Conclusions

Conclusions are based on interpretations of the data presented. Most international students in agriculture and forestry have no prior microcomputer experience. Microcomputer literacy should not be assumed with BS, MS or Ph.D. degrees. While most students use microcomputers, a majority have received little or no microcomputer instruction at West Virginia University. Lack of time, lack of microcomputer facilities, and limited operating hours at available facilities are factors prohibiting increased knowledge and utilization of microcomputers.

Half of the international students in the College are beginners or non-users of microcomputers. Most students plan to return to their country after completing their studies and most will have access to microcomputers. Importance of being able to perform the microcomputer skills is rated higher by students than their actual abilities to perform those skills. Consequently, there is an educational need for every microcomputer skill investigated. The greatest education need exist for the spreadsheet, statistics and "other" (communication, programming, and presentation) skill categories.

Recommendations

The following recommendations are based on the results of this study.

1. The microcomputer competencies of international students enrolling in the College should be discerned as early as possible. This should be done either by requesting the necessary information during the application process, or immediately after enrollment in the University. Workshops or seminars should be provided to students having no previous microcomputer experience before classes begin, or incorporated into the student's first semester of classes.

2. Each Division should advise international students of locations and operating hours of microcomputer facilities within the College, and should investigate the feasibility of expanding facilities and/or extending hours of operation.

3. Education needs were found to exist for every microcomputer skill investigated in this study. Educational and instructional activities should be expanded or intensified in all areas of microcomputer application, with an emphasis placed on spreadsheets, statistics, communication, programming and presentation skills.

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Faculty Assessments Of Video Technology

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Abstract

This article summarizes the results of a video technology survey in the College of Agricultural and Environmental Sciences at the University of Georgia. Faculty perceptions and use of alternative video systems are presented. Impacts of video technology on faculty activities and productivity are examined. Faculty adoption of video technology are described in a human capital framework. The study found that enhanced video technology would increase faculty productivity, involve more faculty in teaching activities, reduce travel time and costs, and improve communications within the college. Strategies for developing enhanced video communications are discussed.

Colleges of Agriculture are experiencing a revolution in instructional technology, unprecedented in the history of higher education. The arrival of *user-friendly* microcomputer, video, and communication technology has converted the traditional classroom to a multi-media environment for instruction and learning. Teaching techniques, once limited to lectures and chalk boards have given way to interactive microcomputer, video and communications technology. This technology has enabled teachers to transcend the traditional bounds of the classroom and use materials, exercises, and specialists, far removed from the classroom.

Despite its potential, the adoption of new instructional technology is not taken for granted. That is, the availability of new technology alone is necessary but not sufficient for its adoption. The adoption of new technology depends on the relative costs and benefits of the technology. In a world of imperfect knowledge and foresight, the assessment of costs and benefits is a subjective process, dependent upon faculty perceptions and opinions. Since the adoption of instructional technology requires that teachers be willing participants in the process, their perceptions and judgements are central to the adoption process.

Recent articles in this *NACTA Journal* emphasize the growing potential of instructional technology, in general, and video technology, in particular. The use of video in

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Special thanks to the following members of the Video Steering Committee for their contributions to the survey: David Beasley, Kris Braman, Miguel Cabrera, Randall Cofer, Rick Jones, Bob Molleur, David Pope, John Ruter, Charles Santerre, and Glenn Ware

improving communications skills was examined by Cox and Martin. Techniques for providing feedback to students in livestock judging were described by Eversole. Lawrence, et al., developed interactive instruction in horse management. Outreach programs to distant learners were examined by Goetsch and Cunningham; Drinka, et al. These articles illustrate some excellent applications of video technology to specific courses or programs. The large-scale adoption of these and other video applications will depend upon faculty perceptions of video technology its impact on faculty productivity.

This article provides a comprehensive assessment of video technology by faculty in the College of Agricultural and Environmental Sciences at the University of Georgia. Specifically, the objectives of this article are to:

1. describe current and projected video use by college faculty,
2. summarize faculty rankings of existing video technology,
3. assess the impacts of video technology on faculty activities and productivity, and
4. discuss plans for developing enhanced video communications systems

This research was motivated by a need to assess the potential of video technology for improved instruction and communication in colleges of agriculture. The potential for video technology to help colleges deliver more effective and less costly programs is an issue of prime concern to students, faculty, and administrators.

Conceptual Framework

The adoption of video technology for college instruction can be analyzed in a human capital framework (Peterson). Teaching activities involve combinations of human and non-human capital. Human capital is investments in skills and knowledge that increase the productive capacity of the individual. Non-human or physical capital refers to tools, machines, and equipment that also increase the productivity of individuals. Individuals forego current consumption to invest in human and physical capital when the expected benefits of these investments exceed their cost. Human and physical capital are interdependent. Investment in human capital is often a prerequisite for development and adoption of physical capital. Therefore, the adoption of physical capital is affected by the attitudes and abilities of would-be adopters. Assessments of relative costs and benefits are a deciding factor in the adoption of new technology. In this context, faculty assessments of video technology are critical to its wide-scale adoption in colleges of agriculture.

Colleges of agriculture at land-grant universities have a tripartite mission of instruction, research, and extension. Given this mission, college teaching was broadly defined in this paper to include:

1. traditional on-campus classroom instruction,
2. non-traditional off-site instruction through "outreach" programs,
3. incorporating off-site specialists and materials through "in-reach" programs, and
4. post-graduate education, training, and professional development.

The adoption and integration of a college-wide video/communications system require the support and cooperation among all faculty. Therefore, this study was not limited to faculty with classroom teaching appointments. As potential contributors and participants in classroom instruction, research and extension faculty and their assessments of video technology are an integral part of this study.

Data and Methods

In the fall of 1990, the dean appointed an ad-hoc steering committee to examine the use of video technology in the University of Georgia's College of Agricultural and Environmental Sciences. This Committee designed and administered a video technology survey to 462 teaching, research, and extension faculty in the college, located on the main campus and on various experiment stations across the State. One hundred-fifty seven (157) usable questionnaires were returned for a response rate of 34 percent. The following analysis is based on these survey data.

Survey results are presented by faculty appointment to identify how faculty assessments of video technology differ by faculty appointment. More importantly, how video technology might affect the faculty's participation in the college's teaching programs. Mean differences across faculty groups were tested using Students t-statistics. These tests compare an individual faculty group with all other groups. Research and extension faculty were defined as those who have appointments of greater than fifty percent. Since few faculty had teaching appointments of over fifty percent, teaching faculty were defined as having teaching appointments of greater than thirty percent.

Use of Video Technology

Table 1. Faculty Use of Video Technology by Faculty Appointment, 1991

Characteristic	Faculty Appointment[a] Instruction	Research	Extension
Number of observations	31	65	67
Frequency of participation:		percent[b]	
Live video presentation	78.22	44.23	39.29
Taped presentation	95.94	65.45	68.97
Used video tapes in presentation	90.77	47.06	83.33
Produced video tapes	66.67	24.49	41.48
Satisfaction of using video technology:		mean[c]	
Teaching	2.86**	2.61**	3.11**
Committee meetings	2.40	2.11**	2.59*
Extension conferences	2.54	2.22***	3.05**
Seminars	2.96	2.57**	2.94
Student/agent training	2.70	2.47***	3.16***
Hours using video technology	38.61	21.10***	45.36*

[a] >30% Instruction, >50% Research, and >50% Extension, respectively.
[b] Percentage of faculty who have used these technologies
[c] Where 4 = satisfied and 1 = dissatisfied. Some means based on fewer observations due to missing data.
Asterisks indicate that means are significantly different from all others at alpha level = 0.10 (*), 0.05 (**), and 0.01 (***) using Student ttests.

Faculty were asked to report how much they used video technology and how satisfied they were with this technology. These data are summarized in Table 1. These data suggest that extension faculty were the most frequent users of video technology, followed by teaching faculty, then research faculty. The video technology of choice by teaching faculty was video tape presentations. The use of live video presentations was the least common among teaching faculty who lagged behind other faculty in the use of this technology. Teaching faculty expressed the greatest satisfaction with using video technology for seminars, followed by teaching, and lastly by committee meetings.

Importance of Video Technology

Faculty were asked to rank the importance of video activities, the results of which are shown in Table 2. For most applications, teachers ranked video activities as more important than that reported by their faculty counterparts. Teachers also ranked non-interactive video as more important than interactive video. Teachers felt the most important uses of video were for extension conferences, followed by seminars, committee meetings and lastly, for teaching. Surprisingly, teaching and research faculty felt that video applications for extension activities were more important than that reported by extension faculty.

Table 2. Ranking the Importance of Video Activities by Faculty Appointment, 1991

Characteristic	Faculty Appointment		
	Instruction	Research	Extension
	mean rank*		
Interactive teaching	2.81	2.86	3.07
Noninteractive teaching	2.86	3.31	3.40
Interactive video committee meeting	3.50**	2.74	2.91
Agent/client training	3.75**	3.54***	2.20***
Interactive extension conference with video	4.62***	3.43	3.74***
Noninteractive extension conference with video	5.20***	4.05	3.48***
Interactive seminar/ conference with video	3.56***	2.81	2.79
Noninteractive seminars/ conference with video	3.81*	3.37	3.40

* Based on a scale of 1 to 5, where 1 = most important and 5 = least important. Some means based on fewer observations due to missing data.

Asterisks indicate that means are significantly different from all others at alpha level = 0.10 (*), 0.05 (**), and 0.01 (***) using Student t-tests

Next, faculty were asked to report their projected use of video technology in the next six months and two years (Table 3). Teachers anticipated the greatest use of video for non-interactive teaching, followed by interactive teaching, with interactive committee meetings, a distant third. Researchers anticipated using video most often for interactive committee meetings. Extension anticipated using video most often for agent/client training sessions.

Effects of Video Technology

Faculty were asked to assess the potential impacts of video technology on various programs and activities in the college, the results of which are shown in Table 4. Faculty evaluations were measured using a Likert scale where respondents report the extent to which they agree or disagree with statements shown in Table 4. All faculty groups felt that the quality and quantity of class presentations could be

Table 3. Projected Frequency of Using Video Technology by Faculty Appointment, 1991

Characteristic	Faculty Appointment		
	Instruction	Research	Extension
	mean rank*		
Interactive teaching:			
Next six months	4.45	2.91	2.20
Next two years	12.27	8.06	7.10
Noninteractive teaching:			
Next six months	7.37	1.48*	5.47
Next two years	24.36**	5.32	7.74
Interactive video committee meetings:			
Next six months	1.50	3.10	2.18
Next two years	4.74	9.66	5.82
Agent/client training:			
Next six months	1.08	0.75	5.15*
Next two years	3.58	2.39**	10.67***
Interactive Extension conferences with video:			
Next six months	0.00**	0.35**	1.25***
Next two months	0.00**	1.43*	3.56***
Noninteractive Extension conferences with video:			
Next six months	0.54	0.27**	1.00***
Next two years	1.00	1.20	2.47***
Interactive seminars/conferences with video:			
Next six months	0.80	1.18	1.23
Next two years	1.94	3.91	3.67
Noninteractive seminars/conferences with video			
Next six months	1.00	0.84	3.88
Next two years	2.72	2.44	5.28

* Asterisks indicate that means are significantly different from all others at alpha level = 0.10 (*), 0.05 (**), and 0.01 (***) using Student t-tests.

Some means based on fewer observations due to missing data

Table 4. Evaluating the Effects of Video Technology by Faculty Appointment, 1991

Characteristic	Faculty Appointment		
	Instruction	Research	Extension
Video technology could improve or increase the following:	mean*		
Quality of class presentations	7.32	6.18***	7.41
Quantity of class presentations	6.29	6.17	6.83
Quality of agent training	5.33**	5.50***	7.53***
Quantity of agent training	5.55	5.53**	6.89**
Some statewide committee meetings and other academic functions could be successfully conducted by:			
Interactive video	6.84	7.35	7.62
Noninteractive video	4.68	4.67**	5.83**
Routine administrative broadcasts would:			
Improve the communication and operation of the College	5.59**	5.87**	7.27***
Lead to better relationships within divisions	6.00	5.57**	6.65**
Lead to better relationships across divisions	5.93	5.48***	6.94***
The level of video technology used by the College is adequate	3.96	3.58	3.40
The College should improve its video instruction and communications capability	7.45*	7.66**	8.67**

* Based upon a Likert scale of 1 to 10, where 10 = strongly agree and 1 = strongly disagree. Some means based on fewer observations due to missing data.

Asterisks indicate that means are significantly different from all others at alpha level = 0.10 (*), 0.05 (**), and 0.01 (***) using Student t-tests.

Table 5. Professional Activities by Faculty Appointment, 1991

Characteristic	Faculty Appointment Instruction	Research	Extension
Number per year:		mean*	
Class presentations	129.27***	43.55	12.11***
Agent training presentations	2.35	0.50***	10.12***
Extension conferences	1.90	1.17***	8.63***
Professional seminars	13.14*	13.41***	6.03***
Trips in 1990:			
In-state (number)	8.15***	11.60***	51.55***
In-state expenses ($)	638.46***	607.04***	3154.96***
Out-of-state (number)	3.11	3.18	3.40
Out-of-state expenses ($)	1988.89	2355.28**	1277.51***

* Asterisks indicate that means are significantly different from all others at alpha level = 0.10 (*), 0.05 (**), and 0.01 (***) using Student t-tests. Some means based on fewer observations due to missing data.

improved with video technology. Teaching faculty felt that video technology would have a greater impact on class presentations than on agent training, a view not shared by extension faculty. Extension faculty were the most positive about conducting state-wide committee meetings by video. Teaching faculty were less optimistic about such prospects. Extension faculty were the most optimistic about the prospects that video technology could improve communications and operations of the College. Extension faculty also felt that video technology would lead to better relationships within and across divisions. All faculty groups felt that the level of video technology used by the College was inadequate and that the College should improve its video instruction and communications capability.

Faculty were asked how video technology would affect them personally. That is, how video technology would affect their participation in professional activities and productivity. First, to establish a base, faculty were asked to report their level of participation in various activities during the past year (Table 5). Teaching faculty reported making an average of 129 class presentations and 2.35 agent-training presentations. Teachers also reported having attended an

Table 6. Effects of Video Technology on Activities by Faculty Appointment 1991

Characteristic	Faculty Appointment Instruction	Research	Extension
Percent change in:		mean*	
Class attendance	6.30	2.16**	6.69
Class presentations	8.89	19.44	7.11
Training sessions attended	4.44	6.22	5.09
Training sessions presented	5.00	8.22	10.00
Extension conferences	3.53	4.88	5.71
Professional seminars	12.69	16.78**	8.95*
Teaching productivity	17.41	23.92	13.75
Extension productivity	4.28**	4.21***	17.72***
Research productivity	6.36	10.00**	3.95*
In-state trips per year	-8.80	-9.32	-13.39
Out-of-state trips per year	-1.25	0.50	2.03
In-state travel expenses	-10.42	-10.88	-15.08
Out-of-state travel expenses	-1.74	-0.69*	-2.76

a Percentage increase or decrease in level of activity. Some means based on fewer observations due to missing data.

Asterisks indicate that means are significantly different from all others at alpha level = 0.10 (*), 0.05 (**), and 0.01 (***) using Student t-tests.

Table 7. Effects of Video Technology on Mean Number of Activities and Travel Expenses by Faculty Appointment 1991.

Characteristic	Faculty Appointment Instruction	Research	Extension
Change in mean number of:		mean*	
Classes attended	5.35***	0.13**	0.98
Class presentations	16.73**	0.93	0.84
Training sessions attended	0.00	0.01	0.28
Training sessions presented	0.75	0.09*	0.91
Extension conferences	0.08	0.14	0.34
Professional seminars	1.30	2.01***	0.41**
In-state trips per year	-1.10	-1.64*	-7.14**
Out-of-state trips per year	-0.02	0.01**	-0.72
In-state travel expenses ($)	-122.04	-66.33**	-505.33***
Out-of-state travel expenses ($)	-3.40	-1.80*	-40.00

* Increase or decrease in mean number of activities or expenses. Some means based on fewer observations due to missing data.

Asterisks indicate that means are significantly different from all others at alpha level = 0.10 (*), 0.05 (**), and 0.01 (***) using Student t-tests.

average of 13 professional seminars and 2 extension conferences. During this period, teachers averaged 8 in-state trips at a cost of $638 and 3 out-state trips at a cost of $1989. As expected, extension faculty logged the highest number of in-state trips and expenses, while researchers incurred the highest out-state expenses.

Next, faculty were asked to report, in percentage terms, how video technology would increase or decrease their participation and productivity. Percentage changes in faculty activities are reported in Table 6. Teachers reported that video technology would increase their class attendance by 6.3 percent, class presentations by 8.9 percent, and professional seminars by 12.7 percent. Teachers expected a 17.4 percent increase in their teaching productivity, a 6.4 percent increase in research productivity and a 4.3 percent increase in their extension productivity. With respect to faculty travel, all faculty groups reported that video technology could be used to reduce in-state and out-state travel and expenses. The largest savings in travel expenses were reported by extension faculty.

Percentage changes shown in Table 6 were combined with the number of activities shown in Table 5 to compute

Table 8. Estimated Effects of Video Technology on Total Activities and Travel Expenses by Faculty Appointment 1991.

Characteristic	Faculty Appointment* Instruction/Research	Extension
Number of observations	90	67
Total population	291	171
Change in total number of:	total*	
Classes attended	497.61	167.58
Class presentations	1871.13	143.64
Training sessions attended	8.73	47.88
Training sessions presented	26.19	155.61
Extension conferences	32.01	58.14
Professional seminars	506.34	70.11
In-state trips per year	-323.01	-1220.94
Out-of-state trips per year	-2.91	-123.12
In-state travel expenses ($)	-18,271.89	-107,464.95
Out-of-state travel expenses ($)	-1,862.40	-6,840.00

* >30% Instruction or >50% Research and >50% Extension.

* Increase or decrease in total number of activities or expenses. Mean per faculty multiplied by total population in faculty group.

changes in the number of activities (Table 7). With the help of video technology teachers expected to attend five additional classes, make seventeen additional class presentations, forego one in-state trip, and save $122 in the process. Researchers expect only modest changes in class participation and travel expenses and see video technology as a means to increase their participation in professional seminars. Major changes for extension faculty are expected in reduced travel time and costs.

College-wide Impacts

Changes in individual faculty activities were used to estimate the college-wide impacts of video technology. The results in Table 8 were computed by multiplying the average change in number of activities shown in Table 7 by the total number of faculty. Since the data did not identify researchers and teachers among non respondents, these groups were combined for college-wide estimates. The impacts of video technology on the college as a whole were substantial. Video technology would enable research/teaching faculty to attend an additional 498 classes; extension faculty, an additional 168 classes, for a total increase of 666 classes. The potential for increases in class presentations was even greater. Video-related increases in class presentations were 1871 for teaching/research faculty and 144 by extension faculty. The potential for incorporating class presentations from faculty professionals at off-campus locations, is a major benefit of video technology.

As expected, teacher involvement in extension training session and conferences will not increase greatly with video technology. However, video technology is expected to increase faculty participation in professional seminars. Video technology also will lead to substantial reductions in travel and travel expenses. Teaching/research faculty are expected to save 323 in-state trips per year for a savings of $18,272. Savings by teaching/research faculty on out-state trips are expected to be small in comparison. Savings by extension faculty are expected to be substantial. Extension faculty are expected to save 1221 in-state and 123 out-state trips per year for a combined savings of $112,305. The potential to save $134,439 per year in foregone travel expenses offers a sizable budget from which to build a video communications network. Also, the source of potential savings lends support to building a college-wide network as compared to one limited to teachers and researchers.

Discussion

The Video Technology Survey clearly shows that faculty do not take full advantage of video technology and that the College should improve its video communications capabilities. Results of the survey suggest that many college activities will be enhanced through improved video technology. Teaching productivity in particular, is projected to increase with the use of video technology. Today, most teaching faculty use non-interactive (pre-produced, "canned," or purchased video tapes) instead of interactive technology. This may be due to the absence of interactive video facilities within the College and the inconvenience, difficulty, and cost involved in using interactive video technology.

All faculty groups predicted that enhanced video technology would decrease in-state travel and related expenses while increasing teaching, extension, and research productivity. Travel savings made possible by enhanced video technology were obviously skewed toward extension. This was attributed to extension faculty traveling more and having a better understanding of the capabilities of video technology than their colleagues in teaching and research.

Teaching and research faculty lag behind extension faculty in their expectations that video technology will enhance communications within the College. Many teaching and research faculty have limited knowledge of video technology's potential for instruction and research. Therefore, faculty seminars on the capabilities of various systems would be a prerequisite to developing a video network. These seminars presume that investments in human capital precede the adoption of new instructional technology.

Conclusions

Enhanced video technology would increase faculty productivity and involve more faculty in teaching activities. This technology would reduce travel related expenses and time away from the job for committee meetings. Off-campus faculty could participate in more seminars. Agent training could be provided more effectively. Communications within the College could be improved. An effective video communications system should have interactive capabilities to meet the diverse needs of College faculty. Interactive video technology that is convenient, readily available, and cost effective is expected to greatly enhance the quantity and quality of classroom instruction. Most importantly, off-campus faculty could increase their participation in instructional activities through the use interactive video technology.

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