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Katia Passerini
George Washington University

Mary Granger
George Washington University

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Testing Multimedia for Ecological Sustainability

Katia Passerini

Mary J. Granger

Department of Management Science
The George Washington University

Abstract

The research in progress reviews the interaction of interactive technology with learning theories and applies it to environmental education. The intended goal is raising attention to environmental damage cause by mass tourism. It suggests an educational strategy that incorporates various technologies to increase motivation and achieve longer-term attitudinal change. Although the use of multimedia is limited by the lack of investment for producing software applications for environmental use, expansion of virtual reality and multimedia software may be the closest, and most sustainable, answer to eco-tourism problems. Effectiveness of the use of multimedia applications on potential travelers is tested through pretest and posttest research design.

Body of Submission

The term "ecological sustainability" is the leading motto of many business activities. New partnerships are being formed to promote safer and cleaner workplaces and living conditions. "Environmentally friendly" is the label characterizing many successful ventures, product and inventions. Tourism itself has become environmentally oriented; it seems to be able to bring civilizations and visitors to remote areas without causing damage to the natural environment. At least on the paper, eco-tourism appears as a harmless tourist activity. It is described as a form of nature-based travel and recreational experience that combines a respect for nature and local cultures with economic development incentives; it uses revenues from tourism for the funding of local conservation programs [Boo 1991].

In spite of these good intentions, eco-tourism is hardly meeting the expectations of combining environmental protection with economic gains. One problem is that this form of tourism is rarely associated with a wide distribution of earnings to local populations; another is that it does contribute to creating lasting damage to the relevant ecosystems [Lindberg & Hawkins 1995]. There are essentially two reasons behind this lack of success. One is the focus on "selling the vacation" rather than the ecological or cultural experiences per se, and the other is the lack of travelers' sensitivity on the damaging effects of their presence on natural and social systems. In both cases, the core problem is that the focus of eco-tourism (as any other form of tourism) remains more economic than environmental.

This research in progress argues that there are little opportunities for limiting the negative effects of visits to the natural habitat: the truly harmless alternative would be preventing travel to endangered areas. However, stopping the flows of tourism would have the same effects that "killing the goose that lays the golden eggs" and there is little support for such drastic initiative in any country, at any given level. Information technology, in general, and multimedia application, in particular, might offer a compromise solution to the problem. Extensive use of information technology can promote environmental education and help future generations to become more "recycling conscious." Development of multimedia and virtual reality applications provide an imperfect substitute to direct visits, targeting those physically or temporally unable to reach the beloved areas.

A review of the literature on educational technology shows that very few technological instruments are used to further the environmental cause, providing access to information and promoting learning of environmental issues. This research looks at this issue through an analysis of the effect of information technologies on learning. This effect has been seen as a function of how well technology supports a specific model of learning and how appropriate that model is to the learning situation [Leidner and Jarvenpaa 1995]. Following this premise, this study reviews the assumptions of learning theories and combines them with specific technologies. Then, it applies these theories to environmental education and creates a roadmap for which technologies are most effective for raising awareness on environmental problems, including those associated with eco-tourism. The application of learning models to specific instructional strategies for environmental education through technology is summarized in Table 1.

Among the different types of technologies promoting environmental education, the research in progress focuses on multimedia applications as an example of the objectivist model, potentially applicable to other models. If the purpose of the presentation is only to provide information, then multimedia can be limited only to an objectivist function. If it is designed to create alternative scenarios and provide interaction in lieu of direct visits, then it reaches the boundaries of constructivism and cognitive information processing. The software is developed in different levels, including the completion of multimedia software designed to educate and provide awareness of eco-tourism (i.e. in Costa Rica). Users are introduced to the CD-ROM content and informed that, while eco-tourism is an educational response to problems linked to traditional tourism (overcrowding, resource depletion and degradation), the software integrates this response to an alternative method to travel: it provides a non-destructive method of visiting ecological attractions. It also includes a training program ("Do's" and "Don'ts" of ecological tourism) designed for developing or enhancing an environmental appreciation by tourists desiring to visit the ecological site.

Table 1

<i>Model</i>	<i>Basic Premise</i>	<i>Goals</i>	<i>Implications for Environmental Instruction</i>
Objectivism	Learning is the uncritical absorption of objective knowledge	Transfer of knowledge from instructor to students	Information is best presented through graphics, figures and other appealing designs that complement text.
Constructivism	Learning is a process of constructing knowledge by an individual	Formation of abstract concepts to represent reality	Learning through recreating experience that can simulate direct field visits
Cooperativism	Learning emerges through shared understandings of more than one learner	Promote group-skills, communication, listening, participation	Use of listservs and on-line conferencing to stimulate discussion on environmental topics
Cognitive Information Processing	Learning is the processing and transfer of new knowledge into long-term memory	Improve processing abilities, recall and retention	Use of multimedia or hypertext gives learners the ability to select, organize and process knowledge in a mode that favors long-term retention
Socioculturalism	Learning is subjective and individualistic	Action-oriented, to change society rather than accept or understand	Technology helps preserving local culture from the impact of tourism. Community Information Centers served by networked computers favor integration.

Adapted from Leidner and Jarvenpaa [1995:270]

Additional work includes developing a framework to test the effectiveness of multimedia software for eco-tourism. The purpose of this part of the study focuses on the assessment of users' reactions to environmental visits *before-and-after* exposure to the technology. The research hypothesis investigates whether the use of multimedia for environmental education affects tourists' attitudes towards environmental protection. For testing this hypothesis, a pre-test survey is administered to two comparable groups of MBA students enrolled in an Information Technology class. The pre-test is conducted to gather demographic information of the sample including their travel preferences and habits. The post-test is conducted after exposure to the CD "Ecotourism on a Computer Screen: Ecotourism in Costa Rica." It contains a few new questions, while repeating several pre-test questions. Although the survey is anonymous, students enter their answers through a Web Browser and a networked computer with the same IP address. Pre-test and post-test answers can be matched in one observation for the same individual to display whether the exposure to the application has altered the response pattern. Preliminary frequency data confirm a general improvement in environmental awareness, willingness to recycle, and higher acceptance of the idea of "virtual travel." The frequency tables (Tables 2 & 3) show the described shift in the response given before and after having been presented with the information contained in the CD-ROM:

Table 2

	CONC	CONC	INPER	INPER	MDAMA	MDAMA	MMNE	MMNE
	ERN	ERN2	SON	SO2	GE	GE2	EDS	EDS2
	%	%	%	%	%	%	%	%
.00	.0%	.0%	8.0%	6.0%	6.0%	12.0%	4.0%	.0%
Not at all	10.0%	2.0%	12.0%	4.0%	10.0%	10.0%	16.0%	6.0%
2.00	8.0%	12.0%	10.0%	12.0%	12.0%	20.0%	22.0%	14.0%
3.00	16.0%	8.0%	6.0%	16.0%	26.0%	22.0%	8.0%	16.0%
4.00	14.0%	18.0%	18.0%	16.0%	6.0%	20.0%	6.0%	12.0%
5.00	26.0%	36.0%	22.0%	24.0%	6.0%	10.0%	24.0%	32.0%
6.00	18.0%	24.0%	14.0%	20.0%	6.0%	4.0%	16.0%	20.0%
extremely								

7-point Likert Scale; .00 indicates not applicable (N/A); Sample: 50 first year MBA Students, Cohort Program. Red Columns indicate answers to same questions in the post-test.

The increase in the upper quartiles values is consistently high and varies from a minimum of 6% to a maximum of 30% over previous answers. Considering the shifts in the values above the average value (5.00; 6.00 and 7.00), the increase adds to:

- 20% more participants from the same population are concerned with the environmental damage caused by tourism (concern and concern2 in Table 2);
- 16% more perceive travelling to endangered areas as a serious damage to the natural environment (mdamage and mdamage2 in Table 2);
- 18% more view "virtual tours" as a satisfactory alternative for disabled unable to travel (mmneeds and mmneeds2 in Table 2);

Table 3

	MQUALITY	MVUALITY2	RECYCLE	RECYCLE2	SUSTAIN	SUSTAIN2	SESSION	SESSION2	VIRTUAL	VIRTUAL2
	%	%	%	%	αα	αα	%	%	%	%
Not at	.0	.0	10.0	8.0	10.0	4.0	4.0	2.0	14.0	6.0
2.0	6.0	.0	8.0	4.0	22.0	20.0	6.0	4.0	26.0	8.0
3.0	14.0	2.0	10.0	6.0	22.0	8.0	26.0	6.0	6.0	12.0
4.0	16.0	12.0	18.0	10.0	8.0	18.0	10.0	8.0	10.0	22.0
5.0	26.0	14.0	24.0	22.0	10.0	22.0	22.0	14.0	20.0	18.0
6.0	24.0	34.0	16.0	30.0	8.0	16.0	20.0	38.0	8.0	16.0
extrem	10.0	38.0	8.0	14.0	6.0	4.0	12.0	28.0	10.0	14.0

7-point Likert Scale; .00 indicates not applicable (N/A); Sample: 50 first year MBA Students, Cohort Program. Red Columns indicate answers to same questions in the post-test.

- 30% more believe that a multimedia training session will improve the quality of their travel (mquality and mquality2 in Table 3);
- 18% more are willing to recycle (recycle2 in Table 3);
- 18% more consider financial contributions to environmentally oriented multimedia development as a sustainable alternative (sustain and sustain2 in Table 3);
- 26% more are willing to participate to an environmental training program (session and session2 in Table 3);
- 0% more recognize the merit of the idea of "virtually travelling" (virtual and virtual2 in Table 3).

However, the question, would you still desire to visit endangered areas in person (inperson, inperson2 in Table 2) showed an increase of 6% which is in the opposite direction of the hypothesis. The nature of the question, thought, does not call for a positive reaction is such a short timeframe. Other

applications of future research involve comparing results with traditional delivery methods (brochures, printed press and other informative material) to better understand the added value that interactive multimedia brings to the environmental sustainability cause. Current results confirm the need for conveying the "sustainability through technology" message with a short-term awareness and long term vision. The first set of responses confirmed the potential behavioral effects of using multimedia. Considering those results, stakeholders, academic institutions, public authorities, and the private sector apparently need to promote the use of technology at all educational levels. Educating to preserve the environment can be the first step to protection. More adventurous applications can follow when the protection of ecosystems becomes a widely held value. In the short-run, this message can be spread with traditional technologies, but the lasting effects, in the long-run, will be brought about only by the goal of transformation by using the appropriate higher level applications which include multimedia and virtual reality.

Associating statistical validity to the framework expands the limited application of multimedia technology in this direction. Furthermore, the potential extends beyond multimedia: virtual reality applications that simulate personal experience can create new concepts. The high realism of the simulated context can propose itself as a stronger substitute to visiting natural areas. If it is agreed that the really sustainable way to protect the environment is decreasing tourism rather than promoting it, defenders of environmental preservation will benefit.

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