A SURVEY OF STUDENTS' ATTITUDES TO METHODS OF TEACHING FARM MANAGEMENT*

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This paper presents the results of a survey of students' attitudes towards a variety of teaching methods. Included in the methods are a simple farm management game and a complex computer-based game. The results provide a basis for deciding the appropriateness of the teaching methods to the different facets of farm management courses.

In 1973 some nineteen of the twenty-five Australian tertiary teaching institutions offering courses in farm management used farm management games.[1] In addition to their use in these institutions, farm management games are widely used both in adult education programmes and for in-service training in farm management by State Departments of Agriculture.

It is perhaps surprising that the use of farm management games is so widespread in view of the controversy surrounding their application to the teaching of farm management. A similar controversy exists regarding the use of business management games from which farm management games have been developed. For example, the applicability of the 'experience' gained through business games to real-world managerial situations has been questioned.[2] Where the usefulness of games has been questioned, this casts doubt on their value as a teaching device.

Both the proponents and the critics of the use of games for teaching have generally based their argument upon impressions obtained through observation of the use of the technique rather than objective evidence. Little empirical research has been undertaken to assess the effectiveness of games as compared with other teaching methods.[3]

This lack of objective evidence of the effectiveness of management

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[1] Lindner, R. K., 'The State of the Art: Farm Management Games Currently in Use in Australia'. A paper presented to the Annual Conference of the Australian Agricultural Economics Society, Perth, February, 1974.

[2] The advantages and disadvantages of management games are discussed in Longworth, J. W., 'Management Games in Business Research and Education', *The Australian Accountant*, Vol. 41, No. 6 (July, 1971), pp. 272-273. Arguments pertinent to farm management games are contained in Lindner, *op. cit.*, pp. 15-17.

[3] For results of two controlled teaching experiments using management games see Raia, A. P., 'A Study of the Educational Value of Management Games', *The Journal of Business*, Vol. 39, No. 3 (July, 1966), pp. 339-352 and Curtis, S. M., 'The Use of a Business Game for Teaching Farm Business Analysis to High School and Adult Students', *American Journal of Agricultural Economics*, Vol. 50, No. 4 (November, 1968), pp. 1025-1033.

games is understandable in view of the difficulties associated with such research. A major problem in the evaluation of a management game is the specification of commonly accepted course objectives against which to assess the contribution of the game. Further, a student's evaluation of any teaching method will be confounded where the student's learning objectives differ from the teacher's objectives for the course.

There is also difficulty associated with the measurement of educational attainment, in this case 'managerial skill'. Management games have the potential to develop simultaneously the student's understanding of facts, principles and technical skills, and his appreciation of and attitude towards the managerial function. Measurement of this latter aspect, the potential influence of games on the student's attitude to the managerial function, his values and motivation, poses problems for the educational researcher. It is probably because of such difficulties that research into the pedagogic value of management games has not been more extensively undertaken.[4]

Whilst an evaluation of the teaching method should ideally be an integral part of any teaching programme, it is particularly necessary in the case of farm management games. As a departure from traditional teaching methods possibly requiring additional costs (both cash costs and opportunity costs in terms of the teacher's and students' time) the use of games needs to be justified. Evaluation provides a means of assessing whether any additional costs are matched by additional benefits.

This paper presents the results of an empirical study of the attitudes of students to a number of methods of teaching farm management. Included among the methods are two farm management games.

Evaluation of Teaching Methods

Extension of the use of farm management games as a teaching device could be justified where an analysis indicates that the benefits flowing from their application exceed their costs. An initial part of such evaluation requires the establishment of superior benefit. Any additional benefit derived from the use of games will result from their educational effectiveness as compared with other methods.

When planning a farm management course, a number of teaching methods may be combined to develop not only an understanding of principles and analytical techniques but also an appreciation of the complexities of the environment in which a farm manager must operate. However, all of the methods will not be equally suitable for teaching the various aspects of the course. Where more than one method could be used, comparative analysis would indicate which is the most appropriate.

One way of obtaining an indication of student attitudes to various teaching methods is to survey students who have participated in courses in which a range of methods has been used. In this study the following methods used for teaching farm management at Hawkesbury Agricultural

[4] For an indication of the problems which can arise in research of this type, see McKenney, J. L., 'An Evaluation of a Business Game in an MBA Curriculum', *The Journal of Business*, Vol. 35, No. 3 (July, 1962), pp. 278-286, and McKenney, J. L., 'An Evaluation of a Decision Simulation as a Learning Environment', *Management Technology*, Vol. 3, No. 1 (May, 1963), pp. 56-67.

College, the University of Queensland and the University of Sydney are compared:[5]

(i) lectures with associated tutorials and exercises;
(ii) case studies involving farm visits; and
(iii) farm management games.

Two games are considered: the Victorian Farm Management Game (VFMG)[6] and the Central Tablelands Farm Management Game (CTFMG).[7]

Using Management Games

The Victorian Farm Management Game

The VFMG developed by McKinlay of the Victorian Department of Agriculture is the most widely used of the various farm management games currently in use in Australia.[8] This game is typical of the group of manual games played using a board. Briefly, the VFMG allows for five enterprises (wheat, barley, sheep, cattle and improved pasture) and four decision periods per year of simulated management. The decisions required for the various enterprises are relatively simple. For example, there is only one type of fertilizer and level of application and there is no choice of seeding rates. Enterprise returns are determined by dice throws and players are required to keep records of their financial position using cash flow statements.

Central Tablelands Farm Management Game

The CTFMG is the most widely used of the fully computerized farm management games available as a teaching aid in Australia.[9] The game was developed by Longworth whilst at the University of Sydney and is the most complex of the various games currently being employed.[10] Decisions are made on a monthly basis, seven enterprises can be undertaken (wheat, oats, potatoes, fat lambs, merino wool, cattle and improved pasture) and players are provided with a computer print-out of monthly and annual physical and financial records. One of the features of the game is that the annual accounts are presented in the form recommended by the Joint Committee on Standardization of Farm Management Accounting.[11] The structure of the enterprises and the decisions involved are relatively

[5] Responses of students attending the different teaching institutions in each of the years have been aggregated. This provides a larger population but it may cover up any differences that arise from variation in the teaching at the different institutions, in the structure of the courses and in the way the games were used.

[6] McKinlay, J. M., 'The Victorian Farm Management Game—Information for Organizers', 2nd Edition (1972), mimeo. The VFMG is a descendant of the 'Farm Game' developed in Western Australia by Jim Malcolm.

[7] Longworth, J. W., *The Central Tablelands Farm Management Game: Manual for Participants* (St. Lucia: Department of Agriculture, University of Queensland, 1973) and Longworth, J. W., 'The Central Tablelands Farm Management Game: Manual for Administrators', mimeo.

[8] Lindner, *op. cit.*, p. 14.

[9] *Ibid.*

[10] For a description of the game and its objectives see Longworth, J. W., 'From War-Chess to Farm Management Games', *Canadian Journal of Agricultural Economics*, Vol. 18, No. 2 (July, 1970), pp. 7-8.

[11] Joint Committee on the Standardization of Farm Management Accounting, *Accounting and Planning for Farm Management* (Brisbane: Queensland Department of Primary Industries, 1966).

complex. For example, players have a choice of two types of fertilizer, three improved pasture mixtures, four seeding rates, and four to six levels of fertilizer application (depending on the enterprise).[12]

An Application of the CTFMG

The use of the CTFMG at the University of Sydney provides an indication of how this game may be used in teaching farm management. The game extends over one university term during which time four years of management are simulated. Students are organized into 'farms' with four to six students 'managing' each farm. As part of the game students complete various exercises in farm management procedures (such as gross margins analysis, cash-flow budgeting and whole-farm budgeting) for 'their farm' prior to commencing computer simulation.

Decisions for the game are made on a monthly basis, but the number of months processed in a single computer run may be varied depending on the students' familiarity with the exercise and the situation which exists on the farms. Initially only the decisions for one month are processed at a time, but after completion of a year's simulation, the number of months for which decisions can be made without feedback of results can be increased (especially during periods when there are no critical decisions to be made).

To allow adequate time for students to study their computer output for the previous month and to adjust their farm plans according to the dynamic environment in which they are operating, decisions are made at daily workshop sessions. These are very informal. Formal workshops are held weekly to allow students to become familiar with the annual accounts (generated by the computer programme), to complete income tax returns and to review their farm plans for subsequent years.

At the University of Queensland and Hawkesbury Agricultural College the CTFMG is run along similar lines to those followed at the University of Sydney. The lack of computing facilities at Hawkesbury, however, necessitates students being taken to a computing centre for the simulation sessions. To reduce travelling time, six months' decisions are processed during the first visit and up to twelve months are simulated in subsequent decision-making sessions as students become better acquainted with the exercise. The major disadvantage resulting from this mode of operation is the artificial pressure placed on students to make rapid decisions. In such a situation there is a strong temptation to dispense with formal analysis and revert to intuition.[13]

The Survey

To obtain students' assessments of methods of learning farm management, former students who had participated in the CTFMG during their farm management course at Hawkesbury, the University of Queensland

[12] Lindner has estimated that the *maximum* number of decisions required per game year for the CTFMG would be in excess of 2,000 compared with approximately 30 for the VFMG. Lindner, *op. cit.*, p. 42.

[13] This defect has also been observed with business games if participants are not allowed adequate time for decisions. See, for example, Jackson, J. R., 'Business Gaming in Management Science Education' in Churchman, C. W. and Verhulst, M. (eds.), *Management Sciences Models and Techniques*, Vol. I (New York: Pergamon Press Inc., 1960), p. 254.

and the University of Sydney during 1972 and 1973 were surveyed. Students at the University of Sydney who had participated in the CTFMG during first term 1974 were also included in the survey.

Briefly, the aims of the survey were to:

(a) gain students' impressions of the relative effectiveness of specified teaching methods;
(b) compare the educational value of a complex computerized game with that of a relatively simple game; and
(c) obtain suggestions for improving the teaching effectiveness of the CTFMG.

The students participating in the CTFMG at the Hawkesbury Agricultural College are extension officers with various state Departments of Agriculture undertaking a course for the graduate Diploma of Extension. They are a group of mature students having had, on average, seven years' extension experience in the field. At the University of Sydney and the University of Queensland the CTFMG is used as part of courses designed to teach farm management to senior undergraduates and post-graduate students in the Faculties of Agriculture together with undergraduate students from the Faculties of Economics.

Questionnaires were distributed to 168 students or former students from whom 150 replies were received, 148 of which were usable. This represents a response rate of 89·3 per cent. Whilst all respondents had been exposed to lectures and seminars and to the CTFMG as methods of teaching farm management, only the Hawkesbury students and some of the University of Sydney students had experienced the VFMG. All the University of Queensland respondents had undertaken a farm case study as had a number of University of Sydney respondents who were specializing in farm management during the final year of their course. In Table 1, details are shown of the composition of the survey population together with an indication of the number of students who had experienced the various teaching methods.

Students were asked to evaluate the effectiveness of the teaching

TABLE 1

Structure of the Survey

Number of:	Hawkesbury Agric. College	University of Queensland	University of Sydney	Total
Students sent questionnaires	34	50	84	168
Respondents				
1972	14	17	31	62
1973	13	31	22	66
1974	—	—	22	22
Total	27	48	75	150
Usable replies	27	48	73	148
Students who experienced				
Lect./Seminars	27	48	73	148
Case Studies	—	48	17	65
CTFMG	27	48	73	148
VFMG	27	—	7	34

methods as a means of appreciating specific components of a farm management course.[14] Respondents were requested to use a five-point scale ranging from one (useless) to five (excellent) for their assessments. The criteria used for the evaluation were selected with the aim of broadly covering the objectives of a farm management course. These criteria are set out in Table 2.

Survey Results

Mean attitudinal scores given by students who experienced each of the teaching methods are given in Table 2. Whilst the table appears to indicate which of the methods is preferred, the absolute values of the means should be viewed with caution. Although the students' attitudes have been quantified using the five-point scale referred to above, attitudes are essentially qualitative. The means have been given merely

TABLE 2

Mean Scores for Students' Attitudes to Various Teaching Methods

Criteria for Evaluation	Mean Scores for Teaching Methods[a]			
	Lectures and Seminars	Farm Case Studies	CTFMG	VFMG
As a student how would you score each of the methods as a means of providing:				
Information about farm management procedures and principles	3·33 (0·96)	3·07 (1·09)	3·11 (1·11)	2·82 (1·18)
Interest in farm management	2·98 (0·95)	3·68 (1·14)	3·92 (0·94)	3·68 (0·96)
Instruction in the *application* of principles and procedures	2·82 (0·89)	3·43 (1·05)	3·60 (1·02)	3·18 (0·92)
Appreciation of how plant and animal husbandry need to be *integrated* in a real-world farming situation	2·46 (0·90)	3·55 (0·87)	3·52 (1·10)	2·94 (1·06)
Awareness of the *complexities* of management	3·10 (0·92)	3·78 (0·99)	3·96 (0·86)	3·10 (0·92)
Appreciation of the value of *good records*	3·20 (1·07)	3·83 (1·11)	3·35 (1·16)	2·68 (1·13)
Understanding about *real-world* farm management problems (e.g. risk, uncertainty and credit)	2·93 (0·99)	3·65) (0·95)	3·62 (1·03)	3·18 (1·12)
Appreciation of the role of *time* in management	2·64 (0·95)	2·92 (0·93)	3·73 (1·06)	3·18 (1·12)
Satisfaction with the farm management course	3·03 (0·95)	3·50 (1·02)	3·62 (0·96)	3·44 (1·03)
Number of students	148	65	148	34

[a] Numbers appearing in parentheses are standard deviations.

[14] There can be substantial differences between self-scored items on effectiveness and results obtained from performance testing.

to indicate relative effectiveness and were not tested for significant differences.

Because of the qualitative nature of the students' responses chi-squared tests were used. Two-way chi-squared tables were constructed to compare attitudinal scores for lectures and seminars with those for each of the farm management games and to compare the CTFMG scores with those for the VFMG and for farm case studies.

To overcome problems of interpersonal comparison, for any one test only the responses from those students who experienced both teaching methods were included. For each of the two teaching methods being compared, responses were distributed between the five attitudinal classifications. These frequency distributions were then used to test the null hypothesis that both populations have the same probability distribution. The chi-squared values are shown in Tables 3 and 4.

TABLE 3

Students' Attitudes to Farm Management Games Compared with Lectures and Seminars—Chi-squared Values[a]

Criteria for Evaluation	Lectures and Seminars compared with	
	CTFMG[b]	VFMG
As a student how would you score each of the methods as a means of providing:		
Information about farm management procedures and principles	3·38 n.s. (3)	4·14 n.s. (2)
Interest in farm management	53·06** (3)	8·94**[c] (1)
Instruction in the *application* of principles and procedures	32·44** (3)	6·78 *[c] (2)
Appreciation of how plant and animal husbandry need to be *integrated* in a real-world farming situation	33·18** (3)	0·52 n.s. (1)
Awareness of the *complexities* of management	41·32** (2)	1·33 n.s. (2)
Appreciation of the value of *good records*	11·06* (4)	7·90 *[d] (1)
Understanding about *real-world* farm management problems (e.g. risk, uncertainty and credit)	35·72** (4)	2·19 n.s. (1)
Appreciation of the role of *time* in management	42·60** (3)	2·19 n.s. (1)
Satisfaction with the farm management course	21·04** (3)	7·38 *[c] (1)
Number of students	148	34

[a] The numbers appearing in parentheses are the degrees of freedom for the chi-squared test.
[b] In all instances in which significant differences occurred, the mean score for the CTFMG was higher than those for lectures and seminars.
[c] Mean score for the VFMG was greater than those for lectures and seminars.
[d] Mean score for the VFMG was less than that for lectures and seminars.
n.s. not significantly different.
* significantly different at 5 per cent level.
** significantly different at 1 per cent level.

TABLE 4

Students' Attitudes to the CTFMG Compared with Farm Case Studies and the VFMG—Chi-squared Values[a]

Criteria for Evaluation	CTFMG compared with	
	Farm Case Studies	VFMG[b]
As a student how would you score each of the methods as a means of providing:		
Information about farm management procedures and principles	1·90 n.s. (2)	3·40 n.s. (3)
Interest in farm management	4·78 n.s. (3)	2·18 n.s. (2)
Instruction in the *application* of principles and procedures	4·06 n.s. (3)	0·54 n.s. (1)
Appreciation of how plant and animal husbandry need to be *integrated* in a real-world farming situation	1·66 n.s. (3)	2·62 n.s. (2)
Awareness of the *complexities* of management	2·16 n.s. (2)	13·60** (1)
Appreciation of the value of *good records*	17·04**[c] (3)	6·28 * (2)
Understanding about *real-world* farm management problems (e.g. risk, uncertainty and credit)	4·08 n.s. (3)	8·92 * (3)
Appreciation of the role of *time* in management	18·74**[d] (2)	6·12 * (2)
Satisfaction with the farm management course	3·88 n.s. (3)	0·14 n.s. (2)
Number of students	65	34

[a] The numbers appearing in parentheses are the degrees of freedom for the chi-squared test.

[b] In all instances in which significant differences occurred, the mean score for the CTFMG was higher than those for the VFMG.

[c] Mean score for the CTFMG was less than that for the case study method.

[d] Mean score for the CTFMG was greater than that for the case study method.

n.s. not significantly different.

* significantly different at 5 per cent level.

** significantly different at 1 per cent level.

As indicated by Table 3, for all criteria except the ability to provide information about farm management procedures and principles, students rated the CTFMG significantly superior to lectures and seminars as a teaching method. The results indicate a favourable attitude on the part of students towards the use of the CTFMG in farm management courses.

The VFMG was rated significantly superior to lectures and seminars as a means of generating interest, understanding the application of farm management procedures and principles, and developing satisfaction with the course. The only other significant difference occurred in the case of the criterion relating to the value of good records for which lectures and seminars were ranked superior. In view of the relative simplicity of the VFMG, these results are as one would expect. Because of the

importance of student interest and motivation in any learning situation, it is noteworthy that both games were ranked significantly superior for developing interest and satisfaction.

The chi-squared values set out in Table 4 indicate that when comparing the CTFMG with farm case studies students were indifferent in their assessments except in their appreciation of the role of time and of the value of good records. The assessment of the role of time is not unexpected because of the essentially static nature of farm case studies compared with the CTFMG. The game involves monthly decisions with immediate feedback of information on such factors as prices, climatic conditions, labour usage, pasture growth and the cash situation. As a means of demonstrating the value of good records, farm case studies rated significantly superior to the CTFMG. This result is due, perhaps, to students playing the CTFMG being provided with manuals supplying most of the technical and economic information necessary to draw up activity budgets and development plans for 'their farm'. However, when preparing farm case studies, students depend on farm records and discussions with the owner or manager to obtain information concerning the farm and consequently appreciate the problems that may arise when farm records are inadequate.

It is noteworthy that the CTFMG was not rated significantly superior to farm case studies as a means of developing interest in farm management and satisfaction with the course. This is somewhat surprising. The result tends to deny the numerous claims regarding the high motivational properties of management games compared with other competitive teaching methods. However, it is not surprising having regard to the way in which the CTFMG is used at the University of Queensland. Of the 65 students comparing these two methods, 48 were from the University of Queensland where the CTFMG and case studies are used in a complementary way. It is possible that these students experienced difficulty in differentiating the methods.

The comparison of the CTFMG attitudinal scores with the VFMG scores showed that the complex game was significantly superior for those criteria relating to complexity of management, farm records, the role of time and real-world farm management problems. However, the students' assessments indicated that the games were equally effective in their ability to demonstrate the application of principles, engender interest in farm management and provide satisfaction with the course. In view of the unsatisfactory computing facilities available to the Hawkesbury students playing the CTFMG, the comparison of the two games may be biased in favour of the VFMG since 27 of the 34 students experiencing both were from Hawkesbury Agricultural College. Notwithstanding, these results are consistent with those of studies of simple and complex business management games which indicate that simple games are as effective as complex games in achieving some educational objectives.[15]

Lecturer's Impressions

After four years' experience with farm management games at the University of Sydney, the author is of the opinion that farm management games do have a place in farm management teaching. Games are

[15] See Raia, *op. cit.*, pp. 345-349.

complementary to lectures and case studies; integrated farm management courses can be developed using various combinations of the three teaching methods. Potential users of the games need to consider carefully whether their teaching objectives require the use of farm games and, if so, what game to use.

As discussed previously, the dynamic nature of games is one of the basic differences between farm case studies and farm management games such as the CTFMG. This dynamic aspect of games is of benefit in that it allows students' appreciation of the managerial process to be extended beyond the initial planning stage to include implementation and subsequent adjustment. Whilst farm case studies are useful in developing an appreciation of the managerial process, they are capable of demonstrating only a part of the managerial function.[16] Using games, students observe the results of their planning and have an opportunity to adjust their plans as the environment changes over time. As Longworth has pointed out,[17] an important contribution of gaming is that it provides students with experience in the use of 'feedback' in a dynamic environment.

Experience in the use of games tends to substantiate claims that games are useful in stimulating student interest. Although initially students may not appreciate the value of analytical techniques, in planning the 'game farm' they are confronted by a number of complex decisions and become aware of the need for decision-making aids. Such changes in attitude are also noticeable where institutional concepts, for example taxation and farm accounting, are taught. Though students often find these dull, experience with the CTFMG has shown that the game provides a framework within which these concepts are more readily assimilated because of student interest and identification with 'their farm'.

Farm management games are of further benefit in teaching because they provide a useful medium for integrating different parts of a farm management course and for illustrating practical problems associated with risk, uncertainty and liquidity. They also contribute to the effectiveness of other teaching methods. In providing a source of examples and information to illustrate principles in lectures, games help to reduce the degree of abstraction of the farm management course.

However, against these advantages of gaming must be weighed some disadvantages:

(1) Some games involve heavy time commitments for both students and staff.[18]

(2) A computer-based game such as the CTFMG may be expensive to run. Computing costs will vary, however, depending on whether institutional or commercial facilities are used.[19]

[16] The limitations of case studies *vis-a-vis* management games are demonstrated in Longworth, J. W., 'Management Games and the Teaching of Farm Management', *Australian Journal of Agricultural Economics*, Vol. 13, No. 1 (June, 1969), p. 66, Fig. 1.

[17] *Ibid.*, p. 67.

[18] For a comparison of the time needed by both students and staff to run various farm management games see Lindner, *op. cit.*, pp. 31-34.

[19] *Ibid.*

(3) A problem with any management game is how closely should it approximate the real-world environment. Because the CTFMG is a complex game bearing a close resemblance to reality, some of the students with a practical farming background tend to forget that the game is an abstraction. These students may become frustrated when the results of their decisions differ from their expectations based on experience. This is so despite exhortations to 'play the game and not the world'.[20] This problem, which is likely to arise with any complex simulation model, does not occur with simpler games such as the VFMG.

(4) As indicated by Boehlje *et al.*,[21] the benefits of gaming can be lost if the game places emphasis on repetitive calculations rather than on management. This will also be the situation if students, because they experience difficulty in understanding the rules of the game, direct their efforts towards 'how to play the game' rather than management of their farm. Experience suggests this problem can be overcome by a trial run to familiarize students with the rules of the game itself.

Some of the above disadvantages are more applicable to complex games than to simple games. Thus the choice of which game to use is significant. Because complex games such as the CTFMG can be used to demonstrate a wider range of management functions they may be preferred to simple games in spite of the problems associated with their successful implementation.

Conclusion

Although the results of the student survey are not sufficient to establish clearly the superiority of any one of the methods, they do show that there are significant differences in students' attitudes to the methods for teaching particular aspects of farm management. However, the results must be regarded as tentative. The population was restricted both in the number of students and in the number of teaching institutions. In addition, the results are subjective evaluations of students and as such may merely reflect the students' enjoyment of games as a novel and competitive approach to learning. Further research needs to be directed towards the educational value of farm management games.

[20] Kuehn, A. A. and Day, R. L., 'Simulation and Operational Gaming' in Alderson, W. and Shapiro, S. J. (eds.), *Marketing and the Computer* (Englewood Cliffs: Prentice-Hall Inc., 1963), p. 238.

[21] Boehlje, M., Eidman, V., and Walker, O., 'An Approach to Farm Management Education', *American Journal of Agricultural Economics*, Vol. 55, No. 2 (May, 1973), p. 193.