WHAT FACTORS AFFECT STUDENT OPINIONS OF COMPUTER-ASSISTED ASSESSMENT?

Chris Ricketts and Sally Wilks

What Factors Affect Student Opinions of Computer-assisted Assessment?

Chris Ricketts
Department of Mathematics and Statistics
University of Plymouth
Drake Circus
PLYMOUTH PL4 8AA

Sally Wilks
Learning and Teaching Development
University of Plymouth
Drake Circus
PLYMOUTH PL4 8AA

cricketts@plymouth.ac.uk

Abstract

During the introduction of computer-assisted assessment in a number of first- and second-year modules, we have been monitoring student performance and asking students to evaluate the use of on-line examinations. Initial results (Ricketts & Wilks, in press) suggested that both student performance and student opinions were strongly affected by the on-screen style of the assessment.

We standardised the style of the assessment interface and continued the evaluation. Modules that involved the teaching of statistics to first-year students in three different subject areas (Biology, Business and Geography) all used on-line examinations, as did a second-year Computing module. We were surprised to find that students from one subject area found the use of on-line examinations considerably less acceptable than the other subjects.

Only 55% of students in Geography preferred on-line examinations compared with 72% to 90% in the other subject areas. We have considered a number of possible explanations for the difference between the subject areas:
a difference in preparedness for the on-line examination;
a difference in performance;
a difference in IT skills.

As part of the evaluation we asked students about how well they were prepared for the on-line examinations, and whether they revised differently. Although there were differences in the responses in the four subject areas, this was not related to the acceptability of the on-line assessment.

As part of the evaluation of the effectiveness of computer-assisted assessment we monitored student performance in successive years. In three of the subject areas there was an improvement and in the fourth there was a

poorer performance, but the poorer performance did not occur in the group which found on-line assessment least acceptable.

We compared the opinions of the students in the three first-year subject areas with second-year students of Computing, who have more highly developed IT skills. The three first-year subject areas all have similar development of IT skills, and if poor IT skills was an issue we would expect all three groups to have a lower opinion of on-line assessment than the second-year Computing students do. This was not the case, with the second-year Computing students showing no greater preference for on-line testing than the two subject areas which liked it most.

This paper asks whether we should be concerned that student opinions of computer-assisted assessment may vary between cohorts and subject areas.

Background

During the introduction of computer-assisted assessment in a number of first- and second-year modules, we have been monitoring student performance and asking students to evaluate the use of on-line examinations. Initial results in one subject area (Ricketts & Wilks, 2001) suggested that the introduction of computer-assisted assessment without proper consideration of screen design could produce a drop in student performance, despite general acceptability to students. Changing the screen design produced both an improvement in performance and an increase in acceptability to students (Ricketts & Wilks, in press) which suggested that both student performance and student opinions were strongly affected by the on-screen style of the assessment.

We standardised the style of the assessment interface and continued the evaluation in other subject areas where computer-assisted assessment was being introduced. Modules that involved the teaching of statistics to first-year students in three different subject areas (Biology, Business and Geography) all used on-line examinations with the same interface. In addition, a second-year Computing module used the same interface and could be used for comparison. We were pleased to note that student performance showed an increase in most subject areas, but surprised to find that students from one subject area found the use of on-line examinations considerably less acceptable than the other three subjects. We therefore undertook a detailed examination of the factors affecting the acceptability of computer-assisted assessment to students.

Methods

In all four subject areas, the module content and method of delivery was the same as in the previous year. In three of the areas the same lecturer delivered the module as in the previous year. However, in Geography a different, but equally experienced, lecturer was responsible for the module.

In all four subject areas the students were given a number of in-course assessments on-line so that they would be familiar with the system before the examinations. The same template was used to deliver all four examinations using question-by-question delivery in Question Mark Perception. In two of

the subject areas (Biology and Geography) the previous year's examinations had also been on-line, whereas the examinations in Business and Computing had previously been paper-based.

Immediately at the end of the examinations, students from all groups were asked to complete the same evaluation questionnaire (Appendix). Not all students did so, so there may be some response bias. Response rates were over 50% across the four groups.

Student Feedback on Computer-assisted assessment

The main findings (Table 1) are that students are strongly (approximately 80%) in favour of on-line examinations in three of the subject areas, but approximately equally divided between in favour (55%) and not in favour or indifferent in the other subject area.

Subject	Biology	Business	Geography	Computing
Yes (%)	74	90	55	72
No (%)	10	2	27	18
Indifferent (%)	16	9	18	10
Sample size	106	178	130	129
Number of students	201	333	213	157
Response rate (%)	53	53	61	82

Table 1: Percentage of students responding positively, negatively, or indifferently to question 1 "Did you prefer this form of exam delivery .."

The student evaluation questionnaire includes two questions (questions 1 and 7) which relate to the acceptability of the computer-assisted examinations to students. Partly because of the similarity of the questions, it is no surprise that the responses are very similar (Tables 1 and 2).

Subject	Biology	Business	Geography	Computing
Yes (%)	64	86	50	70
No (%)	20	5	30	19
Don't know (%)	16	9	20	11

Table 2: Percentage of students responding positively, negatively, or indifferently to question 7 "Would you like more of your exams .."

Possible Explanations for Different Preferences

These differences in student preferences of computer-assisted assessment versus other modes require some explanation. It may be that this is just natural variation between groups, but statistical analysis shows that this is very unlikely ($P<0.001$).

We have considered a number of possible explanations for the difference between the subject areas. It may be that students felt that they were not as well prepared in some subject areas as in others. Alternatively, student performance may influence their opinion of the assessment mode. Another possible explanation is that a difference in IT skills may have an influence on

how students react to on-line assessment.

Student preparation

As part of the evaluation we asked students about how well they were prepared and supported for the on-line examinations, and whether they revised differently. The results are shown in Tables 3 and 4.

Subject	Biology	Business	Geography	Computing
Yes (%)	87	90	75	76
No (%)	9	6	17	15
Don't know (%)	4	4	8	9

Table 3: Percentage of students responding positively, negatively, or indifferently to question 2 "Did you feel you were given enough preparation .."

Subject	Biology	Business	Geography	Computing
Yes (%)	50	46	50	57
No (%)	47	50	46	37
Don't know (%)	4	4	4	6

Table 4: Percentage of students responding positively, negatively, or indifferently to question 8 "Did you prepare differently .."

There was a significant difference ($P<0.01$) in the responses in relation to how much preparation the students had been given (Table 3) between the four subject areas, although the difference was between Biology and Business on the one hand and Geography and Computing on the other. However, there was no significant difference ($P=0.28$) between the proportion of students preparing differently in the four subject areas. It therefore seems that the preparatory activities provided by the lecturers and the preparatory work undertaken by the students prepared them well, but not equally well in the four subject areas, for the online examinations.

Student Performance

As part of the evaluation of the effectiveness of computer-assisted assessment across the university, we regularly monitor student performance from year to year. Three subject areas showed an improvement (Table 5), and in the fourth subject there was a drop in mean mark. All these differences are statistically significant ($P<0.01$ for all), but the group that showed the drop was not the most dissatisfied group. We have already reported (Ricketts & Wilks, in press) that the change of screen presentation between 2000 and 2001 in the Biology modules produced a large improvement in student acceptability of computer-assisted assessment. Unfortunately, we do not have comparative data between the years in Geography. However, the fact that the average mark in Geography improved would suggest that poorer performance in 2001 is not causing the difference in acceptability between subject areas.

Year		Subject Biology	Business	Geography	Computing
2001	Mean	62.6	61.5	59.6	58.3
	(SD)	(18.0)	(15.7)	(17.5)	(9.8)
2000	Mean	44.0	53.6	54.7	61.3
	(SD)	(15.5)	(13.8)	(14.4)	(8.7)

Table 5: Mean and standard deviation of examination marks in successive years. Shaded cells were paper-based examinations in summer 2000.

IT Skills

Because we thought that poor IT skills may be a factor in the acceptability of online assessment, we have compared the opinions of the student in the three first-year subject areas (Biology, Business and Geography) with second-year students of Computing, who have more highly developed IT skills. The three first-year subject areas all have similar development of IT skills, and if poor IT skills was an issue we would expect all three groups to have a lower opinion of on-line assessment than the second-year Computing students do. This was not the case (Table 1), with the second-year Computing students showing no greater preference for on-line testing than the two first-year subject areas which liked it most.

Other Explanations

It is not clear from the data collected at the time of the assessment what factors influence students' opinions of computer-assisted assessment. We therefore have looked further afield for other influences. In particular, we wondered whether students' comments on the assessment might relate to the general popularity of the module, or the popularity of the lecturer, rather than the assessment process per se. Our university regularly carries out evaluations of modules, and so we were able to draw upon existing data (Table 6). These data were collected before the examination period.

While there are obvious differences between subjects, it is debatable whether these differences are related to the acceptance of computer-assisted assessment in Table 1. Certainly, the highest support for on-line examinations came from the group with the highest rating of their module. However, the fact that the responding students would probably have been different samples makes this hard to interpret.

Subject	Biology	Business	Geography	Computing
Positive (%)	33	61	49	39
Neutral (%)	51	29	31	40
Negative (%)	16	10	20	21

Table 6: Percentage of students responding positively (strongly agree or agree), negatively (disagree or strongly disagree), or indifferently to the question "Overall this was a good module"

Discussion

There is evidence that students find that CAA provides a positive learning experience, and that CAA may improve performance when used formatively (Charman & Elmes, 1998; Sambel, Sambel & Sexton, 1999; Sly & Rennie, 1999). However, there are a number of pressures that are leading to a greater use of computer-assisted assessment for examinations and other high-stakes assessments. One positive pressure is the increase in the use of online learning, and the desire to use "Effective assessment methods and tasks (which) are related to ... the methods of learning" (Brown, 2001). A negative pressure arises from the decrease in unit resource per student, so that efficient methods that save staff time are used. However, there is little published work on students' perceptions of online examinations in higher education.

In a previous study, we found that online examinations can be acceptable to students, especially when a user-friendly interface is used (Ricketts & Wilks, in press). Our student feedback is similar to that of O'Hare (2001). With the much bigger sample size this year, we were pleased to see very positive comments, as well as supportive quantitative data. For example, students commented that there was 'Less tension involved', that it was ' Quick and easy to use', and even 'Adds a sense of fun!'. Nevertheless, a small number of students still 'hate computers'.

However, acceptability can vary between different groups of students. During our evaluations we asked a number of questions about what might have had an effect on acceptability, but no clear relationships emerged. Relying on students more general feedback on the modules was also unproductive. It may be that a more extensive analysis with more modules could provide additional information to explain the variation we have observed.

We Finish with Two Questions

Is it important that computer-assisted assessment attains a high level of support from students, as it is merely one of many assessment mechanisms? Should we be concerned that different student groups have very different opinions of the same assessment process, even when it covers similar subjects at the same level?

As partial answers, we have shown that computer-assisted assessment, particularly on-line examinations, can receive a very high level of popularity in comparison with other methods, which suggest that other assessment modes are even less popular with students. Also, assessment processes are supposed to be fair and equitable, not necessarily popular. We have shown that the replacement of traditional examination processes with online examinations does not disadvantage the students, irrespective of their opinions, and so can be regarded as both fair and equitable.

We hope that this study will trigger debate about the relative roles of student evaluation and monitoring student performance in ensuring that computer-assisted assessment is implemented in a fair way.

References

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Appendix

Computer Aided Assessment using Perception

Student Feedback Questionnaire

We would be very grateful if you could spend a few moments to complete this short questionnaire. Your answers and comments would be much appreciated and would give valuable feedback in order for us to improve this method of exam delivery in the future.

1. **Did you prefer this form of exam delivery to other methods e.g. Paper based or Optical mark reader forms?**	**Yes**	☐	2. **Did you feel that you were given enough preparation for taking this exam using a computer?**	**Yes**	☐
	No	☐		**No**	☐
	Indifferent	☐		**Don't Know**	☐
3. **Did you feel that you were given enough support during the examination**	**Yes**	☐	4. **Were the types of questions appropriate?**	**Yes**	☐
	No	☐		**No**	☐
	Don't Know	☐		**Don't Know**	☐
5. **Did the questions cover the course adequately?**	**Yes**	☐	6. **Did you like the fact that your mark was instantly available?**	**Yes**	☐
	No	☐		**No**	☐
	Don't Know	☐		**Don't Know**	☐
7. **Would you like more of your exams to be delivered using computerised assessment?**	**Yes**	☐	8. **Did you prepare differently for this exam knowing that it was to be delivered by computer?**	**Yes**	☐
	No	☐		**No**	☐
	Don't Know	☐		**Don't know**	☐

9. Have you any comments on this exam or the way that it was delivered? (Please continue on the back of this page if you need more room for your comments)

10. What was the best thing about doing the exam using computer aided assessment?

11. What was the worst thing about doing the exam using computer aided assessment?