Engineering Subject Centre Mini-Project:

Assessment Choice Case Study

June 2006
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**Introduction**

This case study has been carried out as part of a Higher Education Academy Engineering Subject Centre Mini-Project by the School of Engineering and the Staff-Student Partnership for Assessment Change (SPACE) Project, at the University of Plymouth. SPACE is a three year (2002-05) HEFCE-funded collaborative project developing and promoting inclusive approaches to assessment.

There have been many developments in student learning in recent years but this has not been paralleled by developments in the assessment of students’ learning outcomes. This Mini-Project provided the opportunity to respond to this by approaching assessment innovatively and offering undergraduate students assessment choice.

Architecture and Environmental Building degree students at the University of Plymouth have traditionally studied a one term module, delivered by civil engineering lecturers on the Behaviour of Structures. The numbers of students varies every year, but there are, on average, 100 Architecture students and 40 Environmental Building students. Historically, the assessment averages have been poor, with the average mark for Architecture students being approximately 49% and for Environmental Building students approximately 42%. The module is both quantitative and qualitative in that it requires students to demonstrate an understanding of how the structure will behave as well as calculating forces in the structure. Historically, the methods of assessment have ranged from a mixture of labs, weekly tests and an end of module exam to an end of module test supplemented by formative weekly tests. The latter assessment technique, having an end of module test supplemented by formative weekly tests, was trialled in 2003/04 with the option of students keeping a portfolio of their own work, i.e: formative tests, self study and class examples, which could be used as an alternative assessment method in conjunction with a viva if they performed badly in the end of module test. The students were informed that if their portfolio and viva were weak their mark could be reduced, so they were required to honestly appraise their knowledge before deciding upon this option. The final uptake of this option was 8% and the overall average of those choosing this alternative changed by 3%, both up and down. This case study is reported in more detail in Appendix 1 and marks the beginning of the Action Research Methodology used to inform and improve students' marks on the module.

**The Research Methodology**

Case study in action research "is concerned with contributing to the development of the case or cases under study by feedback of information, which can guide revision and refinement of action". (Stenhouse,1985). This approach underpinned the Mini-Project to ensure that the research carried out in the previous year would continue to inform the development and application of assessment choice on the module in future years. Therefore, the assessment methods offered in 2004/05 (coursework; end of unit test and portfolio) were, not surprisingly, drawn from the previous year’s student feedback (2003/04).
• “Portfolios require a large variety of skills, theoretical practice and application to real life”

• “Too much pressure attached to one exam - fail the test, fail the module”

• “I wish there was more coursework - that way I could show what I really understand”

• “It would be good if coursework could be used more”

• “Tests are ok as long as I do not go blank. They also place pressure on me to prove that I understand in a short space of time”.

• “I like portfolios. They can be put together at my own pace, enabling me to determine my weak and strong areas”

From this student feedback the options for the 2004/05 assessment choice were developed as follows:

An end of module test:
The students could choose to take an end of module test only. This was felt to suit those who learnt in a random and perhaps unplanned way or for those students’ whose personal circumstances meant that it was difficult for them to spend large amounts of time producing coursework, for example mature students who were working and also caring for a family. The test was to be taken in the last week of term one.

What the 2004/05 students said when choosing this option ............

• “Taking the test will make me constantly revise my work, which is helpful”

• “Choosing the end of unit test can save much time compared to the coursework or portfolio”

Coursework:
This assessment method required students to produce worked examples of each topic area, in the same way demonstrated on the module. Students were also expected to show an understanding of why each particular example had been chosen for that specific topic. This was to be submitted in one document at the end of the first term. It was felt that this choice best suited students who were generally from a less numerate background and who also preferred to learn at their own pace and could follow a more structured approach to learning and the demonstration of knowledge and understanding.
What the 2004/05 students said when choosing this option ………

- “Coursework will help build my knowledge – certain aspects that I don’t understand are bound to come up, this means that I will have time to research the methods needed and thus learn it”.

- It lets me work at examples and take them step by step. Compared to if I had chose the exam, which I may have felt more rushed in.”

Portfolio:
This assessment method required students to submit a portfolio containing an explanation of the principles covered in each topic. This could be a series of PowerPoint presentations, diagrams, pictures of structures and/or models as appropriate. Some examples using numbers were to be included. The idea was to create a learning resource that explained the principles in a way which would best demonstrate their learning. This was to be submitted in one document after term one had finished. It was felt that this method of assessment best suited students who were generally from a non-numerate background, who preferred to learn at their own pace and could follow a more structured approach to learning. However, there was no specification/structure of how the demonstration of knowledge and understanding should be presented. The method was introduced to suit the more creative student who learns visually rather than numerically.

What the 2004/05 students said when choosing this option ……….

- “This option allows me to practice more and that is the only key to success in mathematical subjects”

- “I have to read around the subject to clarify my understanding. I also have to think about how I explain the subject matter in the portfolio – a learning contribution.”

In order to continue the development of the action research spiral of cycles involving planning, acting, observing and reflecting, the triangulation of methods for evaluating the 2004/05 assessment choice were:

1. A self-reflection student questionnaire (Appendix 2). This questionnaire was issued to students at the start, middle and end of the module and encouraged students to reflect upon their choice of assessment and how it contributed to their learning. The questionnaire contained mostly open questions to encourage students’ to reply as freely as possible.

2. Regular interviews were conducted with the module leader responsible for facilitating the assessment choice to monitor progress, developments and any issues as they arose throughout the duration of the module.
3. A student focus group meeting, run at the end of the module, gave students the opportunity to raise any further issues that had not been raised by the self-reflection questionnaire.

The above methods proved to be highly successful. The questionnaire was issued and collected on three separate occasions to ensure and maintain high student completion rates. The focus group, which involved eight students, was run at the end of the module and provided valuable additional feedback which led to a fourth assessment choice being suggested for 2005/2006: a weekly test.

The research process was monitored and evaluated by a representative from industry, the Learning and Development Manager from Davis Langdon LLP, and the Academic Advisor for the Higher Education Academy Subject Centre for Engineering, to ensure its relevance and application to both education and employability. It was felt that the assessment choice developed students’ decision-making skills and independent learning in a way which was transferable, relevant and desirable to the workplace.

Running the assessment choice

The assessment choice in 2004/05 was offered to 146 students. The concept was introduced to students during their first lecture. This was further supported by the student evaluation form that outlined the requirements of each method (Appendix 2). Students were also encouraged to contact the module leader if they were unsure of how best to proceed. Following the introductory lecture, students were given a further week to choose their preferred method of assessment. They were then given an additional five weeks during which they could change from their initial choice to one of the alternative methods offered. Six students in total changed from their original choice.
Figure 1 demonstrates how the assessment choice operated:

**Figure 1: Assessment choice 2004/05**

**Equity in the assessment methods**

It is generally acknowledged that students’ performance in time-constrained examinations/tests is generally poorer than in other forms of assessment such as coursework and continuous assessment (Bridges, et al (2002) and Elton (1998)). Therefore, equity between methods was a key issue for the authors in running the assessment choice and was ensured in the following ways:

- The end of module test was open book (i.e. not a memory test) which made it comparable to the other two methods offered.
- The end of module test consisted of two tests taken on consecutive days with the best mark from either test being the single one used in formatively assessing the student. Therefore, it meant that mistakes could be made and rectified before a final mark was agreed upon, making it more equitable with the other two methods.
- The brief and end of module test was moderated by the Structural Engineering Group Leader.
- The student evaluation form and focus group meeting provided an opportunity for students to reflect and provide feedback on their thoughts regarding equity in relation to their chosen form of assessment.
Results

Figure 2 – the results

Figure 2 shows an improvement in the performance of students in 2004/05 over the previous years, in particular where the number of students achieving less than 40% has been substantially reduced.

The challenges raised by the assessment choice

Although the marks demonstrate an improvement in student performance, running the assessment choice was not without its challenges! Firstly, the coursework option required students to produce examples which represented approximately 100 submissions, each of which contained up to 16 examples. Therefore, there were 1600 ‘unique’ examples which had to be marked without the assistance of any model answers. The marking of these examples was extremely time-consuming. However, it was felt that this compared well with the advantages for student services, such as the Disability Service, in providing students with a choice of assessment methods. This is discussed further, later in this case study.

Secondly the students commented that good and bad examples of each method would have been helpful at the start of the module and would have assisted them in choosing their method of assessment out of the three.

- “We should have had examples of each method”
- “The guidance was clear, but I’d suggest an example of how to do the coursework and portfolio”

The advantages of running the assessment choice

There was little resistance from either colleagues or students to introducing the assessment choice. At a personal level we enjoyed the variety that it brought to the module and the way in which it encouraged students to adopt a more independent approach to their learning. At a departmental level, it was followed with interest and received much encouragement from the external examiner for Engineering and institutionally, it received the ongoing support from the Pro-Vice Chancellor for Learning and Teaching at the University of Plymouth.
Furthermore, the Disability Office received no requests for assessment provisions, which is highly unusual for a service usually called upon to provide additional rooms, invigilators, scribes and resources. This has implications at both a resource level and, more significantly, at a legislative level, as the assessment choice represents a proactive response to recent changes in disability legislation that have shifted away from making ‘reasonable adjustments’ to providing ‘equality of opportunity’.

Equally as important was the student feedback, of which 99% was positive and showed that the diverse student group made up of 10% disabled students, 5% mature students and 17% international students had been well-served through the assessment choice as the following feedback demonstrates:

- “This has been good, it has given us the responsibility. I am 56 and disliked having responsibility taken away from me when I was 20!”

- “I am delighted to have this opportunity because in this way the system is also caring for my interests and needs and is also encouraging me to learn, but not to fail. It is providing a fair and balanced ground for all students with different disabilities to be assessed by. This makes me work around my schedule better and also enjoy my learning at University. Nothing could be better than a student choosing their own mode of assessment.”

- “This is a good idea because every person has their own likes and dislikes, abilities and disabilities.”

- “As a mature student, choice is an important aspect of all education, rather than prescribed learning by others.”

- “I like to have a choice of assessment method because I have dyslexia and for me having an exam would be a little risky, not because of my knowledge, but because of other factors, such as time, I could have difficulties.”

**Proposed changes to assessment options for 2005/06**

It is intended to offer the students an additional option this year of a summative weekly test. This was the suggestion from students at the focus group meeting who were keen to see an option that was somewhere balanced between the coursework and end of module test. The test will assess the students' knowledge as the module proceeds and will provide an opportunity to give students ongoing feedback, felt to be an advantage of the weekly formative test. Students who experienced this assessment option in 2003/04 commented:

- “The weekly test was good because it gives an insight into how much has been learnt throughout the lectures and any areas that need to be revised.”
• “The weekly tests to date have been helpful to the learning process of structural mechanics, the results highlight where you are going wrong and what you are picking up from lectures. Makes you aware of the problems.”

The initial plan was to develop these weekly tests online, however insufficient time and expertise has made this difficult and instead they have been developed as paper-based tests. The students are given the questions in advance in order to overcome some of the issues that can be faced by the more diverse student population. Approximately 60% of the current 2005/06 student cohort has chosen to take the weekly tests.

For 2005/06 the coursework and portfolio options have staged submission dates to overcome the issues that arose last year when the student submissions were all handed in at the end of the module. This additionally ensures a better structure to the students' studies and alleviates the marking pressures at the end of the module.

Figure 3 demonstrates the way the assessment choice is being run in 2005/06:

\[ 
\begin{array}{c}
\text{WEEK 1} \\
\text{Initial assessment choice}
\end{array} \quad \begin{array}{c}
\text{WEEKS 2, 3 & 4} \\
\text{reinforce how the topic can be used in the chosen assessment}
\end{array} \quad \begin{array}{c}
\text{WEEK 5} \\
\text{Opportunity to change assessment choice i.e. reflection}
\end{array} \quad \begin{array}{c}
\text{WEEK 12} \\
\text{Complete assessment}
\end{array} \quad \begin{array}{c}
\text{WEEK 2, 3 & 4} \\
\text{weekly tests and coursework/portfolio ongoing}
\end{array} \quad \begin{array}{c}
\text{WEEK 5} \\
\text{Submission of first part of coursework/portfolio}
\end{array} \quad \begin{array}{c}
\text{WEEKS 6, 7, 8, 9, 10} \\
\text{reinforce how the topic can be used in the chosen assessment}
\end{array}
\]

**Figure 3: Assessment choice 2005/06**

**Conclusion**

We have had great interest in this case study from across the sector and we hope that our pilot study will provide colleagues with the impetus to explore the possibility of assessment choice. Indeed, we have been contacted by a colleague at Bath Spa University who plans to...
run the assessment choice in four subjects, one module from each, from September 2006. In the meantime, they will be considering the most appropriate forms of assessment to allow students to attain skills in various forms. For us, the next year will give the opportunity to provide students with an additional choice in an attempt to respond further to our increasingly diverse student population. We welcome comments and feedback from colleagues and can be contacted at: d.easterbrook@plymouth.ac.uk and mcparker@plymouth.ac.uk

Finally, we offer the following quick guide to offering assessment choice:

**Quick guide to implementing assessment choice:**

1. Choose a mixture of assessment methods to suit the module/student cohort. Carefully think through each assessment to limit excessive marking.
2. Consider parity of each method.
3. Carefully explain the methodologies to the group at the start of the module and, where possible, provide students with examples of each of the proposed methods.
4. Provide students with an evaluation form (see Appendix 2) that encourages reflection on their chosen method of assessment.
5. Provide a cut-off date at which selected choice is frozen, for example midway through the module.
6. Collaborate with other departments that can contribute in some way towards supporting the module (i.e: redistribute the resources saved by the disability department by not having to make any assessment provisions).

**References**


Disability Discrimination Act (2005)


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Simon Steiner, Academic Advisor, Higher Education Academy Engineering Subject Centre

Liz Willis, Academic Coordinator, Higher Education Academy Engineering Subject Centre

The SPACE Partnership: University of Bath, Bath Spa University College, Dartington College of Arts, University College Falmouth, University of the West of England, Gloucester University, University of Plymouth
Appendix 1: Viva

| Courses: BEng Civil Engineering, BSc Building Surveying & BA Architecture | Numbers of students in group: 120 (8 disabled students) | Standard assessment method: Inclass tests and Examination |
| Research method(s): Observation, staff and student surveys | Purpose of assessment method: Formative |

This case study was developed to offer all students an oral alternative to the written examination at the end of the module. Out of the 11 students who chose to take the viva, one was a dyslexic student who was able to undertake the assessment without any assessment provisions. This student achieved an 11% increase in marks compared to their previous exam-based performance in the same module, for which they received extra time. Overall marks for the remaining non-disabled students varied by 3% both up and down. The student feedback received from both the disabled and non-disabled students was extremely positive regarding providing students with an alternative assessment and led to the development of the assessment choice case study.

Resources necessary for the assessment

- Staff guidance on ensuring parity of standards between the Viva and the written assessment

Advantages of the viva for staff

- No requests for assessment provisions were received for the Viva
- All students were able to undertake the viva in the same way
- No amendments were necessary to the existing marking criteria

Advantages of the viva for students

- Students received increased and instant feedback
- Provided variety to the traditional assessment methods deployed elsewhere on the course
<table>
<thead>
<tr>
<th>Issues arising from the viva for staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>• There was an increase on staff time by providing both the traditional and</td>
</tr>
<tr>
<td>alternative method</td>
</tr>
<tr>
<td>• Increased staff time through the setting up, arranging and running the vivas</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Issues arising from the viva for students</th>
</tr>
</thead>
<tbody>
<tr>
<td>None arising</td>
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</tbody>
</table>

**What the students said**

“Oral assessment models should be utilised more to explore knowledge”

“It was good to be provided with an alternative”

**What the member of staff said**

“It has become increasingly important to be able to offer students an alternative form of assessment on this module and give all students the opportunity of demonstrating what they have learnt.”
Appendix 2: Student survey

School of Engineering & Staff-Student Partnership for Assessment Change and Evaluation

This survey is being carried as part of a LTSN (Learning and Teaching Support Network) Engineering mini-project by the School of Engineering and the SPACE Project. SPACE is a three year HEFCE funded Project developing and promoting more inclusive approaches to assessment. This mini project will provide you with the opportunity to demonstrate your learning in a variety of different ways by allowing you to choose your preferred method of assessment from a choice of three.

The methods of assessment available to you are:

1) End of unit test
   The end of unit test has no formal coursework, you will just be required to sit a two hour unseen test at the end of the module. The end of unit test will be made up of one compulsory question and a choice of three out of five questions.

2) Coursework
   You will be required to produce a minimum of four worked examples of each topic covered in class. The examples must be written in such a way that each step is explained and you must make it clear what you are testing in the examples. We would expect the examples to be step by step, annotated and to become progressively more difficult for each topic.

3) Learning materials portfolio
   You will be expected to produce a portfolio of learning material. The portfolio is intended to be an explanation of the principles covered in each topic. It is up to you to decide how to present your portfolio, for instance it could be a series of PowerPoint presentations, diagrams, pictures of structures, models and must include some worked examples. The idea is that you create a learning resource, which explains the principles in such a way that best demonstrates your learning.

Please remember that whatever method of assessment you choose it must demonstrate the following learning outcomes:

1) Identify different structural forms, load forms, actions and reactions
2) Determine whether a structure is statically determinate or indeterminate
3) Calculate support reactions for simple 1D and 2D structures using basic equilibrium and compatibility concepts and produce shear force and bending moment diagrams

4) Identify the best cross section shape for a member based on the type of loading and calculate the basic properties of the section.

This self-evaluation survey will be issued in three parts and will be followed up through focus group meetings and/or interviews as appropriate. The second part will be issued in the middle of the module in order for you to review your choice of assessment by reflecting on the responses you gave to the first part of the survey. The survey will then be re-issued as you complete your studies on the module in order for you to reflect on your experience in relation to your choice of assessment. We would be grateful if you could complete this form by drawing a circle around the answers as appropriate and by answering all the other questions asked. Please return it to Mel at the start of the next session. If you have any questions regarding this evaluation activity please contact Melanie Parker (mcparker@plymouth.ac.uk / 01752 232284. Responses received will be treated confidentially; you can withdraw from this evaluation at anytime by contacting Melanie at the above address/or on the above number. Thank you for participating.

Part 1

Name .............................................................................................................................................
Date ..............................................................................................................................................

1. What is your current course? (BA Architecture, BEng Civil Engineering, BSc Building Surveying, etc)
........................................................................................................................................................

2. What was your route of entry onto the course (A’ Level, Foundation Course, etc)?
........................................................................................................................................................

3. What method of assessment have you decided to take?
End of unit test/coursework/portfolio

4. Please comment on the guidance you were given on choosing this method of assessment?
........................................................................................................................................................
........................................................................................................................................................
........................................................................................................................................................
5. Did this guidance influence your choice of assessment method?
   YES/NO

6. Why have you chosen this method of assessment rather than the two alternatives?

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   ........................................................................................................................................
   ........................................................................................................................................
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7. Is there a method of assessment that you would have preferred to have taken rather than the three alternatives available?

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8. Please list the methods of assessment that you have had previous experience of?

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9. Please comment on whether or not you liked having the opportunity to choose an assessment method

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Part 2

10. Please comment on whether you think the method of assessment you have decided upon contributes to your learning

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…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………

11. Please comment on the feedback you have received so far (feedback is delivered through weekly tests, can also be contained within the lectures and worked examples).

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…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………

12. At this stage of your module do you think your chosen method of assessment has been the most effective way of demonstrating your learning?

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…………………………………………………………………………………………
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…………………………………………………………………………………………
13. At this stage of your module do you wish you had chosen one of the alternative methods of assessment that were made available to you at the start of the course?

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Part 3

Date ………………………………………………………………………………………………

14. Please comment overall on whether or not you feel that your chosen method of assessment has contributed to your learning?

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………

15. Please comment on the feedback you have received for this method of assessment

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…………………………………………………………………………………………
…………………………………………………………………………………………

16. Do you think your chosen method of assessment has been the most effective way of demonstrating your learning?

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…………………………………………………………………………………………
…………………………………………………………………………………………

17. Do you wish you had chosen one of the alternative methods of assessment that were made available to you at the start of the course?

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…………………………………………………………………………………………
…………………………………………………………………………………………

18. Please comment on whether you think you were given adequate guidance and support on choosing a method of assessment

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
19. Please comment on the advantages/disadvantages of your choice of assessment

Thank you for completing this questionnaire
Alternative Formats
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