



TEACHING & LEARNING
RESEARCH INITIATIVE

NĀU I WHATU TE KĀKAHU, HE TĀNIKO TAKU

CASE STUDY 4

Massey University case study

Institutional Report on the Teaching and Learning Enhancement Initiative at Massey University¹

Sam Richardson,^{*} Gordon Suddaby,^{**} Anna Weatherstone,^{**}
Duncan O'Hara,^{**} Fay Patel,^{***}, Kogi Naidoo (Team Leader)^{****}

* Department of Economics and Finance, Massey University

** Centre for Academic Development and eLearning, Massey University

*** Staff Development and Training Unit, Flinders University

**** Centre for Learning and Professional Development, University of Adelaide

1 This is a Teaching and Learning Research Initiative project: Unlocking Student Learning: The Impact of Teaching and Learning Enhancement Initiatives on First-year University Students

Context

The Principles of Microeconomics (paper number 178.101) course taught on Massey University's Turitea Campus in Palmerston North is one of three first-year economics courses offered at Massey University. For many students, 178.101 is not a course they would voluntarily choose: it is a compulsory course for the Bachelor of Accountancy as well as the Bachelor of Applied Economics, it was required for students majoring in agribusiness for the Bachelor of Science in 2007, and it is mandatory for those majoring in economics in the Bachelor of Business Studies and Bachelor of Arts.

Over the recent past the paper has had fluctuating pass rates as well as fluctuating enrolments (see Figure 1). The teacher who has been responsible for the paper since 2003 wanted to investigate these factors with the aim of improving both completion and achievement levels in the internal offering of the paper. The project goals were formulated to develop approaches that would enable the teacher and the academic developers involved to investigate these issues in a scholarly way, and to change practice based on findings drawn from the empirical data obtained.

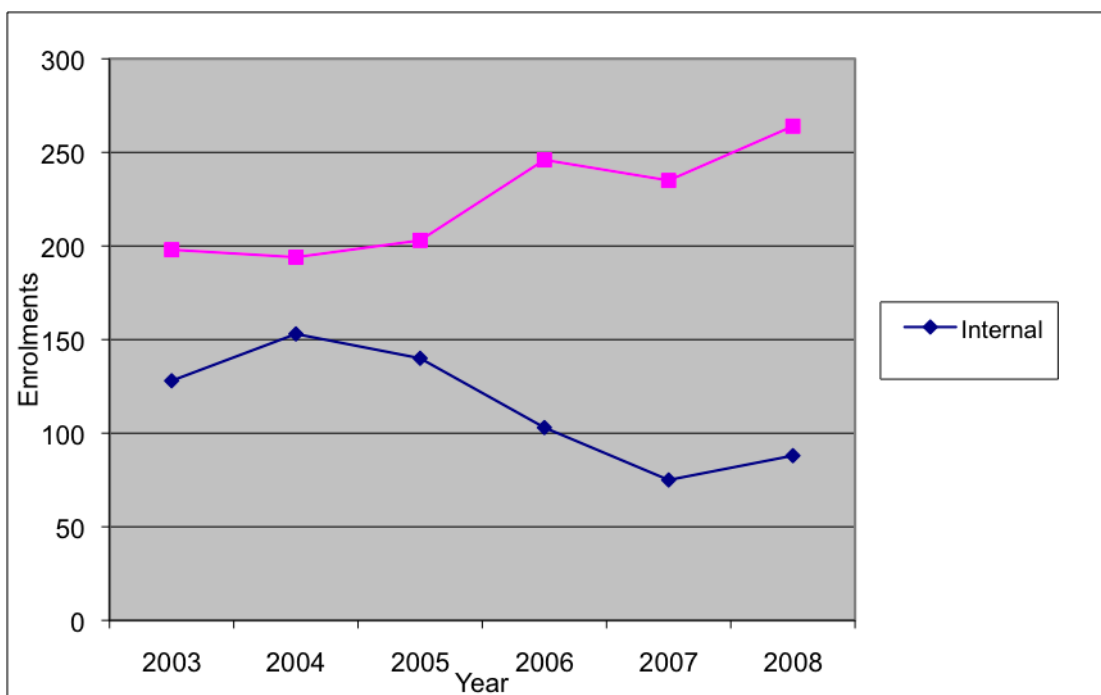


Figure 1: Class rolls for 178.101: Principles of Microeconomics, 2003–2008

The team undertaking this project brought a considerable skill base as well as depth and breadth of experience in the area of academic development. The teacher of the class involved is a dynamic and enthusiastic teacher with a passion for teaching and for his discipline. The academic development team worked collaboratively with the teacher to identify, collect and analyse a range of baseline data related to achievement, retention and other relevant factors, and to identify possible teaching and learning enhancement initiatives.

The partnership established between the teacher, his department and the academic development team was explicit and formally agreed. Effective lines of communication were established to ensure that decisions and actions were open, democratic and transparent. A major strength of the project methodology was that it involved all of the participants (teacher and consultants) researching and reflecting on their own practice in relation to the project, and working collaboratively to enhance the student outcomes and their own practice.

Project focus

The focus of the project intervention was to investigate the impact of instructional design on teaching methods, and the effectiveness of such instructional design approaches in promoting learning. By drawing on current literature and research about instructional design, learning, teaching and assessment, the teacher, in consultation with the academic development consultants, was able to analyse his own teaching methods, review the design of the learning materials and evaluate the effectiveness of his teaching. The academic development consultants worked with the teacher to support him and to provide additional training and advice as required.

It was anticipated that the intervention would lead to a range of improved outcomes, which would be reflected through some or all of:

- enhanced retention rates
- enhanced pass rates
- improved achievement, identified through grade point averages and specified criteria
- positive changes in the results gained from the various tools used to evaluate the effectiveness of teaching and curriculum delivery
- an enhanced profile for academic development, and awareness of the role played by the academic developers
- enhanced instructional design methodologies
- greater awareness of the role of e-learning
- changed student attitudes
- improved learning outcomes for the students involved
- more informed teacher and academic developer practice
- a better-informed approach from and operation of the Academic Development Unit
- better informed teaching activities in the teacher's department
- better informed teaching activities in the wider University over the medium term.

The identified goals for the wider project included (Massey's focuses in italics):

- evaluating the impact of specific academic development practice on student learning success and learning outcomes
- identifying and developing indicators and measures of enhanced student learning outcomes in the paper
- *gaining a better understanding of the processes of teaching and learning in the specific focus area with relation to the instructional design of the paper*
- reducing inequalities in students' learning and barriers to success in the specific focus area
- *identifying teaching practices that supported the attainment of desirable and identified student learning outcomes*
- *developing and evaluating teaching and learning enhancement initiatives (TLEIs) around the focus area of instructional design*
- *accounting for the extent and nature of the influence of such TLEIs on student learning*
- *developing the capacity of the teacher and consultants to investigate and change their practices in scholarly ways*
- *documenting practice and adding to the academic development research literature.*

The project involved obtaining baseline data on student retention, completion and attainment from 2003 to

2008 and using it to compare the changes in achievement and retention over the life of the project. Student rating data for the teacher in this class from previous years were also used as a basis for comparison during the project. Analysis of the current learning resources for the paper was undertaken, which led to revised materials being used. A range of active in-class evaluation methods were used to evaluate the effectiveness of teaching and instructional design, including small group instructional diagnosis, focus groups and observations, in addition to the University's Student Evaluation of Content, Administration and Teaching (SECAT).

The research

The project underwent two iterations: the first in Semester 1, 2007, and the second in Semester 1, 2008. The intervention was narrowed to focus on modifying the assessment tools used in order to enhance student achievement, learning and retention. This involved reviewing how assessment had been carried out and then identifying and implementing changes to this approach.

Key considerations for assessment and design for the Principles of Microeconomics course have been resource constraints—the availability of funding for markers, teacher workload and the issue of equivalence across offerings.² These constraints resulted in an approach for the period 2003–2006 in which the assessment components and their respective weightings for the internal offering of the Principles of Microeconomics course were as follows (Table 1).

Table 1: Assessment components for 178.101: Principles of Microeconomics, 2003–2006

Assessment	Weighting
Test 1	20%
Test 2	20%
Final examination	60%

The tests were timed to occur in the 5th and 10th weeks of a 12-week semester. The students sat constructed-response tests that took place in a 75-minute time slot. The tests typically involved requiring students to define and explain several concepts, calculations (problem-solving using appropriate formulae), and graphical and analytical questions. They were carried out in the evening. The final examination occurred at the end of the semester and consisted of 100 multiple-choice questions. Students entered their answers on a Scantron Card, which was marked electronically via computer.

The existing framework for the online environment at Massey University is WebCT, with websites organised by individual staff members for the particular courses they teach. WebCT includes a range of communication tools and content features. An under-utilised feature within the WebCT environment in economics at Massey is the assessment tool, which consists of a variety of possible assessment options (both formative and summative), including self-test, assignments, quizzes and surveys. Within the Quiz tool, questions can involve: matching definition to concepts, calculations, short answers, paragraphs or multiple choices. The resource constraints, coupled with the untapped potential of WebCT, provided a strong motivation to implement a new assessment option.

The collaboration between the academic developers and teacher was a critical dimension of this project. A number of issues and concerns (both technical and practical) were taken into consideration and discussed between the teacher and the academic development consultants as they explored the feasibility of an online multiple-choice testing option to replace the existing two tests. These included:

- the availability of Internet access for students required to complete the online tests
- how to make online multiple-choice tests equivalent to (and possibly better than) the existing assessment structure

² In addition to the Palmerston North internal offering, 178.101 is also taught extramurally in Semester 2 and internally on the Wellington Campus in Semester 1.

- the use of online tests to examine (and reward) more advanced thinking
- policing student behaviour in tests (cheating)
- test availability (to give students a chance to learn from mistakes and improve their marks)
- providing feedback without “giving the answers away”.

Massey University is placing increased emphasis on e-learning as a mode of instruction in tertiary courses. This is due in part to the desire by students to have access to course information and enhanced communication with their teachers, but also reflects the significant uptake of electronic communication in recent years by the general public. With the Internet much more available and widespread than it was 10 years ago, around 90 to 95 percent of students studying at Massey university were able to access the Internet in some way.

The 2003–2006 assessment structure emphasised performance at three points during the semester. Grades hinged on the students’ performances in 5½ hours of testing under exam conditions. The combination of knowledge acquired (students were not permitted to take notes into the test) and the time constraints of the semester tests was assumed to prepare students for the exam challenge they faced at the end of the semester. Using online multiple-choice tests introduced a different dimension, in that students could effectively sit the tests with an open book and submit their answers electronically while still being subjected to time pressure (with the tests to be completed during a given time period).

A major advantage of the constructed-response tests was the ability of the teacher to design test questions that could test higher-order thinking on a particular topic. When considering whether there is similar flexibility to do the same for an online multiple-choice test, the answer lay in the depth and quality of the test item bank available. The success or otherwise of online testing for large classes is very much dependent on a good (and preferably large) item bank of test questions. The textbook used in this course came with such a test bank. Questions were assigned to three different categories: easy, moderate and difficult. The “difficult” questions typically required students to use the full extent of their knowledge, and consisted mainly of applied problems, in contrast to the “easy” questions, which were mainly definitional. The challenge was to design a test layout that rewarded students more for higher-order knowledge than for more basic knowledge— much like a constructed-response test could do.

The depth of test item banks is also crucial when it comes to dealing with equivalence and student performance, as well as reducing the potential for cheating in online tests. A related issue was how it is possible to simulate test conditions while students have the potential to collaborate with each other to maximise marks. Indeed, an online test has many of the same issues as extramural (distance education) assignments, chief among these being there is no guarantee that the test is the student’s own work. The best one can do in these situations is to limit the opportunities for inappropriate collaboration.

Within the Quiz tool in WebCT a teacher has the ability to randomly allocate the sets of questions to be used, so no student is likely to receive the same test as the person sitting next to them. Also, like the questions, the order of the answer choices within questions can be randomised. This way, a student who writes down the letter combination of “correct” answers for questions in their test and passes them on to their friends to “help” them in their tests will not actually be helping at all. The combination of randomised questions and answers makes it almost impossible for students to pass without some knowledge of the content of the course, unless students collaborate on a series of tests for each individual.

The use of WebCT offers tremendous flexibility in terms of student learning opportunities. Students can access the paper whenever and wherever they please and at whatever time they like. This flexibility, coupled with the desire expressed by students in the past to have a chance to redeem themselves for poor marks in tests, led to the idea of giving students more than one opportunity to sit an online test. The thrust of this idea was that students could sit a test under test conditions, and afterwards review their results without test pressure and work on the areas they did not understand or do well in so as to be better prepared for next time. With the randomisation of questions and answers, this idea became more and more attractive. Students could not simply memorise questions for the next test: they would have to learn the material for future tests, because they would be unlikely to receive the same questions the next time they sat the test.

The last issue, which is very much related to the previous one, is how to provide feedback for students after their tests. Students often asked how they are supposed to learn if (a) they can't see what they got right or wrong and (b) if they can't see what the correct answer is. Within WebCT students can be provided with as much, or as little, feedback as teachers wish them to have. Revealing the answers to students would quickly diminish the effectiveness of the test bank for future offerings of the course, because it would not take long for a group of students to compile answers for the bank of questions. However, if students were shown whether or not they got a particular question right or wrong, it would enable them to focus their learning on their areas of weakness, which should, in theory, help them the next time they sat the test.

After discussing and finding solutions to such concerns, an online multiple-choice testing structure was developed for the 2007 and 2008 iterations, and as a result of the discussions between the teacher and academic development consultants the decision was made to implement an online testing internal assessment package to replace the night test internal assessment.

The new approach for the course, which was based on the 15 chapters of the text taught over 12 weeks, resulted in the online tests being structured in the following way.

- Each test covered three chapters (see Table 2 for details), for a total of five tests throughout the semester, each worth 8 percent, for an internal assessment total of 40 percent—the same overall weighting as for the previous internal assessment components.

Table 2: Assessment components for 178.101: Principles of Microeconomics, 2007–2008

Assessment	Weighting
Online test 1 (chapters 1–3)	8%
Online test 2 (chapters 4–6)	8%
Online test 3 (chapters 7–9)	8%
Online test 4 (chapters 10–12)	8%
Online test 5 (chapters 13–15)	8%
Final examination (all chapters)	60%

- Within each test there were 10 questions per chapter, consisting of four “easy” questions, four “moderate” questions and two “difficult” questions. (The choice of the number of questions was determined largely by the availability of questions of an appropriate degree of difficulty.)
- “Easy” questions were given a weighting of 1 mark, “moderate” questions 2 marks and “hard” questions 4 marks. Each test was then worth 60 marks.
- Questions and answers were fully randomised within tests.
- Each test was set within a time limit of 1 hour. Students who submitted their tests after an hour were subject to review and penalties.
- Students could sit each test a maximum of three times, with the highest mark achieved counting as their overall mark for that test.
- The students were given access to the test from 8 am on the Monday morning after the week in which the last chapter for the test was completed within the study schedule until midnight the following Sunday. This gave students 7 days within which to sit the test.
- After submitting each test, students were told their final score, their answers, and whether they were correct or not.
- The assessment plan is both formative, in the sense that it occurs during the learning process for each chapter throughout the semester, and summative, in that it contributes to a final grade.
- Before students sat the first online test, the teacher provided guidance in the lectures, and students were

provided with a practice test to ensure technical difficulties were minimised. Most students took up this option.

The final examination remained the same as in previous years: 100 multiple-choice questions. Once the changes were implemented, questions within the exam were weighted according to their level of difficulty along the same lines as the online tests: “easy” (1 mark), “moderate” (2 marks) and “difficult” (4 marks).

The findings

Retention/completion

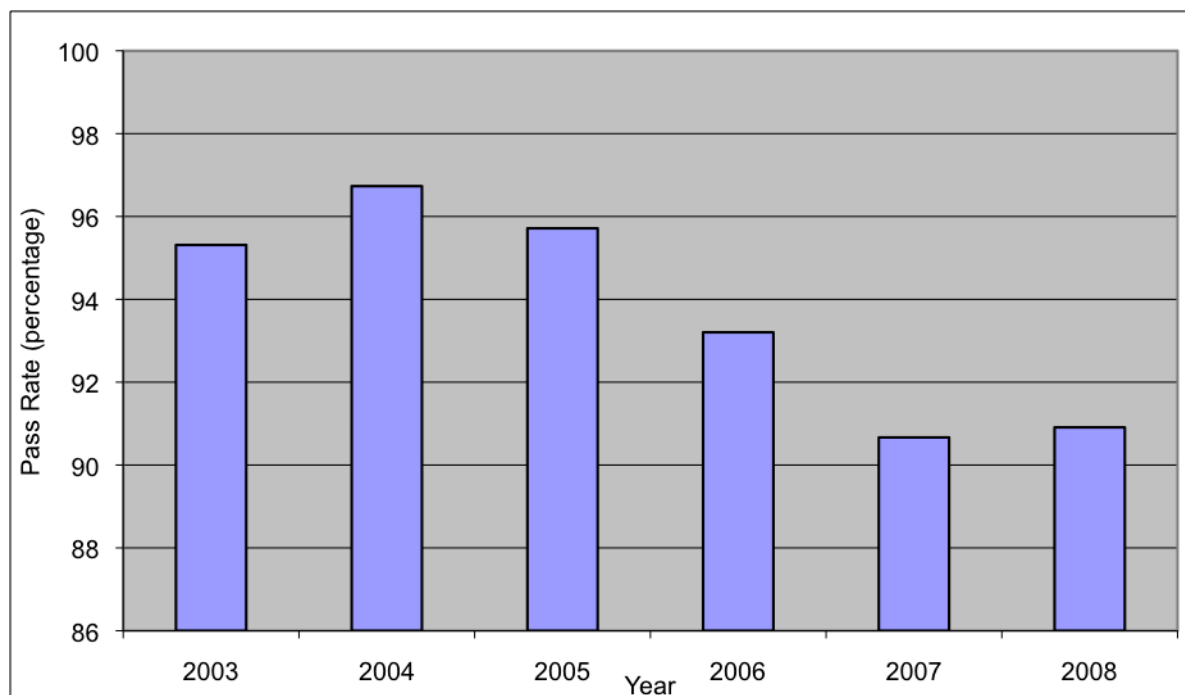


Figure 2: Retention rates for 178.101: Principles of Microeconomics, 2003–2008

As can be seen in Figure 2, there appears to have been a fall in retention rates after the intervention. A t-test for differences in means indicated that the decrease in retention rates post-intervention was significantly different from zero (at the 1% level) This result, while not encouraging, is not of major cause for concern, as retention rates throughout the sample period are in excess of 90 percent for every offering.

Pass rates

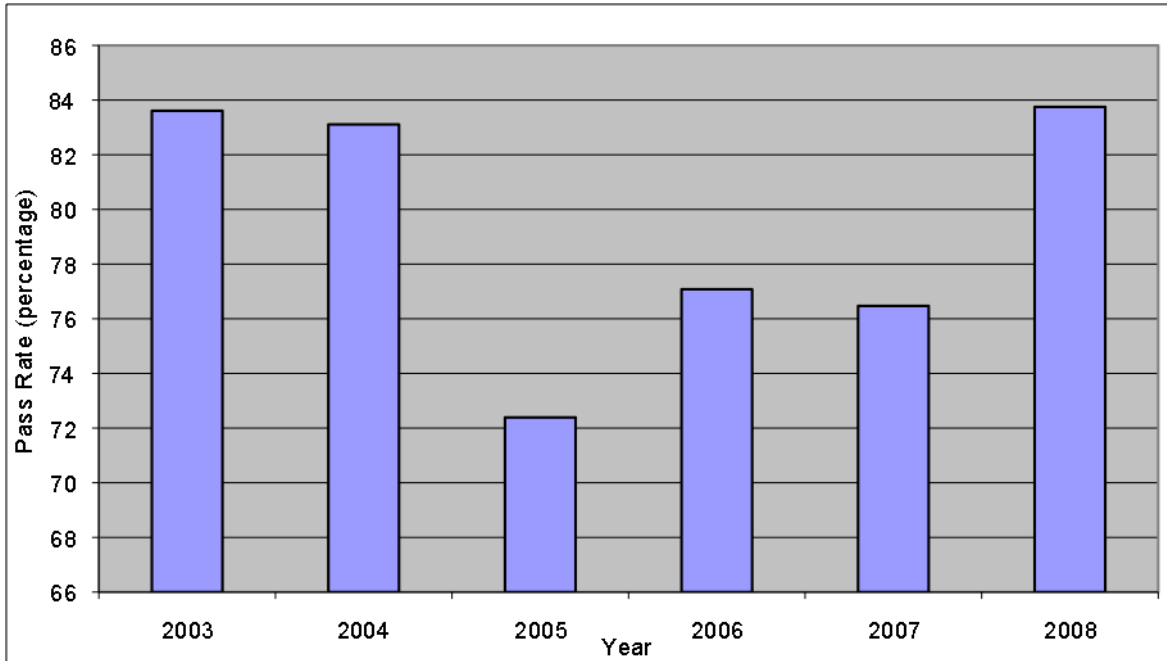


Figure 3: Pass rates for 178.101: Principles of Microeconomics, 2003–2008

As we can see from Figure 3 above, the pass rates throughout the sample period have varied, although there was a jump in 2008 back to 2003–2004 levels. A t-test for a difference in means indicated that the higher post-intervention average pass rate was not significantly different from zero. Note that this figure is calculated as an aggregate pass rate.

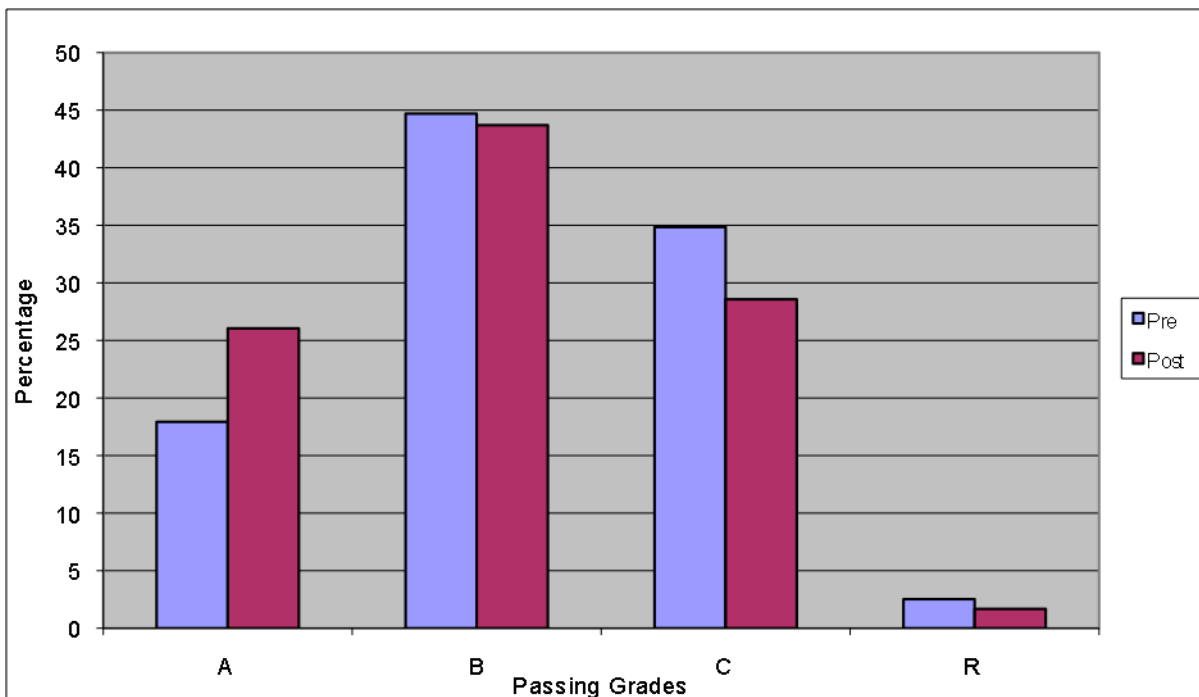


Figure 4: Pass grade distributions for 178.101: Principles of Microeconomics, pre- and post-intervention

The pre- and post-intervention percentage distributions of pass grades are shown in Figure 4. There is an increase in the percentage of A grades post-intervention (although this increase is not found to be statistically significant using a difference in means t-test), a slightly lower percentage of B grades (the fall is not statistically significant), and a noticeable decrease in C grades (which is statistically significant at the 5 percent level). Again,

these results are aggregated: the pre-intervention sample is from 2003–2006, and the post-intervention sample is from 2007–2008.

These distributions, when disaggregated into plus and minus grades in Figure 5, reveal an increase in the higher grades post-intervention, and, with the exception of C+, an observable decrease in the proportion of lower grades post-intervention. This would suggest that the top students are doing better under the new assessment scheme than they were prior to the intervention.

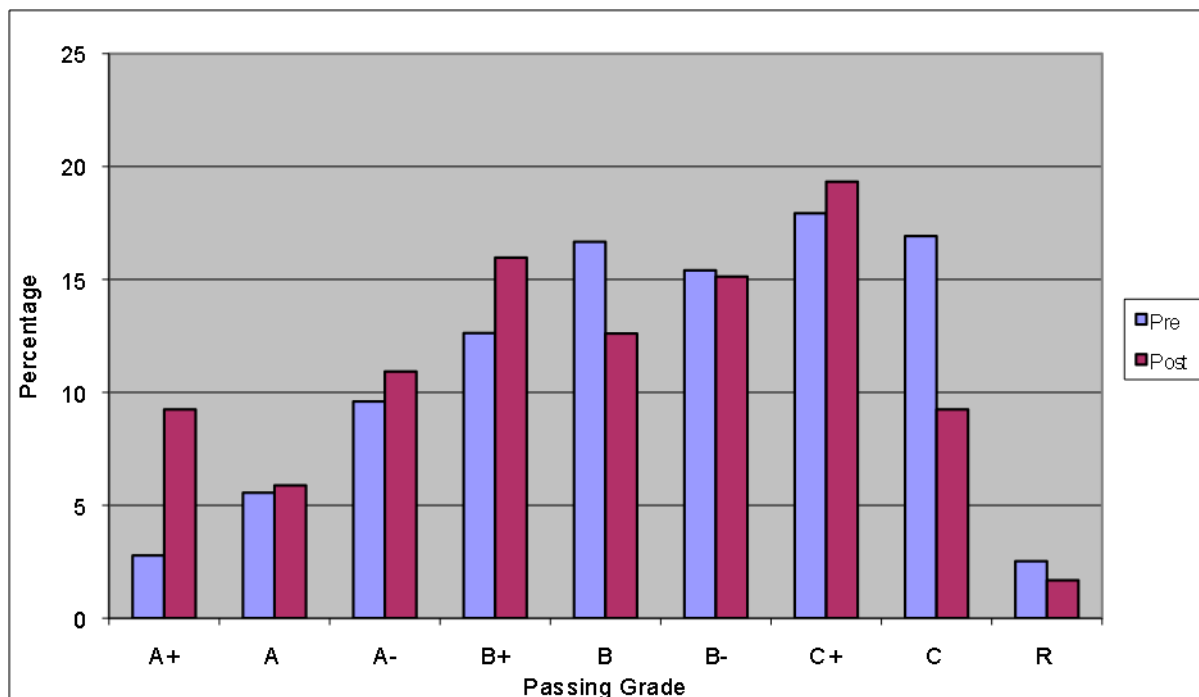


Figure 5: Disaggregated pass grade distributions for 178.101: Principles of Microeconomics, pre- and post-intervention

To ascertain how individual student performance within the course has changed as a result of the intervention, a model of student performance was developed that controlled for a variety of student and institutional characteristics. Results from the model indicated that the intervention enhanced students' performance in their internal assessment but had no effect on performance in the final exam or overall marks, everything else held constant.³

Student feedback

It is one thing to analyse student achievement and the impact of the intervention on student performance. It is quite another to consider students' impressions and experiences of the change in assessment. The following are representative comments taken from Student Evaluation of Content, Administration and Teaching (SECAT) evaluations, both before and after the intervention. They encapsulate student perceptions of the course assessment. These are administered approximately 2 weeks before the end of classes in each semester.

Pre-intervention

Takes a very long time to get tests back. (SECAT, Semester 1, 2003)

Not much constructive criticism on tests—no review of correct answers. (SECAT, Semester 1, 2003)

Two test system does cripple people who constantly study and don't just cram. (SECAT, Semester 1, 2004)

Maybe should include a multichoice test of like 30 questions during the semester for assessment. (SECAT, Semester 1, 2005)

Possibly more helpful if tests were returned more promptly. (SECAT, Semester 1, 2005)

³ It is anticipated that a paper containing further detail will be prepared for journal publication in the near future.

Much of the student feedback focused on the return of tests and the need for more feedback on returned (marked) tests. Some students commented on the assessment structure, but most identified the major shortcomings of the existing assessment.

Post-intervention

In Semester 1, 2007, a small group assessment diagnostic was conducted with the class to gauge their perceptions of the online assessment. Students generally reacted favourably to the new assessment scheme, including mentioning that the frequency of tests encouraged them to revise content on a more regular basis. It wasn't all favourable: some students expressed concerns over the wording and ambiguities of some questions within the tests.

Following are a selection of comments from the SECAT.

The paper is fine, except the wording of the online tests, which seemed to test my understanding of English more than my understanding of economics. (SECAT, Semester 1, 2007)

Online test language can be confusing and often illogical. (SECAT, Semester 1, 2007)

Online test system is great. At least as good as night tests. (SECAT, Semester 1, 2007)

5 x multichoice online tests, 1 x 100 multichoice questions exam = multichoice madness! Surely there can be other forms of assessment introduced as well. (SECAT, Semester 1, 2007)

Thought tests were not helpful as we did not know what the correct answer was afterwards. (SECAT, Semester 1, 2007)

He changed grades if any problems/reasons questioned the correct answer. (SECAT, Semester 1, 2007)⁴

In 2007, as with most things in the first year of introduction, there were some teething issues. There was some criticism of the use of multiple choice as the testing option, and more of the questions themselves. There were some technical issues (including wording issues) with several questions, which were noted and corrected (along with grades) for the 2007 offering and beyond. Students questioned the answers of some questions, which resulted in marks being adjusted accordingly. The teacher also reviewed questions where students performed poorly (i.e., questions with fewer than 25 percent of students answering correctly), amended them where necessary and posted additional feedback on these questions.

There was much less negativity in student feedback in 2008, with many of the student comments identifying the need for more feedback—in this case the answers for each test attempt:

There should be practice multi-choice questions for each test available before the actual test. (SECAT, Semester 1, 2008)

It would be good if the test results came with the correct answers after the test closes. (SECAT, Semester 1, 2008)

Students in the 2007 and 2008 offerings requested to be allowed to practise the online tests before the final exam. The teacher made all five online tests available to students as practice versions, as well as two practice exams (one timed, the other untimed), which were exactly the same structure as the final exam. Many students used the practice exams as part of their final exam preparations.

Teacher feedback and experiences

The project proved to be an enlightening experience for the teacher. Before participating in the project, the teacher was largely unaware of the importance of assessment:

Until now, I have been merely regurgitating existing assessment tools without giving any thought to what we're trying to do... It is the first time that I am thinking about assessment in detail and about what I want learners to do.

Participation in the project gave him a greater sense of ownership of the paper design, and encouraged him to "think outside the square".

⁴ This was the case when students argued that their interpretation of the question differed from the lecturer's. In this situation, answers were assessed on their merits.

The project has enabled me to take a wider perspective on the teaching of the course: rather than concentrating on simply doing things on a yearly basis to fit the prescribed course structure, I have taken a step back and considered the important aspects of the teaching of the course. There were some things in the course pre-project that I was not entirely happy with, with definite areas to be improved on. I wanted to better utilise the Web and make use of the WebCT testing environment to take some pressure off myself administratively through re-designing the course assessment. As a consequence of liaising with the CADeL's online learning consultant and other consultants when discussing assessment, I have found the discussions and feedback immensely helpful and constructive.

With the confidence gained through support from academic developers, the teacher found an opportunity to get back to basics and reflect and think critically about what makes a teacher effective:

I have learned a lot through my involvement with the ADs [academic developers] through the project so far—working with the AD consultants has made me think critically and be more reflective as a teacher on the methods that I use as a teacher, particularly with respect to assessment. There is no one universal viewpoint, no single 'best practice' that we should follow, but a lot of different views on what constitutes effective assessment, and how to amend and improve the assessment experience both for myself and my students. I have done some reading in the area of assessment within economics, and have found that enlightening also, as it reinforces the messages I have been receiving from my interactions with my AD colleagues.

Academic developers' feedback and experiences

This project was a team effort. Important to its success was the view that there were two partners in the team: the lecturer and the academic developers. Although a number of academic developers engaged with the lecturer, it was vital that the lecturer never felt that he was not in control of what he was doing and that he was doing what he wanted to do. The academic developers did not prescribe solutions or advise the lecturer on what they thought was best: they worked alongside, listened to his concerns and discussed these with him, offering ideas for him to consider.

This approach was predicated on three critical factors. The first was trust. The lecturer developed confidence and trust in the academic developers and was able to discuss issues with them openly and confidently, knowing that he would be listened to and that the options being considered were carefully thought through and reflected current research and knowledge. The second critical factor was time. The process could not be hurried. It took time to develop the level of trust that was so important. It also took time to explore the issues, to reflect on them and to discuss the alternatives and decide how best to approach the issue that was the focus of the project. Finally, it took effort on everyone's part. This was a project where all those involved put in a great deal of time and effort to ensure the changes being introduced had the greatest chance of success and that the data that were available were carefully gathered and analysed so that there was evidence of success (or otherwise!).

The project demonstrated to the academic developers that not every change needs to be a big one. The really important lesson was that by working with the lecturer and taking small steps, it was possible to open doors that lead to new ways of thinking about teaching and learning, and to embed a scholarly perspective on teaching and learning.

Conclusions

Analysis of student performance data suggests that the intervention has had a positive impact on student performance. Student performance, however, is not the sole indicator for the intervention. There were improved student perceptions and feedback on their assessment in the course, and the teacher found his involvement in the project to be an immensely valuable experience. The academic developers meanwhile found the experience of collaboration and teamwork enjoyable and worked best when there was trust, time and energy exerted. Overall, the project can be said to have achieved its goals—and more.

Epilogue

The 178.101 course was discontinued in 2009. A new Bachelor of Business Studies core economics paper, 115.106 Economics, was created, which encompasses much of the content taught in the 178.101 course. The course went from a single-semester internal offering of approximately 120 students to an internal offering each semester of approximately 175 students. Many of the lessons learnt in the project have been incorporated into the design of the assessment for the 115.106 paper for 2009 and beyond. In particular, online testing with a particular focus on improved feedback will be used.



Lead researchers and authors



Sam Richardson



Gordon
Suddaby



Anna
Weatherstone



Duncan O'Hara



Fay Patel