IT Worked for Us: Online Strategies to Facilitate Learning in Large (Undergraduate) Classes

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Abstract: Higher education institutions are compelled to accommodate growing class sizes as student numbers have increased over time, especially at undergraduate level. Good teaching principles are relevant to all class sizes. For example, teachers of all classes are required to create safe learning environments, motivate and engage students, interact with students, provide stimulating assessment tasks and give prompt feedback. However, meeting these requirements in the context of large classes is more challenging. As a result, traditional large class teaching methods are often characterised by the passive absorption of material, which is not ideal.

What constitutes a large class? Class sizes of 60 or more have been considered large. In this paper, we report on online teaching, learning and assessment strategies for classes made up of approximately 600 first year students in Business Management 1 offered at the University of Johannesburg, South Africa.

The purpose of this ongoing research project is to integrate educational technologies in the classroom and study the impact of these classroom changes on the students' learning experience. The programme, which blends face-to-face teaching, paper-based teaching materials and online learning by means of WebCT/Blackboard tools, is now in its second cycle of implementation. This teaching strategy aims at greater lecturer-student interaction, engaging students with the course materials on a regular basis and eliciting feedback from students, which is used to re-teach concepts that the students find particularly difficult.

The blended learning strategy resulted in enhanced student perceptions of the quality of teaching and learning, and a significant improvement in student throughput. The findings and recommendations reported in the paper are based on student feedback, gleaned through online surveys, online artefacts created by students and lecturers' classroom experiences.

Although the authors report on online teaching, learning and assessment practices that proved to be effective in large classes, many conclusions may be of relevance to smaller classes.

Keywords: large classes, e-Learning, assessment, evaluation, social presence, action research

1. Introduction

Ives (2000), who wrote *A Survival Handbook for Teaching Large Classes*, argues that "[i]t doesn't take a rocket scientist or a poet laureate to know that teaching a large class is a very different set of challenges than we typically face in our other classes". There is a global need to meet the growing demand for higher education (King, 2004) and South Africa is no exception.

Effective teaching in large classes does involve addressing the requirements of good practice relevant to all class sizes, but large classes offer a unique set of challenges, which put strain on lecturers' resources. Although it is difficult to agree on the exact size of a large class, the term generally applies to classes with more than 60 students (Centre for Teaching Excellence, 2005). This paper reports on teaching, learning and assessment strategies for exceptionally large classes: in 2007, 3157 students were enrolled for the course Business Management 1A01 at the University of Johannesburg, with approximately 600 students in a class.

Lecturers who teach these classes experienced a considerable lack of lecturer-student interaction and could find little evidence that students continuously engaged with the course materials. Their goal was to renew their teaching-learning strategy with the aim to

- Involve students in the learning process
- Engage students with course materials
- Assess students on an ongoing basis
- Provide feedback more regularly

- Address learning needs and improve teaching through eliciting student feedback
- Personalise the learning environment by establishing a lecturer presence and lecturer-student interaction

In addition to the apparent negative impact of impersonalised education on student learning, the lecturers involved in this project were concerned about the fact that they taught first year students who were mostly newcomers to university life. Therefore, they also aimed to assist students to establish a learning method that supports success in Business Management. With the integration of technology in their classroom practice, they attempted to establish a pattern of class preparation, class attendance, engagement with course content and reflection on the teaching-learning process. This strategy is explained in more detail later in the paper.

While it was found that teaching large classes put forward certain obstacles, this paper will show that class size is not necessarily inversely proportionate to learning; it is not as simple as *the smaller the class, the more students learn*. Felder (1997) claims that "anything you can do in a large class you can do better in a small one". Here it is argued that, in teaching, size need not necessarily matter. What really seem to matter are how concerned lecturers are about their students' learning, how much energy they put into the teaching-learning process and how competent and creative they are. The research reported here shows the effects of lecturers' efforts to empower students to find information and create knowledge in self-regulating ways, and to become confident in the process.

This paper addresses the following research problem: how can eLearning technologies be integrated in large class teaching to enhance student engagement and student throughput. The purpose of the research is to inform practice and not primarily the extension of academic discourse on the subject of large class teaching. While the action described in this paper is grounded in learning theory, the research outcomes are aimed at an audience of higher education practitioners who can benefit from the practical guidelines presented here. The paper proposes concrete ways to integrate online teaching tools in face-to-face tuition with the aim of getting students involved in the teaching-learning process and to personalise the learning environment with the expectation to enhance student success.

2. Context of the research

The research reported here concentrates on practical blended learning strategies with the aim of contributing to the innovation of classroom practice. The purpose of this brief contextualisation of the inquiry is to enhance the usability of the proposed teaching-learning strategies in other environments.

The higher education institution where this inquiry was conducted had been a traditional contact tuition provider until 2002 when it adopted a blended learning strategy and set up the infrastructure to support and sustain learning and teaching with technology on campus. This blended learning project involves 3157 students in Business Management 1A01, a course that is facilitated by three lecturers.

The lecturers involved found themselves looking for ways to innovate their teaching practice and explored the implementation of educational technologies as an option. Their main concern was a significant lack of lecturer-student interaction, which resulted in other challenges, such as poor throughput. An eLearning specialist was engaged in order to explore possible eLearning solutions as part of a multi-disciplinary team. Her role was to ground the use of technology in effective practice and pedagogies that enable technology-assisted learning, within the given teaching-learning context. The research project is in its second cycle of implementation.

The research reported here is guided by the principles of action research, with improved practice as primary focus. It is believed that some of the success of the teaching-learning innovation described here can be attributed to planning before action, followed by critical analysis. What follows next is a brief introduction to the research approach and a summary of how the steps in action research were implemented.

3. Strategies guiding the research

Given that the aim of this research is the renewal and improvement of existing classroom practice, action research was regarded as an effective method for inquiry. McNiff (1988: 50) argues: "Built into action research is the proviso that, if as a teacher I am dissatisfied with what is already going on, I will have the confidence and resolution to attempt to change it. I will not be content with the status quo". Kemmis and McTaggart (2005) echo the notion that classroom action research typically involves the use of qualitative research methods and data collection by teachers who put their teaching methods on trial in an attempt to

improve their practice. The action research process is typically defined as a spiral of cycles of planning a change, acting and then observing the outcomes of the change, reflecting on the outcomes and finally re-planning the change. Kermmis and McTaggart (2005: 563) hold that action research is "best conceptualized in collaborative terms". Altrichter, Kemmis, Mc Taggart and Zuber-Skerrit (2002) describe the action researcher as a co-worker conducting research with and for people concerned with a real-life problem and its actual improvement.

A multi-disciplinary team addressed the research problem presented in this paper. The team comprised three lecturers (subject matter experts) who provided contact tuition and facilitated course related activities in the online component of the course. The fourth member of the team was an eLearning specialist. The primary function of this role was to advise on the integration of technology with the aim of improving teaching and learning; it was not to promote the use of educational technologies. The research process was triggered by the lecturers' dissatisfaction with poor student throughput in one of the courses that they teach. The lecturers explored alternative teaching-learning approaches, which resulted in the research team asking: how can educational technologies be utilised to enhance student engagement in large classes with the aim of improving throughput? A proposed eLearning solution was subsequently planned and put into action. The action was then evaluated. The research team reflected on the results of the evaluation, which led to a new cycle of planning, acting, observing and reflecting. Table 1 summarises the steps in the action research process, as described by Zuber-Skerrit (1991), in relation to the research project.

Table 1: Steps in action research related to this project

Step	Description
Plan	This phase of the action research process includes the problem analysis and strategic plan. The lecturers, who initiated this research, were concerned about the lack of student engagement and interaction in large classes, which in their opinion contributed mostly to poor student throughput (58 per cent in 2006). The integration of eLearning technologies with face-to-face tuition was explored as a possible solution. Early in 2007 the lecturers were joined by an eLearning specialist to plan a new blended teaching-learning strategy which aimed at ▪ effectively utilising educational technologies to enhance student engagement, interaction, assessment and feedback in large classes and ▪ improving the throughput rate for Business Management 1A01, while maintaining assessment standards and the cost-effective lecturing format of large classes. A detailed description of the new teaching-learning strategy is found later in this paper.
Act	"Action" refers to the implementation of the strategic plan. The new teaching-learning strategy was executed over a seven-week period during the first quarter of the first semester in 2007.
Observe	In this phase of the research process, the action is evaluated by appropriate methods and techniques. Since the aim was to make informed teaching decisions, the following sources of data were used to review the new teaching-learning strategy: ▪ Students' questions, comments and feedback made in the presence of a lecturer ▪ On-line artefacts, such as discussion board postings by students and lecturers ▪ Lecturers' reflections on the teaching-learning strategy ▪ Online survey statistics ▪ Online quiz statistics ▪ Electronic tracking of students' online footprints and usage of the online materials and functionalities ▪ An online opinion and attitude survey administered on completion of the course Although independent sources of data were used, the bulk of evidence presented in this paper is based on the opinion and attitude survey administered in the online component of the Business Management 1 course. The selection of surveys as one of the data collection tools was driven by contextual factors, for example the large student population and the time available for administration and data analysis. Automatically generated data from the surveys enabled the researchers to collect information from a large number of students in a short time, statistics were available immediately and respondents could remain anonymous. In the interest of practicality surveys consisted of mostly closed questions. Some open-ended questions were included to give participants an opportunity to explain their answers or to add additional comments. During the research cycle reported here the opinion and attitude survey was completed by 1828 students, yielding a satisfactory response rate of 57,9 per cent.
Reflect	Finally, action researchers reflect on the results of the evaluation, on the action as well as the research process. In this project the researchers attempted to reflect on the following issues: ▪ How did the students react to the new teaching-learning strategy and what did they do? ▪ Which aspects of the new teaching-learning strategy contributed positively to the students' learning experience? ▪ Which aspects of the new teaching-learning strategy influenced the students' learning experience negatively? ▪ How did the research team experience the new teaching-learning strategy and what did they do? ▪ What were the key learning points? ▪ What is the impact of the key learning points on the following cycle of implementation (strategies to ameliorate negative impacts and exploit positive impacts)?

The purpose of reflecting on, and recording the outcomes of research cycles is, firstly, to liberate the research team from continuously repeating past mistakes and secondly to enable them to refine teaching practice. The following section unpacks the new teaching-learning strategy.

4. A new teaching-learning strategy

The new approach, which is characterised by enhanced engagement and regular assessment, also aimed at making the teaching-learning experience more enjoyable. The elements of the new approach were grounded in extant research findings about pedagogies that enable learning, and specifically online learning.

The decision to utilise technology for enhanced student *engagement* was based on the premise that students learn by being actively involved; the researchers subscribe to Merrill's (2004) view that information is not instruction. MacDonald (2005) provides a useful definition of what makes learning active: "[A]ctive learning is a process whereby learners are actively engaged in constructing knowledge in a meaningful, realistic context through exploration, reflection and social discourse with others, rather than passively receiving information". The teaching-learning strategy described here, pursued student engagement mainly through assessment with feedback as recommended by researchers, such as Angelo (2002), Brookhart (1999) and Wiggins (1998), and by establishing a social presence as suggested by researchers, such as Aragon (2003) and Salmon (2002).

Online learning technologies were implemented to help students engage with course materials, lecturers and other students in the following ways:

▪   Additional resources, such as lecture outlines were made available, which encouraged students to come to class prepared.

▪   More assessment opportunities (with immediate feedback) were provided in the form of online quizzes, without adding to lecturers' marking load.

▪   Student feedback on the teaching-learning process was elicited on a weekly basis through online surveys, which could be interpreted quickly and easily.

▪   Channels of asynchronous online communication were created to facilitate interaction and collaboration.

The proposed eLearning solution was based on the principles of online teaching-learning models, such as those described by Garrison, Anderson and Archer (2000) and Salmon (2002). Salmon (2002), for example, builds her model of online teaching and learning on the assumption that learning is a complex interaction between cognitive, motivational, affective and social processes, which culminate in the development stage where students assume responsibility for their own learning. The first stage deals with pragmatic issues, such as gaining access to the online learning environment. During this stage, the facilitator provides support and creates a safe space that motivates students to participate. At stage two, students establish their online identities and find others with whom to interact. This stage sets the scene for course related collaboration. The facilitator provides ways to bridge the gap between known forms of behaviour and the rules of behaviour in the online environment. Stages three and four involve the sharing of information about the course and consequent construction of knowledge. The facilitator encourages students to use learning resources and initiates learning activities that require groups to work together to achieve specific outcomes, with the facilitator in a supportive role.

The elements of the new teaching-strategy are discussed below.

4.1 A recommended weekly learning path for students

The objective of the student-learning path was to establish a weekly rhythm of class preparation, class attendance, engagement with course materials and reflection on the teaching-learning process.

In order to enable students to prepare for an upcoming class, lecture outlines were published in the online course component at the beginning of a lecture week. The outlines provided key lecture points in a workbook format with white spaces for students' own contributions. Students were encouraged to use the outline to guide their reading in preparation for lectures. Ideally, students would record their own comments and insights during preparation and in class. The outlines aimed to help students reflect on class discussion as opposed to anxiously copying their lecturers' words and PowerPoint slide contents. Students were encouraged to listen actively and take meaningful notes, using the lecture outlines. The lecture outlines were a "stripped down" version of the PowerPoint presentations used during lectures; the notes contained only key points and other scaffolds, such as selected graphics and models.

Following lectures, students were asked to discuss the lecture with fellow students and/or study group members and then provide individual feedback to the lecturing team by completing an anonymous online

survey, which was referred to as the "muddiest point" survey. The muddiest point surveys attempted to establish the following:

- The "clearest" point of the week's lecture (students selected the best-understood learning outcome).
- The "muddiest" point of the week's lecture (students selected the least understood learning outcome).
- The extent to which the lecturer provided students with all the information needed to successfully complete the learning unit for the week (rated on a scale from zero to 10).

The student feedback was used to establish which learning outcomes had to be revisited during the following lecture. The data from the last question in the survey were used to calculate an average student satisfaction rating. These statistics were used as a "dipstick" measurement of and reflection on lecturing performance.

4.2 Enhanced engagement with course content through online quizzes

Students were expected to complete four on-line quizzes throughout the seven-week course. A compulsory mock quiz was included to allow the students to familiarise themselves with the quiz tool in the online course component. Each quiz covered two chapters in the prescribed textbook and each student was presented with ten quiz questions, which were randomly selected from a question database. The assessments were open-book and had to be completed within a short time, which required students to study, or at least read, the relevant chapters before they attempted the quizzes. Students received their grade and feedback on submission of the quiz in order to assist them to gauge their knowledge and understanding of the course material. Each student was allowed two opportunities to take the quiz and the highest score was recorded. The on-line quiz results comprised a small percentage of the students' final mark for the course.

4.3 Adding a social dimension to the course

It was important that students visit the online course component regularly. One of the strategies to achieve this aim was to create a social dimension in the online course environment. Teaching with technology can easily be associated with cold and impersonal teaching-learning environments. Therefore, an effort was made to create a warm, personalised, inviting, visual and informative environment that was updated every week. The intention was to make the online course component an attractive and rewarding information-destination for students to visit at least once per week.

Maintaining the online social presence required the lecturing team to do the following:

- Update the course home page every week with concise and informative text and visuals, which were linked to an important learning outcome for that week.
- Encourage students to debate course-related issues in the discussion forum.
- Contribute to discussions.
- Continuously moderate student contributions to the discussion board.
- Promptly respond to student postings (within 48 hours).

The next section addresses the perceived impact of the new teaching-learning strategy on the students' learning experience.

5. Results

The discussions in this section are based on data gathered from sources listed in Table 1.

The team approach to finding a teaching solution was constructive. All team members felt safe to engage in debates and discussions as equals with one common objective; to maximise student learning. The contributions regarding teaching and learning, made by the eLearning specialist, were perceived by the lecturing team as theoretically sound and simplistically elegant. It was evident to the lecturing team that the aim was to use technology to support and enable improvements in teaching-learning strategies; technology did not attempt to prescribe strategy. This soon cemented the eLearning specialist's team membership as "a fellow expert" as opposed to an "outsider" or "support staff". This perception supports other research claims that professional development practitioners, such as eLearning specialists, should be seen as a credible source and reliable advisor (Salmon, 2003; Zvacek, 2001).

The challenge that brought the multi-disciplinary team together in the first place seems to have been overcome: student throughput improved significantly in 2007. It is not claimed that the improved throughput rate can be attributed solely to enhanced engagement and assessment through the implementation of

technology. The use of online technologies formed part of a carefully planned blended teaching-learning strategy, which comprise a variety of variables:

- On commencement of the academic year a once-off, one-hour session on studying skills for students in the field of business management was presented by staff from the Learning Centre of the University of Johannesburg.
- Students attended a two-hour face-to-face lecture once a week.
- Lecturers set aside approximately 10 hours per week for one-to-one consultations with students.
- Short tutorial sessions, which were facilitated by third year Business Management students, were available to first year students who sought additional assistance.
- One two-hour revision class was scheduled prior to the summative, written assessment on conclusion of the course. Attendance was voluntary.

However, between 2006 and 2007 there were no significant changes in the following areas: learning outcomes, prescribed textbook, large-class lecturing format, face-to-face student support, scope of assessments, assessors and moderators. The only significant change was the new, blended teaching-learning strategy, which integrated technology in the classroom. Although it would be difficult to prove empirically, it appears as if the revised teaching-learning strategy could be a significant driver of improved student performance as outlined in Table 2.

Table 2: Business Management 1A01 assessment results for 2006 and 2007

Description	2006	2007
Average mark for on-line quizzes	56.1%	58.2%
Average mark for written test	50.2%	65.8%
Average term mark	50.6%	62.9%
Throughput	58%	80%

The final mark of a Business Management 1A01 student is determined by his/her performance in three different assessments, namely online quizzes (10%), one formal written assessment completed during the course (40%) and one final written assessment, or exam (50%). The relative weightings are in brackets. The improvement in assessment results in all areas is evident from Table 2.

In addition to a significant improvement in the throughput rate, student feedback indicates that the online course component was perceived as a useful tool. Despite the marginal increase in online assessment results, 55 per cent of respondents in the online opinion and attitude survey indicated that the online assessments (specifically the quizzes) assisted them "to a large extent" in achieving the course outcomes. Only three per cent of respondents felt it did not contribute to their learning.

Other, unprompted statements recorded under *general comments* in the survey reflect the students' perception of how the online course component supported their learning, for example:

- "I would like to thank the business management team for making life so much easier for us through reducing ambiguity and letting us know what is expected of us. This is much better than any of the other subjects and I would like to see them [other lecturers] adopting the same system, it is proven to work."
- "Business management is the most understandable and interesting subject"
- "I find that the Business Management [WebCT] courses are some of the more impressive and user friendly of the [WebCT] courses I have. Keep up the good work!"
- ˜"I have enjoyed the experience of using [WebCT] as a tool for learning in Business"

It also seems as if the required engagement of students with the course learning materials paid off. For example, one student recorded the following comment the online opinion and attitude survey: "The [WebCT] system … requires consistency from students. I think that it will be an asset to this institution for years to come". Students perceived the quizzes as useful, firstly because it "forced" them to revise the work covered during lectures before they attempted the quizzes. Secondly, students felt that the quizzes served as preparation for tests and exams by exposing them to the types of questions they could expect.

Students found the lecture outlines useful, for example, one student wrote the following comment in the online opinion and attitude survey: "Please do not take the lecture outlines away, but try add more important graphs and diagrams into them as it is difficult to draw them in the lectures. [WebCT] is a brilliant tool for us …"

Students appreciated the fact that they were asked for their feedback on lectures and that their lecturers actually responded to the feedback. Below are comments taken from the online opinion and attitude survey:

- "We can voice whatever problems we have"
- "I got to inform my lecturers on what I did not understand without personally talking to them"
- "[The surveys] helped me to let our lecturers know what I didn't understand - for them to elaborate again"
- "Other departments should look at also placing such surveys on [WebCT]"

If students did not know where to submit their feedback they asked, and received help from other students (note the humour built into the second response):

"How do we give feedback to the lecturer?"

"Click on assessment then on muddiest point survey 4 week 1"

"You speak very slowly to them :)"

"Hi! It's under ASSESSMENTS! Cheerio"

Threaded discussion, posted to the disucssion forum on 2 February 2007

It is evident that the online course component provided a platform for interaction and socialisation. In the online opinion and attitude survey one student commented: "I think [WebCT] is a great way of learning and it makes the work more fun as apposed to a black and white text book". In this regard, social presence theorists claim that a social dimension is a critical element of any learning situation (Swan, 2003; Garrison et al., 2000) and that technology-assisted learning environments with a weak social dimension can even be harmful to learning (Kreijns, Kirschner and Jochems, 2003; Salmon, 2003). A strong social dimension in an online course is associated with enhanced student perceptions of the quality of online learning and students who feel at ease around their facilitators and other course participants are more likely to share information and learn (Greyling and Wentzel, 2007; Aragon, 2003; Swan, 2003).

The research cycle was concluded with an in-depth review session exploring the teaching-learning successes reported above, as well as the challenges, which will be addressed in the next research cycle. These challenges include:

- Insufficient team interaction; the multi-disciplinary team should meet more often to reflect on teaching-learning results in order to re-design course materials and activities responsively during the research cycle.

- Somewhat disappointing student response to muddiest point surveys; the weekly response rate remained almost constant at approximately 25 per cent. An attempt should be made to increase student involvement in this area, for example by using the completion of these surveys as a criterion for releasing other, useful course materials.

- Technical problems; for example, students often signed up to the wrong user groups, which caused a lot of frustration for the students who could, as a result, not access other relevant information. It was also a time-intensive exercise to re-assign students to the correct groups. Both lecturers and students should be supported to become more adept in using the online course tools.

- Navigation of the online environment; the online course component needs to be simplified to some extent.

6. Conclusion

This article explored ways of enhancing student engagement and assessment in large classes with the aim of improving the teaching-learning experience and maximising student learning. The research was initiated by a need to increase student throughput. A new teaching-learning strategy was implemented, drawing on the affordances of technology to increase student engagement and assessment within the parameters of a particular teaching-learning context. It was found that eLearning technologies made it possible to establish and maintain contact with students in large classes. Communication channels also provided a platform for student-to-student interaction. Autmatically graded quizzes enabled continuous assessment in the course and helped students track their progress and improve their performance. Online surveys made it possible for students to provide feedback on the teaching-learning process, which was used by lecturers to improve on what they did in class.

It was shown that while technology is not an isolated contributor to student success, it can play an important role in students' perceptions of the quality of the teaching-learning experience and seems to contribute

significantly to student throughput. These research findings have practical iimplications for the design, development and facilitation of learning in large classes.

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