Clientele Perceptions of Master Gardener Training Delivered via Interactive Television versus Face to Face

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SUMMARY. Master Gardener training was delivered via interactive television (IT) or face to face (FTF) in Missouri in 1997. IT and FTF participants were surveyed on their acceptance of the Master Gardener training method and their perceptions of program quality and technology to evaluate the newly developed multiple site IT training. Demographic characteristics were also recorded to determine if IT format attracted a different clientele than that of FTF training. Those who participated in IT training generally had more years of education than those in the FTF training and lived in suburban rather than rural areas. IT participants missed fewer training sessions than FTF participants. However, IT participants rated the slide quality, sound, and overall training lower than the FTF group. Some problems associated with IT training identified by the participants are correctable, which should improve future acceptance of this technology.

Master Gardener volunteer programs sponsored by state or local co-

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operative extension service (CES) coordinators have been highly valued by participants and CES administrators. Master Gardeners enjoy educational opportunities of participating in training and serve their local extension office by volunteering their services to the community. Community stewardship, improving citizenry through education, and improving the environment are often cited benefits of this program (Bobbitt, 1997; Meyer, 1997; Relf and McDaniel, 1994). Master Gardener programs also attract a broad range of participants, which is appealing to those in agriculture who wish to serve more urban audiences. While benefits of Master Gardener programs are generally undisputed, limited budgets and faculty resources often threaten efforts to maintain or expand them (Meyer and Hanchek, 1997). Because of the high cost of faculty time and travel to remote locations to provide Master Gardener training, alternative delivery methods are being considered such as the use of video tapes and satellite or IT technology (Stack, 1997).

In 1996, >12 requests for FTF Master Gardener training were received. Due to the limited number and availability of University of Missouri Horticulture Department faculty, IT training was televised to four remote locations. The goals for IT program delivery were to 1) multiply extension human resources by offering training more efficiently; 2) expand and standardize the length and content of Master Gardener core course training; 3) reach new audiences; 4) produce video tapes of broadcasts for use by trainees who missed or wanted to review a particular session; and 5) reduce university extension program costs in comparison to conventional FTF Master Gardener training. While the overall training and individual presentations were evaluated in 1996, a more extensive program evaluation was conducted in 1997 when training was delivered a second time. Biner (1993) recommended that a systematic evaluation effort of televised educational programming should start with an assessment of student attitudes and opinions. He reported that positive student reactions to interactive television courses can not be presented as evidence that learning has occurred. However, negative perceptions can undermine support for the program and adversely affect learning. Thus, the objective of our study was to determine if newly devel-

oped multiple site IT program delivery was accepted by participants as an effective method for Master Gardener training. This was done by comparing IT participant perceptions of program quality and technology to those of traditional FTF trainees. Demographic characteristics were also recorded to determine if IT format attracted a different group of Master Gardener clientele than FTF training.

Materials and methods

INSTRUCTION. In 1997, face-to-face (FTF) Master Gardener training was delivered at three locations (Springfield, Hannibal, and Carthage, Mo.). Eleven, 3-h training sessions were held including such topics as plant growth and development, home lawn care, soil fertility and plant nutrition, home fruit production, vegetable gardening, indoor plants, woody ornamental plants, annual and perennial garden plants, and disease and insect management. Course materials included a *Grounds for Gardening* notebook comprised of extension service guide sheets related to course topics.

Master Gardener training was also delivered via interactive television (IT) to three remote locations (St. Louis, Rolla, and Camdenton, Mo.) in 1997. Nearly all instructors were involved in IT and FTF training. Fifteen, 3-h sessions were broadcast on similar topics as those for FTF training. However, additional topics covered included plant propagation, home greenhouse structures, soil amendments, composting, plant health care, and safe handling of garden chemicals. Course materials included *Grounds for Gardening* and a 288-page bound copy of lecture outlines. Participants were also in the broadcast classroom located in Columbia, Mo. Those participants enrolled in the IT training as Master Gardeners paid \$130, while those who participated in FTF training paid \$40 to \$50.

TRAINING TECHNOLOGY AND ENVIRONMENT. Instructors presented FTF training in meeting rooms where they projected slides onto a screen with conventionally used equipment supplied by the local extension centers. Local extension staff served as site coordinators for FTF and IT training. For IT training, an interactive system allowed audio and video exchange between the instructor and participants at remote sites. The network operated on a dedicated T1 telephone

line at a 768-kb/s data-transmission rate. The broadcast classroom was equipped with three cameras mounted on walls and an overhead camera mounted above the lectern, which was used to project written statements, illustrations, small equipment, and live plant, disease, and insect specimens. From the lectern, the instructor viewed trainees at a remote site from which the most recent audio signal was received via a video monitor mounted on the back wall of the classroom. A projector (TRV-35H; Elmo Manufacturing Corp., New Hyde Park, N.Y.) with an internal camera was used for text and photographic slides. With this equipment, slides were photographed by the internal camera and relayed to a video switcher. Some instructors used Freelance Graphics (Lotus Dev. Corp., Cambridge, Mass.) for their computer presentations. A TelevEyes Pro Hyperconverter (PC Video Conversion Corp., San Jose, Calif.) converted the digital computer signal to an analog signal that was read by the video network. A large-screen video and data LCD projector (Sony Corp. Amer., Montvale, N.J.) was used to view slide images on a screen mounted in the front of the room. All video signals were produced via a JVC KM2000 video switcher (JVC Professional Products Division, Aurora, Ill.) before being transmitted to the remote sites. A CLI/Rembrandt codec (coder-decoder) (Compression Labs Inc., San Jose, Calif.) compressed audio and video signals which were transmitted via fiber optic lines connecting the sites. At remote sites, trainees viewed programming on either of two television monitors in the classroom. In St. Louis, voice activated microphones were mounted on the classroom ceiling, which enabled participants to communicate spontaneously with the instructor at the broadcast site or trainees at other remote sites. At Rolla and Camdenton, four microphones were placed on desktops, which required the trainee to move to the microphone before communicating with the instructor or others at remote sites.

Each of the IT training sessions was video taped and duplicate copies of the tapes were made and mailed to all remote sites participating in IT training within two days after the broadcast. Participants at remote sites could check out the video tapes to view a session they missed or to review sec-

tions of the lecture about which they had questions. Video tapes were not made of the FTF training sessions.

SURVEY INSTRUMENT. At the end of the training, Master Gardener participants were asked to complete a 40-question survey. In the face-to-face training 64 participants (77% response rate) completed the survey, while 57 of the participants in the IT training (84% response rate) responded. Only eight participants were in the broadcast classroom in Columbia. Data from the Columbia group were omitted since they were similar to the FTF group in that an instructor was present in the classroom. However, the Columbia group was also similar to the IT participants because they viewed the same images that were projected to remote sites and interacted with those at other locations. To determine if participant responses were dependent upon the program delivery methods, data were subjected to chi-square analysis using SAS (SAS Institute, 1989).

Results and discussion

DEMOGRAPHICS. Participants in the Master Gardener training programs were primarily female ($\approx 70\%$) and nearly two-thirds were between 40 to 59 years old (Table 1). FTF participants had fewer years of formal education than IT participants. More than half of the IT participants had ≥ 17 years of education. IT training in St. Louis attracted participants with the greatest number of years of education. About half of the IT participants had their primary residence in a suburban area. In contrast, most of the FTF participants had their primary residence in a rural location. About half of those enrolled in the Master Gardener training had lived on a farm. Of those who had lived on a farm, 37% had done so for 10 or fewer years, 35% had done so for 11 to 20 years, and 28% had lived on a farm for 21 to 60 years.

TECHNOLOGICAL ASPECTS OF TRAINING. FTF participants rated the quality of text slides better than the IT group (Table 2). Of the FTF participants, 56% responded that the text slide quality was very good, while 58% of the IT participants rated the text slides as only good. IT participants also rated the quality of photo slides lower than the FTF group. Of the IT participants, 42% rated the quality of photo slides as poor or very poor, while only 3% of the FTF group rated

them similarly. The reason for the poorer ratings of the slides by the IT group may have been related to the difference in the projection equipment. The projector in the IT classroom required the instructor to frequently adjust an iris to regulate the brightness of the slide. In contrast, the projectors used in FTF training did not require this adjustment. Written comments from the St. Louis participants revealed that green tones in the slides appeared blue during some broadcasts. In this case, a color adjustment was needed by the on-site technician.

The FTF group rated the sound quality better than those in the IT group (Table 2). Written comments indicated that it was difficult to hear questions asked at remote locations. The reason for this was that microphones were often turned down to reduce background noise or interference from conversation among individuals at remote sites. Adjustments were then required by technicians to increase the volume when a trainee asked the instructor a question.

Although the FTF group rated the ease of viewing the instructor higher

than the IT group, few participants rated the ease of viewing poor or very poor. Written comments from St. Louis participants indicated a high expectation for professionally produced broadcasts. In contrast, comments from other locations did not indicate this expectation for extremely high quality broadcasts.

Nearly all the FTF participants indicated that they felt it would be easier to learn the course material face to face (Table 2). However, about one-third of the IT group responded that it would make no difference or would be easier to learn the course material on television rather than by FTF methods. These types of responses from IT vs. FTF groups are consistent with those reported by others (Miller et al., 1993; Pirrong and Lathen, 1990). Pirrong and Lathen (1990) reported that remote students did not feel that IT interfered with their learning. Miller et al. (1993) also found that remote students felt that their mastery of course content was as successful as in the FTF class. Salomon (1983, 1984) proposed a model in which the amount of learning via a given medium is pro-

Table 1. Demographics of participants in the face-to-face (FTF) vs. interactive television (IT) Master Gardener training.^z

Demographic variable	Participants (%)	
	FTF	IT
Gender		
Female	67	76
Male	33	24
Age		
20s	2	2
30s	18	14
40s	33	31
50s	34	27
60s or older	13	26
Years of formal education		
0-8	2	0
9-12	20	8
13-14	31	12
15-16	23	23
17 or more	24	57
$\chi^2 = 16$		
Location of your primary residence		
Urban	30	18
Suburban	21	53
Rural	49	29
$\chi^2 = 12$		
Have you ever lived on a farm		
Yes	56	41
No	44	59

^zOf the participants in the FTF training, 64 (77% response rate) completed the survey and 57 of the IT participants (84% response rate) completed the survey; $P \leq 0.05$.

Table 2. Perceptions of technological aspects of Master Gardener training.^z

Variable	Participants (%)	
	Face to face (FTF)	Interactive television (IT)
Quality of text slides		
Excellent	25	6
Very good	56	26
Good	19	58
Poor	0	8
Very poor	0	2
$\chi^2 = 30$		
Quality of photo slides		
Excellent	22	4
Very good	52	10
Good	23	44
Poor	3	30
Very poor	0	12
$\chi^2 = 46$		
Sound quality		
Excellent	28	8
Very good	44	34
Good	26	48
Poor	2	8
Very poor	0	2
$\chi^2 = 16$		
Ease of viewing instructor		
Excellent	22	6
Very good	43	41
Good	30	43
Poor	5	6
Very poor	0	4
$\chi^2 = 12$		
Which training method do you think would make it easier to learn the course material		
IT	0	4
Makes no difference	2	28
FTF	98	68
$\chi^2 = 18$		

^zOf the participants in the FTF training, 64 (77% response rate) completed the survey and 57 of the IT participants (84% response rate) completed the survey; $P \leq 0.05$.

portional to the amount of invested mental effort (AIME). Miller et al. (1993) used this model to explain that remote students received lower scores because of initial student expectations of how easy learning may be in a televised format. Others have reported that learning was not enhanced by FTF delivery when compared to televised delivery (Abel and Creswell, 1983; Pirrong and Lathen, 1990; Stack, 1997; Weingand, 1984). These conflicting results may indicate that the medium of delivery is simply a conduit through which information is transmitted to the learner (Miller et al., 1993). Mastery of training content was not evaluated in our FTF Master Gardener training, although IT participants did have two take-home exams, which were graded

by local site coordinators or one of the IT instructors.

Video tapes of the training sessions were not available to FTF participants. Of the IT group participants, 28% did not view any tapes of the sessions. However, 42% of the group watched one to four of the video tapes. Surprisingly, 20% of the IT participants viewed all 15 of the video tapes of the sessions. Of those who watched the tapes, 89% of the group rated them as good to excellent.

QUALITY OF TRAINING. Participant attendance differed between the two types of training. The percentage of FTF participants who missed two or more training sessions (17%) was twice as much as those in the IT training. Reasons for missing training sessions

were not addressed in this survey. Both groups of participants prepared for class in a similar manner. Half of the participants read a few *Grounds for Gardening* guide sheets before attending each training session (Table 3). However, more of the FTF participants read the guide sheets after class than IT participants. Of all participants, 80% agreed that *Grounds for Gardening* was useful as a class reference.

Both groups rated the academic level of the training content similarly. More than 70% of the group rated the content as excellent or very good and 25% of them rated it as good (Table 3). Additionally, 77% of both groups rated the selection of topics as excellent or very good.

A larger percentage of the IT group agreed that the instructors were helpful in learning the training material than did those in the FTF group (Table 3). In contrast, more of the FTF than IT participants agreed that classmates were helpful. Both groups were similar in their perception that site coordinators were helpful in learning the training material. These results may suggest that FTF participants relied more heavily on classroom discussion or group interaction than the IT group. These findings support those of Hezel and Dirr (1991) in which television distance education students indicated that interactivity with other students was less important than that with faculty.

About half of all participants responded that they had a few questions left unanswered by the instructors at the end of the training. The two main reasons that questions were left unanswered were that they didn't want to interrupt the instructor or that they didn't think of the question during class. However, significantly more IT participants (30%) did not want to interrupt the instructor than FTF participants (14%) ($\chi^2 = 5$). IT participants also indicated that they couldn't get the instructor's attention or that they were too embarrassed to ask their question, while none of the FTF participants cited these reasons for unanswered questions. Other reasons for questions left unanswered cited by both groups included, instructor didn't leave enough time for questions, other class members monopolized time, or their questions were too specific for group discussion. Pirrong and Lathen (1990) reported that students' reluctance to use a microphone may have been a factor where there was a higher level of

Table 3. Perceptions of the quality of face-to-face (FTF) vs. interactive television (IT) Master Gardener training.^z

Variable	Participants (%)	
	FTF	IT
Proportion of guide sheet in Grounds for Gardening read before class		
None	26	20
A few	55	44
Most	16	28
All	3	8
Proportion of guide sheets in Grounds for Gardening reviewed after the related lecture		
None	0	10
A few	59	43
Most	36	31
All	5	16
$\chi^2 = 11$		
Academic level of course content		
Excellent	22	16
Very good	51	55
Good	22	27
Fair	5	2
Poor	0	0
Instructors were helpful in learning the training material		
Strongly agree	52	29
Agree	2	65
Neutral	46	4
Disagree	0	2
Strongly disagree	0	0
$\chi^2 = 10$		
Classmates were helpful in learning the training material		
Strongly agree	16	22
Agree	66	33
Neutral	18	39
Disagree	0	2
Strongly disagree	0	4
$\chi^2 = 15$		
Site coordinators were helpful in learning the training material		
Strongly agree	34	36
Agree	64	52
Neutral	2	10
Disagree	0	0
Strongly disagree	0	2
Proportion of your questions were left unanswered by the instructors at the end of the training		
None	48	29
A few	42	62
Most	7	9
All	3	0
Overall rating of the training		
Excellent	43	21
Very good	51	39
Good	6	34
Poor	0	6
Very poor	0	0
$\chi^2 = 20$		
Value of the course to you for the enrollment fee paid		
Excellent value	54	27
Very good value	25	27
Good value	19	38
Poor value	2	6
Very poor value	0	2
$\chi^2 = 12$		
The training enrollment fee was affordable for me		
Strongly agree	28	25
Agree	67	58
Neutral	5	11
Disagree	0	6
Strongly disagree	0	0
How strongly would you recommend this training to others if it were available via interactive television		
Strongly recommend	42	30
Recommend	32	46
Recommend with reservations	20	14
Would not recommend	6	10
How strongly would you recommend this training to others if it were available as face-to-face lectures		
Strongly recommend	75	62
Recommend	23	34
Recommend with reservations	2	2
Would not recommend	0	2

^zOf the participants in the FTF training, 64 (77% response rate) completed the survey and 57 of the IT participants (84% response rate) completed the survey; $P \leq 0.05$.

dissatisfaction by remote students concerning their ability to communicate with the instructor than by FTF students. However, they also suggested that the higher level of dissatisfaction may be attributed to nonclassroom communication problems such as the student not being able to talk to the instructor before or after class, or to visit during office hours. Pirrong and Lathen (1990) concluded that these problems are inherent to IT and may not be correctable. Interaction with faculty is often cited as an important component of IT courses (Barron, 1987; Hezel and Dirr, 1991). Barron (1987) reported that although students prefer FTF contact with their instructors and peers at other remote locations, IT students did not feel that information transfer was significantly hampered by the technology.

Of the FTF group participants, 94% rated the training as excellent or very good, whereas only 60% of the IT group participants rated it this highly (Table 3). A larger percentage of the FTF group responded that the value of the course to them (considering the enrollment fee paid) was excellent, whereas the IT group rated the value lower. Most participants were unaware of the difference in fee structure between the IT and FTF training. One participant who was apparently aware of the different price structure suggested that FTF training fees should be higher than those of IT because FTF audiences had the privilege of having a live instructor. However, both groups felt that the enrollment fee for the training was affordable for them (Table 3).

Of all participants who responded, 75% said that they would recommend this training to others if it were available via IT, whereas 97% of all participants indicated that they would recommend the training to others if offered as FTF lectures. Written comments by FTF participants indicated that they were unfamiliar with the IT technology and were consequently hesitant to recommend it to others. Stack (1997) reported that 83.9% of Master Gardener trainees indicated that they would enroll in the program again if half the sessions were presented locally (FTF) and half broadcasted via IT. Thus, program satisfaction may be enhanced by utilizing two modes of program delivery.

The cost of program delivery via IT was \$17,194 which included faculty

salaries, hourly broadcast charges at remote sites, course materials, video tapes, marketing, and administrative costs. In contrast, the cost of FTF training at the same sites was estimated at \$23,023. The higher cost of FTF training was due to travel costs (car rental, mileage, meals) and increased faculty time spent en route to remote sites. As the number of broadcast sites and travel distance to these remote locations increases, the savings realized by delivering IT vs. FTF training increases. For example, in the first year Master Gardener training was broadcast to Poplar Bluff, Kansas City, St. Louis, and Rolla, Mo., the cost of IT program delivery was 37% less than FTF training (Warmund, unpublished data). In contrast, the second year training was broadcast to sites located closer to campus and the cost of IT program delivery was 25% less than FTF training.

Conclusions and recommendations

IT participants missed fewer training sessions than FTF participants. In spite of this, the IT group generally rated the sound, slide quality, and overall Master Gardener training lower than the FTF group. However, results of this study indicate that some changes can be made to rectify aspects of the IT Master Gardener training that produced negative participant reactions. For example, slides can be digitized and the brightness or contrast can be modified via a computer to minimize the constant need for manual iris adjustment on the projector. Also, site coordinators can minimize conversation at remote locations, which will allow the microphones at these sites to be turned up to increase interactivity among locations. More interactive educational activities can be incorporated into the training to enhance participant involvement. In the future, audience acceptance of this technology is recognized as an important factor if program delivery by interactive television is to expand. Despite the technological shortcomings of IT training, this study demonstrated that it is an acceptable delivery method for Master Gardener training. While FTF training may be slightly preferable to participants, instructor availability, limited travel budgets, and time constraints may make IT program delivery more attractive to Master Gardener instructors and CES administrators.

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