THE USE OF CAA FOR FORMATIVE AND SUMMATIVE ASSESSMENT – STUDENT VIEWS AND OUTCOMES

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Abstract

A study was carried out to examine the effects of introducing formative CAA on the summative assessment results. Twenty six students studying Farm Animal Production were given the option of using self-assessment tutorials in QuestionMark Perception. Each tutorial consisted of 10 randomly selected questions on either beef production or sheep production. Feedback was provided to the student after the completion of the tutorials. Uptake was variable, with 38% (n=10) of the students choosing not to use the selfassessment tutorials. Significant positive correlations were found between the use of beef production tutorials and marks in the beef production section of the summative assessment ($r_s = 0.69$, P < 0.01) and also between the use of the sheep production tutorials and marks in the sheep production section (r_s = 0.59, P < 0.01). The positive correlations between the marks for the beef and poultry sections of the exam (r = 0.52, P < 0.01) and the sheep and poultry sections (r = 0.36, P < 0.1) suggest that it may have been either the more academically able or the more motivated students who were choosing to use the tutorials.

A questionnaire was completed by 24 of the students. For students who used the self-assessment tutorials, the responses given in the questionnaire were mostly positive, and in favour of the use of the self-assessment tests. One concern was the nature of the feedback given in the tutorials, and this is undergoing further investigation during the current semester.

Introduction

Harper Adams University College is the UK's largest specialist Higher Education institution for agriculture and the land and food-based industries. Courses include Agriculture, Agricultural Engineering, Land Management and Agri-Food Marketing and Business Studies at degree and diploma level. The majority of students at the college are currently required to study a compulsory core module in Farm Animal Production. This can pose challenges for non-Agricultural students. A number of these students do not come from a farming background and are therefore presented with novel material relating to the production of farmed livestock. Also, the five species taught (beef cattle, dairy cattle, sheep, pigs and poultry) vary widely in terms of their production systems. This often results in a high failure rate for non-Agricultural students on the Farm Animal Production module.

The current study relates to first year HND Agri-Food Marketing and Business Studies and HND Countryside Management students. In recent years, the initial failure rate on the Farm Animal Production module has been 25 % (2001-02) and 28% (2002-03). These failed students then need to be reassessed or even have to restudy the module. The aim of the study was to examine the effects of the introduction of formative CAA on the results for the module. The module is taught over two semesters and results are presented for the first semester only.

Methods

Twenty-six students on the Farm Animal Production module were taught sheep production, beef production and poultry production during the autumn semester. Together with lectures, tutorials and farm classes, the students were given the option of using self-assessment multi-choice questions in QuestionMark Perception as an additional tool for learning. Due to staff resources, questions (with feedback) were presented for sheep and beef production only.

Each self-assessment tutorial consisted of 10 questions, drawn at random from question banks of 58 and 67 questions for sheep and beef production respectively. Students were given a printed sheet detailing how to gain access to the self-assessment questions, and a demonstration was given inclass. Throughout the module the students were reminded of the availability of the self-assessment tutorials. These tutorials were available on the College intranet, but it was not possible to set up remote access.

At the end of the semester, students underwent summative assessment using QuestionMark Perception. This examination consisted of 29 sheep production questions, 29 beef production questions, 40 poultry production questions and two general questions. These questions were not randomly selected within Questionmark, so all the learners had the same questions for the summative assessment. It should be noted that negative marking was used in both the self-assessment tutorials and in the examination.

To determine the nature of the relationship between the use of the selfassessment tutorials by the students and their subsequent marks in the summative assessment, correlation coefficients (Spearman Rank) were calculated. Following the examination, but prior to being informed of their results, the students were asked to complete a questionnaire relating to their use of the self-assessment tutorials (Table 1). Questions were adapted from those used by Blayney and Freeman (2003), Russell and Bullen (2003), Wood and Burrow (2002) and O'Hare (2001). The questionnaire was paper-based and completed in-class. This was in order to obtain as many responses as possible. It can be noted that some of the questions are worded positively whilst others are worded negatively. This was done deliberately to avoid students simply ticking either 'agree' or 'disagree' to all the questions.

| How often did you use the self- | Very often | Often | Occasionally | Rarely | Never |
|---|------------|-------|---------------|----------|----------|
| assessment tests ? | | | | | |
| As a method of learning, I enjoyed the | Strongly | Agree | Neither agree | Disagree | Disagree |
| self-assessment tests | agree | | nor disagree | | strongly |
| The wording of the questions was | Strongly | Agree | Neither agree | Disagree | Disagree |
| unclear | agree | | nor disagree | | strongly |
| The assessment questions were closely | Strongly | Agree | Neither agree | Disagree | Disagree |
| related to the content of the module | agree | | nor disagree | | strongly |
| I used my lecture notes whilst | Very often | Often | Occasionally | Rarely | Never |
| completing the self-assessment tests | | | | | |
| The self-assessment tests helped me to | Strongly | Agree | Neither agree | Disagree | Disagree |
| understand the lecture notes | agree | | nor disagree | | strongly |
| The marks helped me to assess how I | Strongly | Agree | Neither agree | Disagree | Disagree |
| was doing on the module | agree | - | nor disagree | _ | strongly |
| The feedback given if you get the | Strongly | Agree | Neither agree | Disagree | Disagree |
| question wrong is not very useful | agree | | nor disagree | | strongly |
| Doing the tests made it easier to study | Strongly | Agree | Neither agree | Disagree | Disagree |
| for the exams | agree | | nor disagree | | strongly |

Table1. Questions presented to students in the questionnaire

Four free response questions were also included. These were:

- 1. Why did you use/not use the self-assessment questions?
- 2. What were the three best things about the self-assessment tests?
- 3. Can you give three suggested improvements for the use of the self-assessment questions?
- 4. Please add any other comments about the self-assessment questions.

In order to correlate results, students were identified by their surname for the self-assessment tutorials, the examination and the questionnaire. This information is not included in this paper, but students have been allocated a number from 1 to 26.

Results

Uptake of the tutorials was variable (Table 2). Ten of the students (38%) did not use the self-assessment questions at all. Nine students (35%) accessed the tutorials between one and nine times, and seven of the students (27%) accessed the tutorials more than ten times, with the maximum number for an individual student being 25 times. The subsequent exam marks ranged from 17% (Fail) to 69% (Merit), with a mean of 41.5 %.

| | Beef Production Sheep Production | | Poultry | Overall performance | | | |
|----|----------------------------------|------|----------|---------------------|------------|-----------|------|
| | | | | | production | | |
| | Times | Exam | Times | Exam | Exam mark | Times | Exam |
| | tutorial | mark | tutorial | mark | (%) | tutorials | mark |
| | accessed | (%) | accessed | (%) | | accessed | (%) |
| 1 | 0 | 26 | 0 | 12 | 14 | 0 | 19 |
| 2 | 0 | 4 | 0 | 44 | 23 | 0 | 24 |
| 3 | 0 | 51 | 0 | 59 | 59 | 0 | 57 |
| 4 | 0 | 9 | 0 | 18 | 11 | 0 | 17 |
| 5 | 0 | 32 | 0 | 17 | 43 | 0 | 32 |
| 6 | 0 | 20 | 0 | 40 | 29 | 0 | 29 |
| 7 | 0 | 49 | 0 | 46 | 44 | 0 | 46 |
| 8 | 0 | 7 | 0 | 42 | 31 | 0 | 28 |
| 9 | 0 | 41 | 0 | 70 | 49 | 0 | 54 |
| 10 | 0 | 10 | 0 | 25 | 15 | 0 | 17 |
| 11 | 0 | 32 | 1 | 51 | 39 | 1 | 39 |
| 12 | 0 | 27 | 1 | 32 | 57 | 1 | 42 |
| 13 | 0 | 19 | 1 | 50 | 42 | 1 | 39 |
| 14 | 1 | 17 | 1 | 40 | 42 | 2 | 33 |
| 15 | 0 | 10 | 3 | 25 | 32 | 3 | 24 |
| 16 | 0 | 40 | 4 | 64 | 20 | 4 | 39 |
| 17 | 2 | 51 | 3 | 39 | 54 | 5 | 49 |
| 18 | 3 | 28 | 3 | 42 | 43 | 6 | 38 |
| 19 | 3 | 11 | 5 | 41 | 48 | 8 | 35 |
| 20 | 6 | 70 | 6 | 93 | 42 | 12 | 65 |
| 21 | 1 | 59 | 12 | 94 | 58 | 13 | 69 |
| 22 | 11 | 67 | 2 | 43 | 63 | 13 | 58 |
| 23 | 5 | 61 | 16 | 82 | 48 | 21 | 62 |
| 24 | 5 | 54 | 17 | 69 | 29 | 22 | 48 |
| 25 | 14 | 81 | 9 | 79 | 41 | 23 | 64 |
| 26 | 4 | 49 | 21 | 82 | 34 | 25 | 51 |
| Σ | 105 | | 55 | | | 160 | |
| | | 50.0 | | 35.6 | 38.9 | | 41.5 |

| | Table 2. | The use of | of self-assess | ment tutorials | and exam marks. |
|--|----------|------------|----------------|----------------|-----------------|
|--|----------|------------|----------------|----------------|-----------------|

There was a highly significant positive correlation between the number of times a student accessed the sheep tutorial and the examination mark for the sheep section of the summative assessment ($r_s = 0.59$, P < 0.01). The corresponding correlation coefficient for beef production was 0.69 (P < 0.01). When this information was combined, the correlation coefficient between total tutorial usage and the exam mark for the beef and sheep section of the exam was positive and highly significant ($r_s = 0.67$, P < 0.01).

There was a significant positive correlation between the mark achieved in the poultry section of the exam and that achieved in the beef section (r = 0.52, P < 0.01). The relationship between the marks in the poultry section and the sheep section was also positive and approaching significance (r = 0.36, P < 0.1).

Twenty-four students completed the questionnaire. The results are shown below (Table 3). The answers to Question 1 (How often did you use the self-assessment tests?) were interesting. Of the students who chose not to use the self-assessment questions (n=10), only four chose 'Never' as their response. Four chose 'Rarely' and the remaining two chose 'Occasionally'. This may have been because the questionnaires were not anonymous, and students may have perceived that a positive response to this question was required. A number of students who had not used the tutorials subsequently went on to complete questions 2 - 9 even though they had not used the self-assessment tutorials. Therefore, in order to gain views about the formative assessments from students that had actually taken part in them, the responses to questions two to nine are only presented for the students who used the self-assessments, and the responses for those who did not use the assessments have been disregarded.

| | | Α | В | С | D | Е |
|---|---|-----|-----|-----|-----|-----|
| 1 | How often did you use the self- | | 25% | 29% | 25% | 17% |
| | assessment tests? | | (6) | (7) | (6) | (4) |
| | | 1 | 2 | 3 | 4 | 5 |
| 2 | As a method of learning, I enjoyed the | 7% | 64% | 29% | | |
| | self-assessment tests | (1) | (9) | (4) | | |
| 3 | The wording of the questions was | | 14% | 21% | 64% | |
| | unclear | | (2) | (3) | (9) | |
| 4 | The assessment questions were closely | 29% | 57% | 14% | | |
| | related to the content of the module | (4) | (8) | (2) | | |
| | | Α | В | С | D | Е |
| 5 | I used my lecture notes whilst completing | 7% | | 21% | 29% | 43% |
| | the self-assessment tests | (1) | | (3) | (4) | (6) |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | The self-assessment tests helped me to | | 50% | 21% | 29% | |
| | understand the lecture notes | | (7) | (3) | (4) | |
| 7 | The marks helped me to assess how I | 14% | 57% | 21% | 7% | |
| | was doing on the module | (2) | (8) | (3) | (1) | |
| 8 | The feedback given if you get the | 7% | 29% | 29% | 29% | |
| | question wrong is not very useful | (1) | (4) | (4) | (4) | |
| 9 | Doing the tests made it easier to study | 7% | 57% | 21% | 14% | |
| | for the exams | (1) | (8) | (3) | (2) | |

Table 3. Questions presented to students in the questionnaire, and their responses.

(Number in parenthesis indicates the number of students who selected this response).

A = Very often, B = Often, C = Occasionally, D = Rarely, E = Never

1 = Strongly agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree, 5 = Strongly disagree

In general, the responses to the questions were positive in relation to the students experience of using the CAA. Most of the students (71%) agreed that they enjoyed using the self-assessment tests (Question 2). Only two students (14%) agreed that the wording of the questions were unclear, whilst nine (64%) disagreed with this statement (Question 3). The majority of the students (86%) agreed that the content of the questions was closely related to the module (Question 4).

With regards to using their lecture notes whilst answering the self-assessment questions (Question 5), the responses were varied. However, only one student used lecture notes all the time, indicating that other students were at some attempts trying to test how much they had learnt.

The majority of the students (71%) agreed that using the tests helped them to assess how they were doing on the module (Question 7), and 64% agreed that doing the tests made it easier to study for the exams (Question 9).

The two areas that give the most concern are the responses to Question 6 and Question 8. Four of the students (29%) indicated that the use of the tests had not helped them to understand their lecture notes (Question 6), and a further three students (21%) neither agreed nor disagreed. The positive responses to this question only accounted for half of the students. In terms of the feedback provided at the end of the test, five students (36%) agreed that the feedback was not very useful. Only four students (29%) disagreed with this statement.

In the free response section, half of the students who did not use the tests (5/10) stated various reasons as to why they had used the tests. The students who had chosen not to use the self-assessment and who answered 'Never' to Question 1 indicated that this was because they had forgotten about them, as this type of learning is not used extensively throughout the College. Two of these students stated that they should be given constant reminders about the self-assessment tests, and perhaps a lecture on them.

For the students who did use the self-assessment tests the main reasons were to practice for the examination (10/14) and to test their knowledge of Farm Animal Production (4/14). There were a number of aspects that the students liked about the assessments. These were that it was easy to use/follow (5/14), a percentage result was provided immediately (4/14) feedback was provided (5/14) and that it gave the student an indication of what the examination would be like (7/14). Suggested improvements included giving the correct answer as part of the feedback (3/14), removing the negative marking (2/14), making the test available off campus through remote access (2/14), providing more feedback (3/14) and providing more questions (3/14). With the limited number of questions available students who used the tutorials frequently may have been presented with the same question on more than one occasion. This would be useful if they had failed to provide the correct response when previously faced with the question, and would allow them further attempts at providing the correct answer. However, for students who had provided the correct response at the first attempt it could lead to them finding the tutorials repetitive and uninteresting.

When asked to add any other comments only two students responded. Their responses were 'They were a good way of learning and very worthwhile' and 'It was very helpful, thank you'.

Conclusions

The results are in agreement with those reported by Sly and Rennie (1999a, 1999b) and Charman (1999) who found that students who sat optional practice tests had higher marks in subsequent summative assessments. However, although there is a positive correlation between tutorial use and exam mark, a large proportion of the students are not taking advantage of the learning tools available to them. In 2002-03, when the self-assessment tests were not available to the students, the mean mark for the January exam was 34.8%, and only 25 % of the students passed the examination i.e. achieved a mark of 40% or higher. In 2003-04, the mean mark for the January exam was 41.5%, and 46% of the students passed the examination. However, these figures are not directly comparable as they are for different cohorts of students.

Positive correlation coefficients were found between the performance of a student on the sheep and poultry sections and on the beef and poultry sections of the summative assessment. It could be suggested that this was because students who had used the tutorials for formative assessment were more familiar with its use, and this led to their improved performance in the poultry section of the summative assessment when compared to students who had not used the self-assessment tutorials. However, the lack of a significant correlation between total tutorial use and the performance of the student in the poultry section of the examination ($r_s = 0.29$) does not support this theory. The more likely explanation is that the students who had used the tutorials as a method of learning were either the more academically able students in the group of those who were more motivated, with a higher work rate.

The responses from the questionnaire were mainly positive in relation to the self-assessment tutorials. The main area of concern was the form of the feedback provided. One of the problems perceived by the students was that the feedback did not present the student with the correct answer. In this study the feedback was designed to explain why an answer was incorrect and to give clues to the correct answer, but not to state outright which of the options was correct. However, three of the fourteen students who used the self-assessment tests suggested that providing the correct answer would be an improvement. This may be because they adopted a surface approach to learning and wished to learn the correct answers rather than to understand the theories behind them. Those students who did not want to be informed of the correct answer may have adopted a deeper approach to learning. The

nature of the feedback is currently under review, with student views being sought.

Self-assessment tests are being made available to the students in the second half of the module during the current semester, and further investigations will be made.

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