015 years of study. The 2012-2014 scores were attained by teaching using ODL methods only. The 2015 teaching was performed using a blended learning approach. The qualitative data consisted of a random sample of 10 students in the 2015 year of study. The results indicate a trend of improvement of scores from 2012-2014 to 2015. They improved from 38%, 36% and 57% during 2012-2014 to 84% in 2015. Qualitative analysis suggests some specific strategies employed impacted on the 2015 scores.

### **INTRODUCTION**

The purpose of this article is to inform educators that engagement is a vital ingredient for the improvement of pass rates in both traditional and ODL institutions. This survey deals with the comparison of pass rates in an ODL institution with the objective of highlighting that engagement of students is imperative for student success. The quality assurance course provides students with knowledge, skills and attributes in the quality assurance field and is aimed to achieve the following:

- Acquire skills to apply the techniques of quality assurance in many types of organisational decision-making situations;
- Apply work place improvement techniques and methods to a work situation;
- Apply mathematical models to solve complex problems.

Experience of traditional lectures at a university in South Africa involve structured course content transmitted to the students via a one-way transmission process. A large volume of core knowledge is transmitted by a lecture and seen as an effective method in terms of time utilisation. Students are seen as passive recipients as there is not much discussion on the subject matter. This phenomenon has been seen to change in recent years to a more discussion-orientated lecture. Power point presentations are used in most cases. A summary of core ideas is presented and discussed, as well as skeletal notes provided. Students are sometimes given activities for the purposes of engagement with the content. Course notes and additional information is placed on the ICT system to assist students in understanding the information. After a series of lectures, students are given assignments, projects, tests and the like in preparing them for the final examination [1].

In an ODL context, the principal mode of service delivery used in teaching and learning is technology. Therefore, the communication platform needs to be robust, reliable and durable in order for effective teaching and learning to occur. Elements of quality in an ODL context include instructional design, content development, media production, delivery, student support, assessments, regular communication, human-software interface and the like. It is of critical importance that all correspondence is viewed through the lens of quality and professionalism as these are under constant scrutiny through the eyes of the public [2].

The pass rate for the quality assurance (QA) course between 2012 and 2014 was 38%, 36% and 57%, respectively, with an increase in 2015 to 84% as shown in Table 2. The overall assessment consists of two parts, assignments and examination.

The mark is calculated as follows:

- The year mark contributes 20% of the final mark;
- The examination mark contributes 80% of the final mark.

Curriculum model: the content of the course is underpinned by Lockett's model of an epistemically diverse curriculum provided by a critical analysis of the programme. The model considers four spheres of knowing; namely, foundational competence, which concerns the knowing of disciplinary knowledge; practical competence, which entails knowing how - the application of disciplinary knowledge; personal competence, which concerns learning through reflexivity; and reflexive competence, which entails the development of meta-cognition through thinking epistemically, contextually and systemically [3].

## THEORETICAL UNDERPINNING OF ODL PEDAGOGY

The technology innovation may influence the delivery of teaching and learning [4-6]. It is focussed on the transformational process that impacted academia and students in relation to knowledge transfer modes, syllabuses, instructions, as well as the changing roles of academia and students over decades. Teaching strategies encompass epistemological principles that guide the process of learning that ranges from the view of teaching as transmission, becoming transactional and, then, transformational. Learning theories, such as constructivism, connectivism, behaviourism, rationalism, cognitivism, constructionism, social constructivism, and other hybrid models of learning theory are embedded in the three meta-frameworks where repletion and reinforcement enable reflexivity to occur.

The ODL philosophy attempts to assimilate characteristics from the spheres of learning, that is andragogy (adult learning), heutagogy (self-determined learning) and pedagogy (science of teaching) [7]. Critical analysis of adult learning premised five assumptions that differentiate adult learning from child learning, that is self-concept, experience, readiness to learn, orientation to learn and motivation. These concepts play a major role in student learning in ODL. The notion of heutagogy is based on competencies and outcomes that are pertinent to current students [7].

The development of distance education into the ODL strategy was premised on the notion of provision of education for the working classes. This philosophy encourages the engagement of students in the workplace, as well as the creating of communities of practice (COP) where professional discussions enable learning through listening and speaking where common insights are shared. Peters stated that the principles of operations management in distance education were applied, where cost and value were prominent measures [8]. He advocated the use of communication technology as the primary means of learning through self-learning, tele-learning and social interaction that promoted lifelong learning. The structural components of independent learning and recommended dialogue is an important variable in transactional distance education [4].

The notion was a personal characteristic of self-directedness and accountability in the teaching and learning process. Most discussions on formulating ODL pedagogy refers to the different generations of distance education as proposed by a range of authors, such as Moore; Keegan; and Heydenrych and Prinsloo [4-6].

It is also important to note that particular choices of teaching strategies or pedagogies are based on epistemological beliefs and assumptions regarding how learning takes place, ranging from teaching as transmission, to transactional to transformational. Embedded in these three meta-frameworks are different learning theories, such as behaviourism/empiricism, cognitivism or rationalism, constructivism, constructionism, social constructivism, connectivism, and other hybrids. The aim is not to denigrate any of these learning theories, but to provide general broad principles, which should be considered when lecturers decide on particular teaching strategies.

Transitions in thinking about learning have many implications for existing theories of learning. According to more recent theories of learning and cognition, drawing on socio-cultural, psycho-analytic, linguistic and complexity theories, mainstream conceptions of working knowledge and learning should be questioned. One argument is that these conceptions are informed by theoretical explanations of learning that are too simplistic. New insights argue that learning takes place at the intersection of intervention, identity and environment, and should be taken into consideration when designing programmes, because they hold heuristic value for understanding knowledge production and subjectivity in these contested sites of work [9].

The contextual factors that underpin teaching and learning are derived from curriculum design. The principal factors that influence what is being taught may be categorised in three levels: the macro, meso and micro.

- Macro - national and international influence, such as globalisation, massification, marketisation. Also includes socio-economic and political influence.
- Meso – the Department of Higher Education and Training (DHET) and institutional level influence include issues, such as policies, culture, location, student profile. Also include external influence from employers, professional bodies, accreditation bodies, quality agencies, as well as political redress.
- Micro - individual academics and support staff in relation to personal theories, beliefs, professional knowledge.

The question is what does the teacher teach without a curriculum? The teaching and learning process can be considered as a relationship between students, teachers and support functions [10]. It is important to note that all three variables contribute significantly to an enabling environment for teaching and learning to be successful in ODL. The systems approach in the educational context views the institution as a system where there is interaction of variables of input,

process and output that enable learning to take place. In view of the complexity and nature of this curriculum, there has been limited change over the years. Curriculum is driven by systems theory and administered by policies to structure the process of curriculum design.

## METHODOLOGY

A qualitative and quantitative method was employed. For the quantitative method, the population scores were elicited from traditional examination at the end of the year. The admission requirements for students to study the QA course was the same from 2012 to 2015. The means of the pass rates in other engineering subjects were the same. The number of students was normally 25 students, but only 10 students responded to the survey as shown in Figure 2. The QA course is offered via ODL in the Department of Mechanical and Industrial Engineering.

The data were taken over four years. The ODL course during 2012-2014 remained unchanged. The course was taught by three lecturers consecutively. The QA course progressively developed from ODL to ODeL. The 2015 ODeL course emphasised optimisation of motivation, time efficiency, pedagogical structure and assessment procedures. In the 2015 course design the content, communication and assessment strategies were developed using the Carpe Diem model:

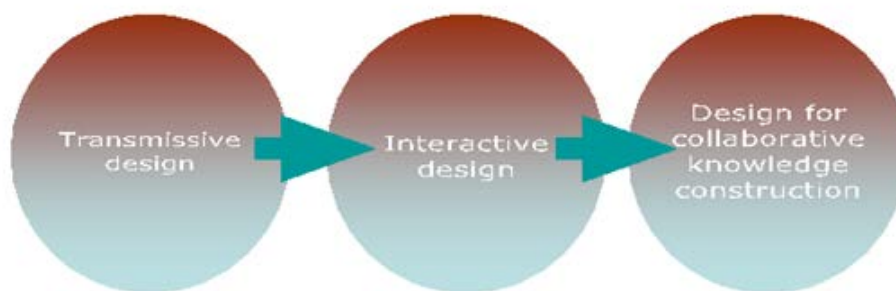


Figure 1: *Carpe Diem* model.

## THE PRACTICE OF QUALITY IN AN ODL CONTEXT

ODL has evolved over the past 140 years. Due to the intensification in student numbers, the University has appointed tutors and e-tutors, firstly to improve pass rates, and secondly, to decrease the workload burden of lecturers. This promulgates interactive discussions among students and tutors, where the quality of discussions is scrutinised by the lecturer and the coordinator to determine their effectiveness and added value. Therefore, it has become fundamental that the quality of these dialogues contribute to improved student experiences in open distance learning.

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## ANALYSIS OF RESEARCH

Table 1 exhibits the 2012 to 2015 *Carpe Diem* list of components in each category.

Table 1: *Carpe Diem* list of components in each category.

ODL trends	2012	2013	2014	2015
Transmission design	Used guides	Used guides	Used guides and interaction	Power points, use of curriculum design and teaching and learning models in the content
Interactive design	No interaction	No interaction	Interaction	Telephone, e-mails, mock tests
Design for collaborative knowledge construction	No collaboration among students	No collaboration among students	Some collaboration	MyUnisa platform, Youtube video interactions, on-line contact sessions
Face-to-face meetings	No	No	Some appointments	Open to all students

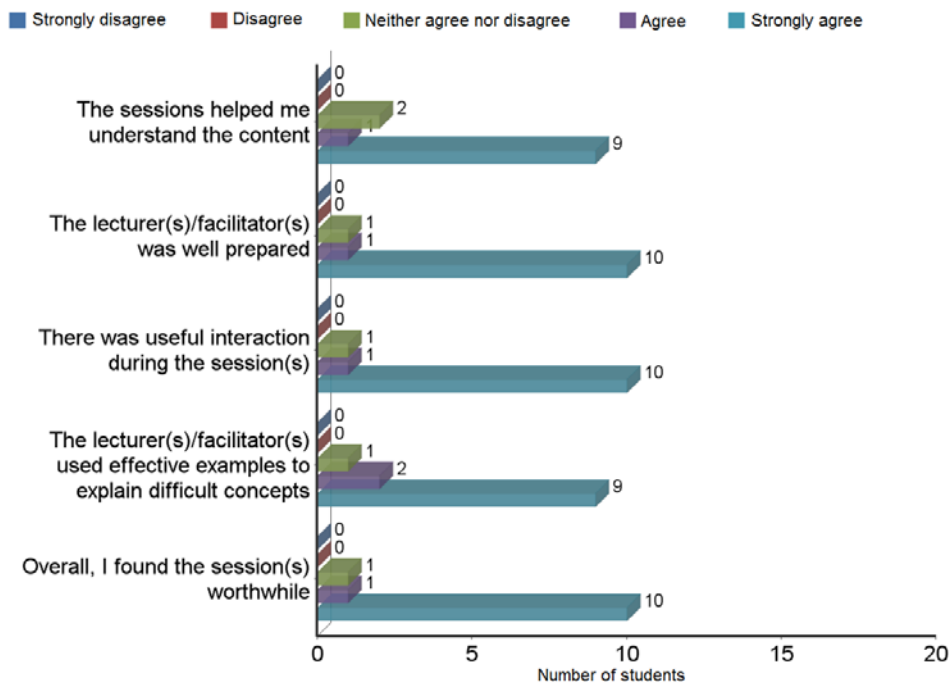


Figure 2: Results of a survey run by registered students (quality assurance module).

Table 2: Yearly pass rates with mean and standard deviation.

Year	Mean	SD	Pass rates
2012	7	8	38
2013	24	13	36
2014	41	12	57
2015	50	17	84

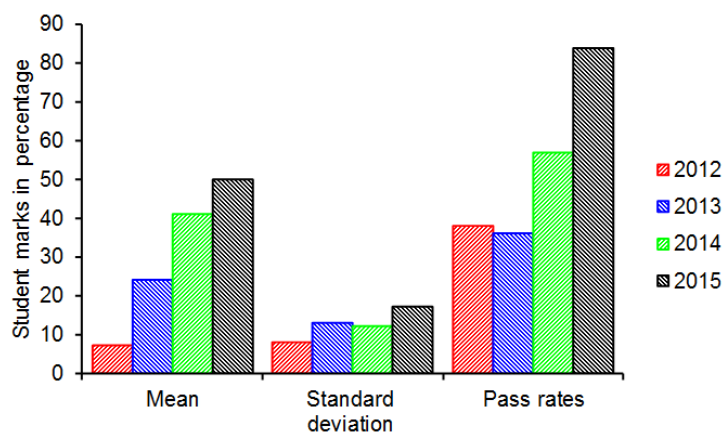


Figure 3: Statistical assessment of students' performance over four years.

## DISCUSSION AND RECOMMENDATIONS

An analysis of the current scenario led the lecturers to implement strategies that would have an impact on students. The following aspects were implemented: held contact sessions, discussed assignments, developed teams within the class, set mock examinations, got students to set mock examinations, communicated regularly on e-mail, discussion forum, called students to evaluate their progress and motivated students. Contact sessions - students were invited to the campus. Discussions were conducted regarding the subject matter and other general issues. In the contact sessions teams were formed with the objective of engagement with the text and how to answer questions. Students were asked to apply the theory of the text as a roleplay scenario. These discussions also clarified the requirements for the assignments. This enabled the application of the *Carpe Diem* model of knowledge construction.

Figure 2 shows the survey conducted where registered students for the proposed academic year were asked different questions regarding the quality of the module. The majority of these students agreed that there were useful interactions for the duration of the module. As shown in Table 2 and Figure 3, the academic year 2015 has been shown to have more improvement in terms of student success.

Telephone calls - getting to know the students (from a quality perspective, it may be said that getting to know your customers). This was done looking up the list of students and randomly selecting and calling them. The objective was to introduce the caller as the new lecturer and to get to know where the students are working, what they are doing, talking about quality and its importance in general and, then, getting to the context of quality as a subject in the BTech industrial engineering programme. This enabled the linking of what the students are studying to their everyday activities at work and at home. The progress of students was ascertained through telephonic discussions, which enabled motivating them to spend time on their studies on a more regular basis. This communication provided valuable insight into the students' style of studying. Getting to know their style of studying and engaging them through activities enabled the grasp of subject content. In addition, informing them of the fundamentals that are required for progress in the subject was imperative.

Students engaged themselves in discussions through the myUnisa platform where issues in context were clarified. Through this platform numerous challenges in the understanding and knowledge construction of the text were encouraged. Typical examination type questions with the methodology of answering questions were debated at great length. Team formation encouraged participation and debate on relevant matters of concern experienced in the workplace.

Students began to appreciate the subject and apply themselves in quality management on a regular basis. Additional material in the form of summaries of chapters, questions and answers, multiple choice questions, mock tests, open book tests encouraged further understanding of the subject matter. E-mails were responded to timeously in order to prevent the transmission of information. Meetings and contact sessions were held to further enhance understanding of the subject.

The 2012 and 2013 students' marks suggested that there was a significant lack of student support. Simply delivering content will not ensure achievement of learning outcomes. The strategies suggest highly focused students, optimal time management, flexibility, collaborative learning and interactivity. The low scores indicated that the content was not pedagogically structured. It was not adapted for the cohort of students. It did not sustain or enhance learning outcomes. It led to high attrition rates. The lecturer designed the QA course by using the experiences gained by the student.

## CONCLUSIONS

The strategies providing the best possible learning experience are design, encouraging commitment, motivation, sequencing of assessment, technology and communication. The design of the course must be flexible enough to meet the needs of a diversity of students. Knowing the students in order to detect their needs is critical for the course.

The course needs to create a climate of motivation and engagement. Students need to be scaffolded through the key literature and assessed through learning outcomes. The course must be flexible for all students. There must be constant communication with students using podcast, audio and slides. The technology must be effective enough for synchronous and asynchronous learning.

The lecturer must organise discussion forums that require full participation. It is crucial that on-line discussion forums include assessment items. These assessment items maybe designed progressively sequenced in accordance to objectives, specific content and optimal timing. The objectives and student feedback can be linked to formative and summative assessments. Assignments or tutorial tasks should be simple, short and formulated such that they includes a clear path from the concrete to the abstract. Good courses are aware of variation in student depth in knowledge.

Students should be able to e-mail or SMS the lecturer at any time. Feedback must be optimised for response time. Phone calls or Skype to students is a good near substitute for face-to-face. It gives the students an assurance of the ever presence of the lecturer, which is a motivation to learn. Analyses indicate that the strategies most effective were the *Carpe Diem* design model, motivation, structuring of pedagogy content and assessment, technology and efficient communication.

The QA course was designed taking into account the particular needs of the students and adjusting the learning material and assessment progressively. The students became motivated when they met the lecturer face-to-face, discussed on the telephone, Skype and workshops and discussion forum on the myUnisa. Different strategies for communicating were used discretely. The assessment were optimised so that feedback was decisive. The lecturer gained insights on integrating pedagogy and new technologies to create next generation student-centred blended learning environments.

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