
Multiple Choice Questions in Stats for Sport Science Students – a student perspective

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The problem that motivated this work will be familiar to teachers of service modules. The 50 first-year Sport Science students seemed to lose much of their energy and liveliness when confronted with a compulsory module on research methods in sport. This module had a large component of Statistics, based on SPSS. Few of the students had studied maths beyond GCSE, and some had actively avoided it. Part of the problem seemed to be an inherent fear of the subject material, accompanied by lack of confidence.

An idea

The assessment for the module comprised write-ups of the computer classes, and two multiple-choice tests. The idea of this work was to produce a bank of interactive multiple-choice test questions as a learning resource. It was hoped that this would:

- encourage ;
- motivate;
- build confidence;
- reinforce learning;

in a non-threatening environment which students could use as and when they liked.

Using WebCT

The University had chosen WebCT as a virtual learning environment. This has two facilities for multiple-choice questions, and so was selected as the development medium.

The two facilities are rather different. Self-test is a tool for asking questions with as many possible answers as required. Clicking on the correct answer results in a large tick, whereas the wrong answer gives a large cross. There is also the option to give immediate feedback about the selected answer. The student can answer the questions in any order, and click as many times as they wish on all answers. An example is given in Figure 1. Here the student has selected an incorrect answer, and the feedback at the bottom of the screen gives information about why this answer is wrong. At this point the student could select a different answer to this question or visit another question. The system keeps no count of the number of attempts or of the number of correct answers.

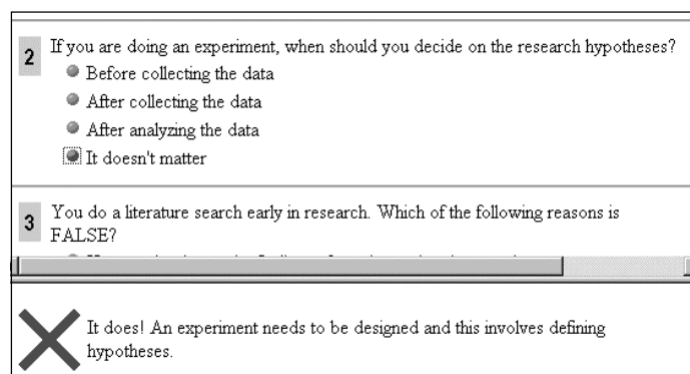


Fig 1 An example of a question in self-test, where there is immediate feedback

The quiz tool operates differently. There are various design formats but the basic approach is as follows. Again, questions can be answered in any order, but no feedback is given until after the quiz is completed. The questions in a particular session can be chosen randomly from a bank of questions, and hence vary from session to session. This is therefore more like an assessment test, and at the end the student is given a total score. An example is shown in Figure 2 where the student has answered one question, and is about to answer another question.

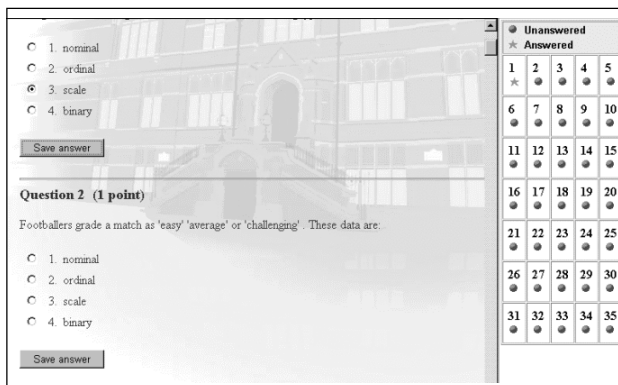


Fig 2 An example of a question in a quiz

Which format?

There were two major challenges. First it was necessary to produce a robust set of questions which were clear, where the right answer was indeed correct and where the feedback was accurate. Colleagues in the Faculty of Science, including Statisticians and non-Statisticians, went through the questions checking these aspects and suggested important changes. A bigger challenge was to produce a resource that would appeal to the intended users - the students. Students were therefore recruited to evaluate the questions. They were used at two stages in the work. Early on a pilot set of 12 questions was produced in both formats in WebCT. Students were asked to work through the questions 'thinking aloud' while being tape-recorded. They were told that it was an evaluation of the questions and not of them, and that nothing they said could be 'wrong' if it was really what they thought. Half of the students worked through the self-test first and then the quiz, and the other half did the reverse order. Later in the study, when the questions had been written, students did a similar evaluation, but this time their comments were more specific about the details of the wording of questions and feedback. A selection of students was chosen, primarily from the first year, but some from the second and third years. Students who freely admitted to 'hating' the subject, who did not attend well, or who found it difficult were included in the evaluation. All staff and students were

paid an honorarium for their work. A total of 7 lecturers and 19 students were involved.

The student verdict on the *self-test* was:

- The big tick gives encouragement;
- You can find the answer straight away;
- It's good to know why you get it right;
- There's less pressure than with the quiz;
- Good for revision;
- No incentive to get it right – you can just click around;
- It's no better than the notes.

The student verdict on the *quiz* was:

- Not as friendly – more like a test;
- Hard;
- No good if you haven't understood it or revised;
- Makes you think more – you can't just click;
- Good to test myself;
- Good if unpredictable;
- Good if like the real tests we get.

It therefore became clear – as is obvious in retrospect – that neither format was superior. The usefulness depended on the learning style of the student and also on their stage of learning. Some might always prefer one, whereas others might use each format at different stages in their learning.

The outcome

Following initial student feedback six sets of self-tests were produced, three per semester, each of 30-35 questions. Two quizzes were also produced, one per semester, with questions drawn randomly from the corresponding self-tests. Furthermore, the questions for the 'real' assessment tests would be drawn from the self-tests, so the quizzes would be like the assessments.

General feedback

In the second stage of student evaluation the consensus view was:

- Good to have up-to-date examples from sport;
- Start with easy questions and build up;
- Good to have questions to make you think;
- Spread the topics out;
- Make a clear distinction between the information about the question and the actual question;
- Don't have too many long questions together – keep short and to the point;

- Don't have too many in a group without mentioning sport;
- Don't force sport into a question if it's not necessary;
- Don't give the answer in the feedback – just a clue;
- Good to have hints in the feedback;
- You need very good feedback on the hard questions;
- Good to have groups of related questions in the self-test to check understanding of a topic;
- It's very hard when the answers to a question look very similar.

Other points are worth noting. Colleagues made several comments about the layout of the questions, especially with respect to charts and the use of colour. Some of these features were restrictions of WebCT. Students were much more resilient, and were quite prepared to cope with 'quirks' of the system as long as they perceived that the resource would really help them to understand the module's material. In this context they found the feedback one of the most important aspects of the resource. It was notable how many of them checked the feedback even when they had chosen the correct answer ('to make sure I got it right for the right reason') and even checked the feedback for incorrect answers to the same question ('to check that I knew why that was wrong').

The real test

The real test of a resource like this is whether it is used in anger. The cohort who helped to develop it asked for it to be made available to them in their second year, 2002-2003. (By default in WebCT it is available to the students registered on the module). Over the past academic session over 2/3 of the first year students have accessed the self-test questions at least once, the median number of times is 10 and the maximum 98 times. More than half the students have attempted a quiz, and approximately a third have run a quiz 7 or 8 times. These outcomes are encouraging, especially as I now have no input to this module. It is hoped that the student views are generic; this is currently being tested by developing a similar learning resource for mature MSc students in the Faculty of Health.

Acknowledgements

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