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Dissemination of Outreach Education Programs: In-Person and Computer-Mediated Strategies

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Abstract: In-person and computer-mediated strategies are used to disseminate Extension programs, but little is known about their relative effectiveness. Using educator surveys, we compared the effectiveness of program dissemination via educator workshops, short presentations, and a DVD in terms of rates and extent of implementation in an urban environmental education program. Workshop participants were more likely to implement programs with youth, although the number of implemented activities did not differ significantly among educator participating in various dissemination strategies.

Introduction

University Extension and other youth outreach programs (e.g., Project WILD, Health Rocks) often seek widespread dissemination to 4-H clubs, classrooms, and after-school and community-based programs (Bourdeau & Knutz, 2006; Gilchrist, 2004; Kaslon, Lodl, & Greve, 2005; Krasny 2005; Penuel et al., 2006). Their dissemination strategies include educator workshops, short presentations during professional meetings, various computer mediated communications without face-to-face communication, and a combination of these and other means.

Face-to-face workshops are often viewed as having a number of advantages over less interactive computer-based dissemination (McCann, 2007). For example, workshops offer educators a chance to observe and interact with other educators conducting program activities and to engage in hands-on activities themselves (Konen & Horton, 2000; Smith, Meehan, Enfield, Goerge, & Young, 2004). Shorter presentations, including conference talks and information booths, convey general information about a program to large audiences who can later request print or view online curriculum materials, but provide fewer opportunities for interaction and hands-on learning.

Barriers to participation in workshops and short presentations include the costs in time, money, and environmental impact of travel to workshop or presentation sites. To address these barriers and to reach large numbers of educators, outreach education programs are increasingly using computer technologies in dissemination. Examples of computer-mediated tools for program dissemination include but not limited to:

- CDs with educators' guides and resources, such as the Education for Sustainability Development Toolkit CD (McKeown, 2002);
- DVDs with live footage of educators conducting programs with youth along with teaching resources, e.g., Garden Mosaics interactive DVD (Krasny, Tidball, & Hoard, 2004);
- Websites with educator resources, e.g., UNESCO's Teaching and Learning for a Sustainable Future (UNESCO, 2005); and
- Online workshops or forums, e.g., the International Education and Resource Network (Khalsa, 2005) and Garden Mosaics (Kudryavtsev, 2006).

The lack of information on the effectiveness of in-person vs. computer-mediated dissemination hampers the ability of train-the-trainer and other Extension programs to make informed choices about means for program dissemination. To address this issue, we conducted research to answer the following question within the context of an urban environmental education program: What are the rates and extent of program implementation after participation in workshops, participation in short presentations, and use of instructional interactive DVDs?

Methods

Garden Mosaics

We answered the research question using the Garden Mosaics program, through which youths aged 10-18 learn about environmental science within a community, intergenerational, and multicultural context (Krasny, Doyle, & Tidball, 2005). Educators conduct one or more of the Garden Mosaics activities with youth in after-school, 4-H, or community-based programs or classrooms. The hands-on activities take place in urban community gardens, which provide opportunities for youth to learn about the environment, cultures, and community engagement from immigrant, minority, and other elder gardeners in their own neighborhoods. The Garden Mosaics activities include:

- *i-m-science* investigations (Gardener Story, Community Garden Inventory, Neighborhood Exploration, and Weed Watch). Inquiry activities about the gardeners, gardens, and their neighborhood;

- Action Projects. Hands-on activities to improve the garden and community; and
- Science Pages. Short-term inquiry activities related to science topics that youth are exposed to in the gardens.

Developed at Cornell University, Garden Mosaics is currently a program of the American Community Gardening Association. More information and many of the curriculum materials are available at <www.gardenmosaics.org>.

Dissemination Strategies

From 2001-2005, Garden Mosaics trained over 300 educators across the USA and in Canada through in-person workshops. The workshops ranged in length from several hours to 2 days. They took place at meetings of the American Community Gardening Association, Ecological Society of America, and other professional societies, as well as at regional meetings organized specifically around Garden Mosaics. The Cornell Garden Mosaics staff facilitated national workshops, whereas educators from environmental non-profits, Cooperative Extension, and universities in 11 cities across the U.S. who participated in developing the Garden Mosaics program facilitated the regional workshops. In addition, Cornell and regional cooperators gave shorter presentations and organized information booths at professional conferences to acquaint people with the program and to build program visibility (Krasny, 2005). Program brochures and curriculum resources on the Garden Mosaics Website were made available to all educators reached through the workshops, presentations, and information booths.

Starting in 2005, Garden Mosaics also used an interactive DVD to disseminate the program. Some educators used the DVD in addition to attending workshops or short presentations. The Garden Mosaics DVD includes footage of educators conducting program activities with youths and resources to help educators implement the activities. In spring 2005, more than 600 environmental, science, and garden educators in the USA and internationally received interactive DVDs for free. Of this group, approximately 500 educators received the DVDs during a promotional campaign without attending workshops; the other 100 educators received DVDs during workshops.

Measuring Rates of Implementation

To evaluate the effectiveness of in-person and computer-mediated dissemination strategies, in fall 2005 we conducted a survey of educators who learned about the Garden Mosaics program through in-person workshops, short presentations, the DVD, and a combination of workshops and DVD.

We emailed invitations to 696 educators representing the various dissemination strategies, asking them to take part in a survey using the online SurveyMonkey. Of the 696 email invitations sent to educators, 105 were undeliverable, and out of the remaining 591 educators, 303 responded to the survey (response rate 51%). Table 1 shows the profile of survey respondents.

Table 1.
Profile of survey respondents (N=303)

Gender	
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	238 (79%) females 65 (21%) males
Education	21 (7%) PhD 124 (41%) Masters' degree 109 (36%) Bachelors' degree 49 (16%) Associates' or no degrees
Occupation	65 (21%) School teachers 43 (14%) University extension educators 31 (10%) Volunteers 14 (5%) Community center educators 9 (3%) Nature center educators 9 (3%) College professors 132 (44%) Other smaller categories, including staff in botanical gardens and community- or faith-based organizations, college students, horticulturalists, community activists, and IT developers

We categorized survey respondents into four treatment groups depending on Garden Mosaics dissemination strategies:

- Workshop only (49),
- DVD only (165),
- Workshop and DVD (50), and
- Short presentations (39 respondents).

Education level, years of experience as educators, age, and gender ratio did not vary considerably among these groups. We did not conduct follow-up surveys with non-respondents.

Data Analysis

We used the *chi-square* test with $\alpha = 0.05$ to compare proportions of educators who implemented and did not implement the program after participation in various dissemination strategies. Number of different types of Garden Mosaics activities implemented by educators served as another indicator of dissemination success (maximum six activities, including four *i-m-science* investigations, Action Project, and use of Science Pages). All statistical analysis was done using STATA statistical software version 10.1.

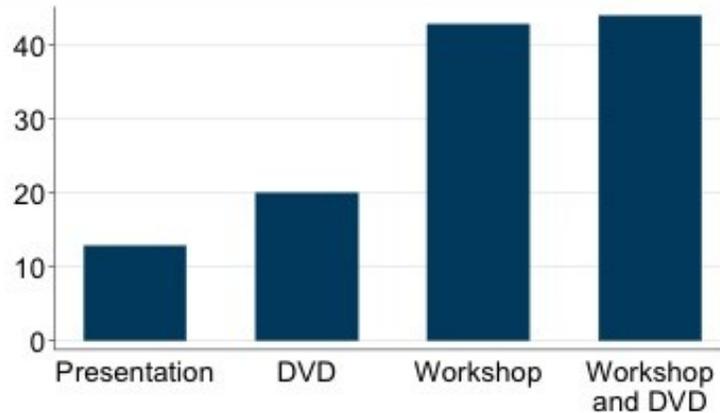
Results

The rate of program implementation differed among educators who participated in short presentations (13%), watched the DVD (20%), participated in workshops (43%), or were trained through both workshops and the DVD (44%) (Figure 1). Program implementation rates among educators who learned about Garden Mosaics from the DVD alone and who attended short presentations were significantly less than among educators who participated in workshops ($p < 0.01$). Giving DVDs to workshop participants did not result in significantly greater implementation in comparison to educators who attended workshops and were not given DVDs.

Implementation rates among educators who participated in short presentations and those who watched a DVD were also not significantly different.

Figure 1.

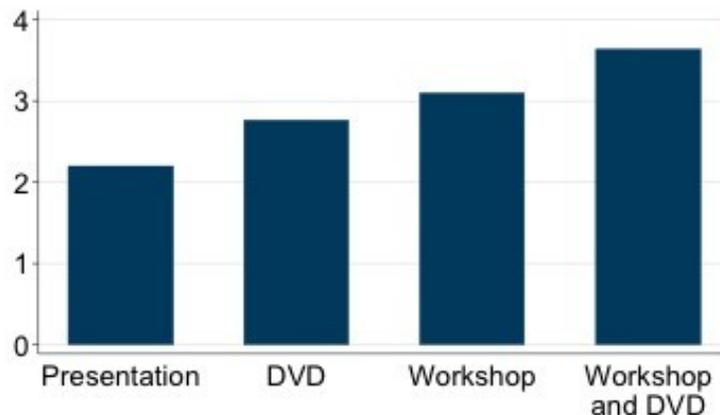
Implementation Rates of Garden Mosaics Program Among Educators in Different Dissemination Groups



The number of different types of Garden Mosaics activities conducted with youth was lowest among presentation participants (mean=2.2), relative to DVD recipients (2.8), workshop participants (3.1), and educators who participated in a workshop and received the DVD (3.6) (Figure 2). *Chi-square* tests, however, showed that proportions of educators who implemented two or fewer types of activities vs. educators who implemented three or more types of activities were not statistically different among all dissemination groups.

Figure 2.

Mean Number of Activities Implemented by Educators in Different Dissemination Groups



Discussion

The results of the study reported here indicate that educators who chose to participate in Garden Mosaics in-person workshops are more likely to implement the program than educators who chose to request a free

DVD or who participated in short presentations. This result is consistent with the literature about the advantages of in-person communication and hands-on activities that are made possible through educator workshops (Konen & Horton, 2000; Smith, Meehan, Enfield, George, & Young, 2004). The number of activities implemented, which may serve as a proxy for the intensity of the educational experience for youth participants or the extent of implementation, did not vary significantly as a function of dissemination method, despite a trend toward greater numbers of activities implemented after workshops relative to short presentations.

Because the educators self-selected to participate in a workshop or request a DVD, we cannot attribute these results solely to the type of dissemination strategy. Another explanation might be that educators who received the DVD for free or at low cost, rather than expending the effort and funds to travel to workshops and pay registration fees, were less interested in program implementation. Another bias might have been introduced by self-selection of survey respondents. Non-respondents might have lower rates of program implementation and thus may have been less likely to respond to the survey.

Despite possible biases, given that different groups of educators had similar educational backgrounds, positions, and years of work experience, the study provides useful information to program developers deciding whether to invest in workshops, short presentations, or computer-based tools for program dissemination. For example, the results suggest that a large group of educators who do not attend workshops may request a free DVD, and a reasonable percent of these individuals will implement the program. Thus, a dissemination strategy using DVDs may be useful for programs seeking program implementation across a wide geographical area.

Given that for program directors the DVD variable costs can be lower than workshop variable costs, which often include travel and lodging (Kudryavtsev, 2006), DVDs may be an important strategy for program dissemination. In this way, DVDs are similar to other computer-mediated and online tools described in the literature that are easily scalable and have low variable costs (Bartley & Golek, 2004). Fixed costs of conducting workshops or short presentations, however, can be much lower than fixed costs of producing the DVD, which was about \$30,000 in the case of Garden Mosaics. Thus, DVDs are most cost-effective in instances where the goal is to reach large numbers of educators, in which case the higher fixed costs are compensated for by the lower variable costs relative to workshops. On the participants' end, distance learning using computer tools can be less expensive than in-person learning (Ricketts, Hoelscher-Day, Begeman, & Houtkooper, 2001).

Even though workshops may be costly and reach only limited numbers of participants, they may serve educators who prefer to learn through face-to-face interaction with program staff and peers. Workshops may be particularly important in targeting specific audiences. For example, Cornell University Cooperative Extension-NYC conducted Garden Mosaics workshops, rather than using short presentations or DVDs, in efforts to involve educators serving ethnically diverse and low-income youth in NYC.

Because we conducted the study with only one outreach program, care must be taken in applying the results to other educational initiatives. However, the study reported here may contribute to critical consideration of the advantages and disadvantages of using the many computer-mediated and more interactive online dissemination tools that have become mainstream since we conducted this study (Boulos & Wheelert, 2007; Spadaccini, 2006), including wikis (Sellers, Crocker, Nichols, Kirby, & Brintnall-Peterson, 2009) and other types of Web-based communications (Haviarova & Vlosky, 2009). For example, in a separate study of the use of an online forum as a dissemination tool, we found that educators felt a sense of community and connection with other educators, which potentially encourages them to stay with the program longer (Kudryavtsev, 2006). It is likely that a combination of different in-person and computer-mediated means of dissemination will prove most effective for a given outreach education program that seeks to achieve national

or international impacts.

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