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LEARNING STRATEGY AND LEARNER CHARACTERISTIC VARIABLES RELATED TO ACHIEVEMENT IN AGRICULTURE COURSES DELIVERED BY VIDEOTAPE

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Abstract

There is a paucity of research involving factors related to student achievement in agriculture courses taught at a distance. Such research is needed to he&professors and advisors become more effective in their work with distant learners. The purpose of this descriptive study was to predict student achievement in college of agriculture videotaped courses using learner characteristic and learning strategy variables. The error in predicting student achievement in agriculture courses delivered by videotape can be significantly reduced by consideringfour learning strategy variables and one learner characteristic variable. Students who earned higher grades in videotaped courses spent less total time studying, spent more time viewing the videotape, were more likely to use study methods other than those identified on the questionnaire, were more likely to view the videotapes as they were received, and were more field-independent. Recommendationsfocus on how professors and academic advisors could use the results in advising students of how best to approach the learning task in videotaped courses.

Introduction

Distance education in various forms has become increasingly effective in providing access to educational opportunities. Brown and Brown (1994) noted that during the last decade of this century a shift from an institution-based system of learning to a more open and flexible system will occur. A demand for more open systems of learning in agriculture exists. Miller and Honeyman (1993) discovered that adult learners enrolled in the Iowa State University College of Agriculture off-campus degree program were strongly positive about the program and viewed it as a valid means of meeting educational needs. One student in their study commented "I am so happy that these programs are being offered as I have no other way at this time to further my education"(p. 90).

Thus far, more emphasis in distance education has been placed on teaching and content as opposed to learners and learning (Wolcott, 1991; Miller & Carr, 1997). What do we know about student success in distance learning courses? Moore and Kearsley (1996) suggested that factors related to student success in distance education had been well studied. Moore et al's definition of success was whether students complete programs. Program completion is clearly an important measure of success, but other measures of success including student achievement in specific distance learning environments are also important. Little research has been conducted to determine what factors might be useful in predicting achievement in courses delivered by specific distance education technologies.

Threlkeld and Brozoska (1993) suggested that individual learner differences may be important determiners of how students respond to instruction. Threlkeld et al. described successful adult distant learners as mature, highly motivated, flexible and self-disciplined. They also noted that students with a field-independent learning style were more likely to experience success in distance learning programs. Threlkeld et al. warn us that developing an illusionary typical distant learner is dangerous considering the diversity of persons served. Describing successful distance learners within the context of a specific distance delivery medium such as videotape may be more valuable

(Moore et al., 1996).

Can distant learners apply strategies that will enhance their likelihood of success in distance learning courses? According to Fellenz (1989), providing instruction in appropriate learning strategies can improve student achievement. This instruction has included such topics as note taking, time management and study skills in addition to metacognitive and memory strategies.

What can we tell agricultural distance learners about strategies for success in videotaped courses? Miller (1995) identified learning strategies that graduates of an off-campus agricultural degree program had found useful in learning from videotape, but acknowledged that more research was needed to determine what strategies were most effective. Miller (1997) investigated learning strategies and their association with cognitive style in agricultural videotaped courses. In this study, Miller discovered that students relied heavily on the videotape to study, studied independently, completed reading assignments, and studied their notes to learn. Miller also found that students were consistent in their approach to learning from videotape and that field-dependent and field-independent students approached the task of learning in videotaped classes in much the same way. While Miller's research helps us to understand how students approach the task of learning in videotaped courses, it offers limited guidance in determining what strategies lead to greater achievement of intended learning outcomes.

There is a paucity of research involving factors related to achievement in agriculture courses taught at a distance. Such research is needed to help professors and advisors in their work with distant learners. Ultimately, this information would sensitize professors to the needs of students and would be useful for students in selecting more effective and efficient learning strategies.

Purpose and Objectives

The purpose of this descriptive study was to predict student achievement in college of agriculture videotaped courses. The objectives of the study were as follows:

1. Compare characteristics of learners who earned As with those who earned grades lower than A in college of agriculture videotaped courses.

2. Compare learning strategies of students who earned As with those who earned grades lower than A in college of agriculture videotaped courses.

3. Determine whether a linear combination of learner characteristic and learning strategy variables could be used to predict whether students earned a grade of A in college of agriculture videotaped courses.

Procedures

The population (n=143) consisted of all students who received a grade in one or more of eight agriculture courses delivered through videotape during Spring and Fall Semesters of 1995 at a Midwestern land-grant university. Courses in agronomy (3), agricultural systems technology, animal science, animal ecology, sociology, and biochemistry were offered.

A learning strategies for videotaped instruction instrument was developed by the researcher. Items included in this instrument were composed after reviewing literature on learning strategies, interviewing faculty and staff to record their observations of strategies used by agricultural distance learners, and asking agricultural distance learners about their experiences with videotaped courses. The instrument sought both quantitative and qualitative data about the learning activities of distant learners. Content and face validity were established by a panel of experts in agricultural

education, and the instrument was field-tested for suitability with a group of 10 students who had formerly enrolled in videotaped courses through the off-campus program. The instrument required students to record data related to their learning activities over a seven-day period.

The scale for assessing attitudes toward videotaped instruction consisted of 11 Likert-type items with response categories ranging from strongly disagree (1) to strongly agree (5). The instrument was previously developed and validated by Miller and Honeyman (1993). The Cronbach's alpha reliability coefficient for the attitudinal instrument was .86.

The Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin, & Karp, 1971) was used to determine the preferred learning style of the distant learners. The GEFT is a standardized instrument with a reliability estimate of .82. Also, concurrent validity with the Embedded Figures test was .82 for males and .63 for females. Higher scores on the GEFT are associated with the field-independent learning style while lower scores are associated with the field-dependent learning style.

Identical data collection procedures were used for both Spring and Fall Semesters. Learning strategies and attitude toward videotaped instruction data were collected by mailed questionnaire. One complete follow-up of non-respondents was completed by mail five weeks after the initial mailing. A total of 117 (81.8%) students completed the learning strategies and attitude toward videotaped instruction instruments. The GEFT was administered by proctors during a regularly scheduled examination. A letter was sent to all students included in the population approximately one week before the GEFT was administered to explain the purpose of the study and to encourage their participation. Ninety-two (64.3%) students completed the GEFT. Student grades were obtained from official university records.

All data were analyzed with the SPSS personal computer program. Appropriate statistics for description (frequencies, percentages, means, standard deviations) were used. In addition, step-wise discriminant analysis was used to determine whether a linear combination of learner characteristic and learning strategy variables could be used to predict whether students earned a grade of A in college of agriculture videotaped courses. Due to the early stages of this line of inquiry, a significance level of .10 was used as the variable selection criteria for the discriminant analysis. Dummy coding was used to facilitate the inclusion of nominal scaled variables in the discriminant analysis.

Results

Student grades in eight college of agriculture videotaped courses ranged from A to F. A majority (52.4%) of students earned an A while an additional 9.1% of students earned an A-. The distribution of student grades was strongly skewed in a positive direction (Table 1). For purposes of comparison, students were placed in one of two grade groups. One group included students who

Table 1. Student grades in videotaped courses

Grade	f	%	cum. %
A	75	52.4	52.4
A-	13	9.1	61.5
B+	15	10.5	72.0
B	14	9.8	81.8
B-	12	8.4	90.2
C+	5	3.5	93.7
C	5	3.5	97.2
C-	1	.7	97.9
D+	1	.7	98.6
F	2	1.4	100.0
	143	100.0	

earned a grade of A, the other was made up of students who earned grades lower than A.

Tables 2 and 3 compare the demographics of students who earned grades of A with those of students who earned grades lower than A. Students who earned As were more likely to be older, male, employed in agriculture related occupations, and possess a more positive attitude toward videotaped instruction. Students who earned As had taken more videotaped courses and scored higher on the GEFT.

Tables 4 and 5 compare learning strategies for students who earned grades of A and grades less than A. Regarding tape usage, students who earned a grade of A were more likely to view the tape as received, view the tape in segments,

Table 2. Comparison of learner characteristics for students who earned grades of A and grades less than A

Learner Characteristics	Grade of A f	Grade of A %	Grade less than A f	Grade less than A %
Gender				
Male	63	84.0	47	70.1
Female	12	16.0	20	29.9
Occupation				
Farming	22	33.3	16	25.8
Agribusiness	19	28.8	16	25.8
Agricultural Extension	3	4.5	1	1.6
Agricultural Education	5	7.6	4	6.5
Other	17	25.7	25	40.3

Table 3. Comparison of learner characteristics for students who earned grades of A and grades less than A

Learner Characteristics	Grade of A Mean	Grade of A SD	Grade of A n	Grade less than A Mean	Grade less than A SD	Grade less than A n
Age	35.92	7.77	72	33.74	9.34	65
GEFT Score	13.98	3.41	51	**10.51**	**4.90**	**41**
Attitude toward videotape instruction	3.88	.29	60	3.74	.33	57
Number of videotaped courses taken	3.08	3.47	59	2.65	3.10	55

Table 4. Comparison of learning strategies for students who earned wades of A and grades less than A

Learning Strategies	Grade of A f	Grade of A %	Grade less than A f	Grade less than A %
Tape Use				
Viewing schedule				
View as received	**6**	10.0	1	**1.8**
View at preset time				
As schedule permits				
Viewed tape in segments				
Took notes				
Viewed tape more than once				
Pause the tape				
Study Methods				
Read class notes				
Read assigned reading				
Viewed videotaped lessons				
Studied with one other person				
Studied with a group				
Used "other" study methods	**8**	**13.3**	**2**	**3.5**

				Mean	SD	n
Tape viewing time[a]	136.08	40.34	60	118.42	45.38	57
Percent of time spent studying with others	2.28	8.04	60	3.77	11.39	57
Total study time"	266.33	211.19	60	298.09	171.57	55
Number of calls to the instructor	.28	.58	60	.19	.48	57

"Time in minutes

take notes, view the tape more than once and pause the tape while viewing. As for study methods, students who earned As were more likely to read assigned readings, view the videotaped lesson, and use "other" study methods. Students who earned As, on average, spent more time

viewing the videotaped lessons, spent a smaller proportion of their time studying with others, spent less total time studying, and called the instructor more frequently.

Due to missing data on the discriminating variables, only sixty-four cases were used in the step-wise discriminant analysis procedure. The procedure yielded a set of five discriminating variables from the 21 learner characteristic and learning strategy variables included in the study. The mean discriminant score (centroid) for students who earned a grade of A was significantly different from the mean discriminant score for students who earned a grade less than A (Wilks' Lambda = .59, Chi-square (5 df) = 3 1.32, p < . 10). Further evidence of the discriminating power of the discriminant function is provided. The eigenvalue was .69 and the canonical correlation was .64 (Table 6).

The most distinguishing characteristics of students who earned As in videotaped courses when compared with students earning grades less than A can be determined by examining the standardized discriminant function coefficients (Table 6). Results show that students who earned As spent less total time studying, spent more time viewing the videotape, scored higher on the GEFT, were more likely to use study methods other than those identified on the questionnaire, and were more likely to view the videotapes as they were received.

A mean substitution for missing data was used to facilitate the classification of all cases from the population. This procedure resulted in a more conservative estimate of the function's ability to classify cases into grade groups. Discriminant functions are more accurate in classifying cases from the sample used to develop the function than they are in classifying cases from the entire population (Hair, Anderson, & Tatham, 1987). The discriminant function resulted in an overall correct classification rate of 74.1% (Table 7). Students who earned As were correctly classified 84.0% of the time while students who earned grades less than A were correctly classified 63.2% of the time. Random assignment of students to grade groups would result in correct classification 50% of the time. Classification of students using the five discriminating variables resulted in 48.3% fewer errors than would be expected from random classification (tau = .48). To classify all students, a mean substitution was used for missing data.

Table 6. Summary data from the discriminant analysis procedure

Variables	b	s	Group	Centroids
Total study time	-.91	-.45	Grade of A	.72
Tape viewing time	.84	.19	Grade less than A	-.93
Learning style	.61	.44		
Used "other" study methods	.41	.21		
Viewed tapes as received	.36	.21		

Eiaenvalue	R_c	Wilks' Lambda	p
.69	.64	.59	<.10

Note. b = Standardized discriminant function coefficient; s = Within - groups structure coefficient; R_c = Canonical correlation coefficient

Table 7. Classification of cases

Actual Croup	Number of Cases	Predicted Group: Grade of A	Predicted Group: Grade less than A
Grade of A	75	63 84.0%	12 16.0%
Grade less than A	68	25 36.8%	43 63.2%

Percent of cases correctly classified: 74.13%

Conclusions and Recommendations

The error in predicting student achievement in agriculture courses delivered by videotape can be significantly reduced by considering four learning strategy variables and one learner characteristic variable. Students who earned higher grades in videotaped courses spent less total time studying, spent more time viewing the videotape, were more likely to use study methods other than those identified on the questionnaire, were more likely to view the videotapes as they were received, and were more field-independent. Professors and academic advisors should use this information in advising students of how best to approach the learning task in videotaped courses.

Surprisingly, students who spent less total time studying were more likely to earn an A in their videotaped course. What a student does with their study time may be more important than the total amount of time spent studying. Students who spent more of their study time viewing the videotaped lessons were more likely to get As. Perhaps instructors present key information in their videotaped lectures and evaluate students on how well they understand this information on exams. Students should be advised to use the videotapes as a primary study tool in videotaped courses. How might students productively spend additional time viewing the videotape? Miller (1995) concluded that graduates of an off-campus agricultural degree program had learned to view tapes in segments, pause the tape to think or take notes, and to view the tape more than once to reinforce learning. Students who earned As in this study were more likely to use these strategies than students who earned grades less than A.

Students who used learning strategies not identified in the questionnaire were more likely to earn an A. Therefore it was concluded that students with a larger repertoire of learning strategies were more successful in videotaped courses. Professors and advisors should encourage students to use a variety of approaches for learning from videotape. Various learning strategies should be identified and shared with students, but professors and advisors should not promote the idea that there is a generalized list of good strategies for all occasions. Prescriptive how to advice lacks sensitivity to individual differences in learners (Taylor, 1984).

Students who viewed the videotapes as they were received were more likely to earn As than students who put off viewing the tape until a predetermined time or viewed them as their schedule would allow. This activity is the distance education equivalent of going to class. Advisors should encourage students to view their tapes as they are received (go to class). Research has

shown that students who submit their first assignment on time are more likely to complete a distance education course successfully (Moore et al., 1996). Professors may be able to encourage students to engage themselves early in the course by requiring students to complete assignments that require them to view the videotape. Students should be required to complete the assignments within a specific period of time. Such assignments should begin early in the course. This imposition of structure onto a learning environment noted for learner independence and self-direction may be especially helpful to field-dependent learners who were significantly less likely to earn an A. Professors should not assume that all adults are equally capable of self-directed learning (Joughin, 1991).

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