AN INTERACTIVE MULTIMEDIA EDUCATIONAL PROGRAM FOR PASTURE MANAGEMENT

P.G. Tow[1], Corina Mulholland[2], P. Marriott[2] and D.A. Shelton[2]

[1]Department of Agronomy and Farming Systems, The University of Adelaide, Roseworthy Campus
[2]School of Communication and Information Studies, University of South Australia, Magill Campus

ABSTRACT

Developing abilities in pasture management decision making is important for all students of pasture agronomy, whether they plan to work in management, extension or research. Such problem-based learning fosters an ability to understand and apply principles, and to integrate and use information from various sources. A computer-assisted, problem based, multimedia educational programme, "Pasture Management" has been developed to complement limited field exercises in pasture assessment and management. It comprises illustrated case studies and supporting information. Students interact with the programme by choosing alternative management options, calling up images and text as required to assist them. The programme supplies feedback for each decision. Evaluation in the first year of use showed that students found "Pasture Management" easy, interesting and satisfying to use and helpful for learning pasture management. They appreciated the multimedia aspects and feedback. "Pasture Management" is available on CD-ROM. Development is continuing.

KEYWORDS

Pasture, management, multimedia, interactive, education, case studies, evaluation

INTRODUCTION

In the past decade, there has been increasing interest in development of educational multimedia programs. Educators see value in them for improving the quality of teaching and learning (effectiveness for attaining educational goals). However, they are costly to produce with educational benefits yet unproven.

Developers of these programs face at least four challenges:
(i) To select an appropriate aspect of the syllabus for use of the technology.
(ii) To achieve a combination of effective, innovative technology and educational content of a high standard.
(iii) To integrate the programme with other parts of the syllabus to achieve a superior course overall.
(iv) To evaluate the programme by student response and adjust it to meet student needs.

These challenges have all influenced the development of an interactive, multimedia, computer-assisted programme, "Pasture Management" discussed in this paper. It is designed to give tertiary students of pasture agronomy experience in management decision making. It complements field exercises, which are given limited time in the syllabus. Such problem-based learning fosters abilities in problem assessment and integration of knowledge which are desirable educational aims in themselves.

METHODS

"Pasture Management" is a problem-based package comprising a number of illustrated case studies and supporting information presented as lectures, a glossary and a diagnostic section.

The software was written using Macromedia Director 4.04, which supports both Macintosh and PC platforms and has the ability to handle text, graphics, animation, video and sound in an integrated manner. A dedicated editor has been written to allow authors who are non-programmers to construct case studies and add to lecture notes without programming support. The graphical content of "Pasture Management" is provided by a large colour slide base stored digitally. Video is digitized and saved as quick time movies. The programme is available on CD-ROM and in the classroom environment is delivered by a Novell file server to a teaching network comprising 486DX-33 and Pentium 100 PCs . Further details of programming are given in Tow et al (1996).

In the class teaching situation students are given field exercises to assess the condition of pasture paddocks and decide on appropriate management. They are then given similar, simulated exercises with the "Pasture Management" programme, where they can explore the outcomes of alternative management decisions, in a range of Case Studies. Each Case begins with a Key Concept and background information. Users are then presented with a management question and a number of alternative management options from which one is chosen. They receive a score and feedback information, then may go back to test other options, or forward to new questions, options and feedback. Students write a short report on factual and conceptual knowledge gained.

Evaluation by students was conducted in 1995 while development was underway, and in 1996 when the first year of development was complete. Questionnaires were completed by a total of 66 students in degree and diploma courses at The University of Adelaide and (for 6 degree students) the University of Western Sydney. The questionnaires were completed at the end of class sessions, on a voluntary basis. In 1996 because of syllabus changes, attendance at sessions was also on a voluntary basis, resulting in fewer respondents than in 1995. Evaluation is continuing.

Students completed three types of questionnaires:

(1) Information on previous knowledge and experience with computers, multimedia and pasture management.
(2) Users' opinions of the programme design and their level of satisfaction (two extra questions were added in 1996).
(3) Information on concepts learnt from using the programme, which ones they already knew and which they understood for future use (1996 only).

Questionnaires in (1) and (2) were mostly answered on a Likert scale of 1 to 7 (Tables 1 and 2). Some questions were adapted from a generic user-evaluation questionnaire for interactive systems (Shneiderman 1992 pp 485-7). A few questions called for comment on the value of multimedia aspects and the programme in general. Additions in 1996 aimed to clarify what the students were actually learning and how effectively the programme conveyed the information.

RESULTS AND DISCUSSION

After a year of development, the programme is suitable for regular use. Evaluation results will guide improvements. Only minor variations occurred between student groups in answers to some questions, thus all 66 students are treated as a single group to summarize results for the next stage of development and use.

Questionnaire (1) indicated that most students had reasonable experience in using computers (mean 4.2), fairly limited experience of educational multimedia (mean 2.4) and reasonable knowledge of pasture management (mean 4.0).

Questionnaire (2) has been divided into four categories:
(a) **General satisfaction with the programme.** Students enjoyed using "Pasture Management" (mean rating of 5.4 for the scale

"frustrating to satisfying" and 5.7 for the scale "dull to interesting").

(b) **User-programme interface.** Students found the programme consistent and easy to use (Table 1).

(c) **Educational benefits.** Students found the programme helpful for learning and neither too easy nor too hard (Table 2). They perceived they had gained a moderate amount of factual and conceptual knowledge, perhaps a consequence of their limited use of the programme so far. However, this score agrees with information from Questionnaire (3) that the programme contains a mix of what students already knew and what was new to them, and that a moderate proportion of information was still not adequately understood for future use. This latter finding suggests the need for follow-up tutorials/discussion groups.

(d) **User comments.** These were generally positive. The value of the multimedia aspects and feedback on choices was generally acknowledged. Useful suggestions were given for improving programme design and style.

With respect to the four challenges mentioned in the Introduction, the evaluation suggests that progress has been made in (i), (ii) and (iii). However evaluation so far has been mainly by means of student response. Such formative evaluation during the development process is useful for identifying design and useability problems and programming "bugs", but does not necessarily determine if the multimedia format is enhancing the learning process. Methodologies employed for this purpose have given inconclusive (Reeves, 1993) or even negative results (Janda, 1992).

The fourth challenge in developing "Pasture Management", to integrate the programme with other parts of the syllabus, is only starting to be addressed. However, with its emphasis on interactive, problem-based learning, made more interesting by multimedia, and aimed at improved management abilities, this programme should assist in achieving other course aims, such as:

(a) Improved ability of students to recognize, define and apply principles.
(b) Fostering a holistic attitude by linking management decisions to farm goals and conservation of the resource base.
(c) As a consequence of (a) and (b), to contribute to the creation of professionalism as an outcome in education.

Table 1

Mean Ratings for Questionnaire (2) - Interface Questions

Question (scale)	Mean Rating
How did you find reading the screens? (1 = very difficult; 7 = very easy)	5.38
How consistent was the programme? (1 = inconsistent; 7 = consistent)	5.24
How did you find navigating through the programme? (1 = easy; 7 = difficult)	2.99
Did you have a sense of where you were in the programme? (1 = got totally lost; 7 = knew exactly)	5.59

REFERENCES

Janda, K. 1992. Multimedia in political science: sobering lessons from a teaching experiment. J. Educational Multimedia and Hypermedia. 1, pp 341-354.

Reeves, T.C. 1992. Research support for interactive multimedia: existing foundations and new directions. Pages 13-19 *in* C. Latchem, J. Williamson, and L.Henderson-Lancett, eds. Interactive multimedia: practice and promise. Kogan Page Ltd, London.

Shneiderman, B. 1992. Designing the user interface: strategies for effective human-computer interaction. (2nd ed.) Addison-Wesley, Reading, Massachusetts.

Tow, P.G., P. Marriott, R.S. St. John-Sweeting and D. Shelton. 1996. A multimedia educational programme in pasture assessment and management. Proc. 8th Aust. Agron. Conf. Toowoomba, Queensland, pp 546-549,

Table 2

Mean Ratings for Questionnaire (2) - Educational Benefits Questions

Question (scale)	Mean Rating
How much factual knowledge do you feel you have gained from the programme? (1 = none; 7 = a great deal)	4.94
How much conceptual knowledge do you feel you have gained from the programme? (1 = none; 7 = a great deal)	4.71
How much has your understanding of Pasture Management increased as a result of using the programme? (1 = not at all; 7 = a great deal)	4.63
How did you find the questions/activities contained within the programme? (1 = not helpful; 7 = very helpful)	5.29
How did you find the questions/activities contained within the programme? (1 = too easy; 7 = too difficult)	3.91
Do you think the questions/activities helped you to learn the material contained in the programme? (1 = not at all; 7 = very much)	5.19