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ABSTRACT

The purpose of this paper is to determine the effectiveness of computer-based instruction to deliver cross-cultural education to agriculturalists. A quasi-experimental research method known as a nonequivalent control-group design was employed to compare and contrast the effectiveness of delivering a cross-cultural module via traditional classroom instruction and computer-based instruction to two separate groups of undergraduate students at Texas A&M University. A pretest was administered to both the control and treatment groups to establish a cross-cultural knowledge baseline for each student prior to being exposed to the cross-cultural training module. Results suggest that computer-based instruction may serve as an effective means of delivering cross-cultural education for agriculturalists, and that it may even been more effective than traditional classroom instruction. (AEF)

Comparing and Contrasting the Effectiveness of Computer-based Instruction with Traditional Classroom Instruction in the Delivery of a Cross-cultural Educational Module for Agriculturalists

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Globalization is impacting the way in which American citizens and agricultural professionals do business. As the world becomes increasingly interconnected, it is important that agriculturalists understand cross-cultural issues. Computer-based instruction has been found to be an effective educational tool in engineering, microbiology, anatomy, and medical education programs (Fasce, Ramirez, & Ibanez, 1995; Inglis, Fu, & Kwokchan, 1995; Jones & Kane, 1994; Tothcohen, 1995). The purpose of this study is to determine the effectiveness of computer-based instruction to deliver cross-cultural education to agriculturalists.

The world is rapidly moving toward a more global economy, a fact to which agricultural educators must respond by developing educational programs to insure that agricultural students and professionals will be prepared to meet the global challenges and opportunities being created in today's global village.

> Over the past decade or so, the world economy has changed profoundly: it has become a truly global system. International trade has grown rapidly; international flows of money have grown explosively. Economic booms spread more readily from country to country, and so do recessions. Interest rates in one economy affect investments in others. Capital roams freely around the world. Without a doubt, these changes have great implications for the ways people, firms, and governments go about their business. The increasing "globalization" of the world economy is a fact, and one that nobody can ignore ("The myth," 1995, p. 15).

Education serves a very important role in society by ensuring continuous development of a competent workforce. Agricultural educators are specifically responsible for ensuring that agricultural students and professionals receive proper training to function competently in the global agricultural environment. Cross-cultural training, learning how to work with individuals from cultures different from one's own, has become an increasingly important component of globalization training. However, in many cases, cross-cultural training is not available or easily accessible to agricultural students and professionals. With this in mind, it is important for agricultural educators to take the necessary steps to ensure that cross-cultural training is provided to agricultural students and professionals. New technology may offer agricultural educators an opportunity to fill this educational need.

Advances in technology, specifically computer-based instruction (CBI), is creating an opportunity to provide cross-cultural training to many agricultural students and professionals who previously did not have access to this training. Computer-based instruction has been shown to deliver high quality training, assist the educational process, require less time to achieve the same amount of training, and cost less than instructor-led training ("Multimedia training," 1995). Although CBI has been shown to be very effective and efficient in a variety of other fields (i.e., engineering, science, and medicine), only limited research has been focused on agriculture. A study involving horticultural education found CBI to be just as effective as traditional instruction (Corbett, 1992) and an agricultural economics study noted similar effectiveness (Marrison, Tao, and Frick, 1993).

This study seeks to determine the effectiveness of facilitating learning through computer-based instruction to deliver a cross-cultural educational module for undergraduate students enrolled in a university. The following objectives were developed to guide the study:

(1) Determine the cross-cultural knowledge baseline of students prior to exposure to a cross-cultural module.
(2) Determine the cross-cultural knowledge level of students following exposure to a cross-cultural module delivered via traditional classroom instruction.
(3) Determine the cross-cultural knowledge level of students following exposure to a cross-cultural module delivered via computer-based instruction.
(4) Compare and contrast the cross-cultural knowledge level of students exposed to the computer-based instruction with students exposed to the traditional classroom instruction and to each of their respective baselines.
(5) Determine the cross-cultural knowledge level of all students after a two to four-week lapse in time from their initial exposure to the cross-cultural module.
(6) Determine the perceptions of students concerning the appropriateness of computer programs as educational tools.
(7) Determine if there is a relationship between selected personal characteristics and the cross-cultural knowledge level of students in both the control and treatment groups.

Definition of Terms

For the purpose of this study, the following terms are defined operationally as follows:

Computer-based instruction - Self-paced instruction that learners access from computers.
Multimedia - The use of computer-based programs that incorporate sound, text, graphics, and video into computer-based instruction.
Cross-Cultural - Cultural interaction among individuals from different countries or with different cultural backgrounds.
Globalization - A process of acquiring the skills, knowledge, and attitudes to allow one to function more effectively in the economic, political, and cultural environment inside and outside one's geographic borders.

Background & Significance

Cross-cultural Education

The world is becoming increasing global. Increasing numbers of Americans are traveling overseas and increasing numbers of foreigners are traveling to the United States. "Coupled with the vast population increase, people today have much more contact than ever before with diverse cultures of the world" (Frederick, 1993, p. 7). Students and professionals within the field of agricultural education are being faced with tremendous challenges created by these trends. "A significant number of agribusinesses are becoming global in their activities" (Schroder, Wallace, & Mavando, 1993, p. 175). This increase in global activity has created a need for cross-cultural education to be provided to these individuals to assist them in meeting global challenges.

Cross-cultural education can be divided into two general categories: international and intranational approaches (Kim & Ofori-Dankwa, 1995). The international approach refers to the comparison of national cultures and the intranational approach refers to diversity within one nation. While both approaches are important, the international approach is of specific concern. Encounters with individuals from foreign nations have increased rapidly and it is imperative that students and professionals be prepared for these encounters. Medich (1995) suggests that a lack of cross-cultural training exists because of cost, lead time requirements, lack of recognition of the need, and a perception of programs being ineffective. In fact, many corporations have viewed cross-cultural

training as unnecessary or ineffective (Harrison, 1994); however, this view is certain to change as companies become aware of the benefits that cross-cultural training offers both for the employees and for profits. Computer-based instruction has the potential to provide cross-cultural training in such a way as to overcome the barriers (i.e., cost, lead time) of previous cross-cultural training programs.

Computer-based Instruction (CBI)

Computers have been integrated into education since the 1960's. Although computer-based instruction has been shown to be very effective and efficient in fields such as engineering, science, and medicine (Fasce, Ramirez, & Ibanez, 1995; Inglis, Fu, & Kwokchan, 1995; Jones & Kane, 1994; Tothcohen, 1995), only limited research has been conducted to determine the effectiveness of using CBI in agriculture. A study involving horticultural education found CBI to be just as effective as traditional instruction (Corbett, 1992) and an agricultural economics study noted similar effectiveness (Marrison, Tao, and Frick, 1993). In addition, many of the CBI studies located are based on the use of technology that does not include interaction, audio, or video.

New technology is creating tremendous opportunities for educators. "Multimedia, with its ability to engage users with speech, music and video, can excite the imagination as few technologies can" (Sullivan-Trainor, 1995, p. 71). This technology has opened the door for educators to assist learners in achieving outstanding results. "The power of these instructional systems lies in the way instruction is constructed and delivered - not in the technical components" (Schwier, 1994, p. 213). Timing, cost, modification ease, and effectiveness are just a few of the reasons computer-based training should be considered.

CBI has also been described as a means for students to learn by doing (Richmond, Demello, & Gardner, 1995). Situations and processes can be simulated on the computer to allow students the opportunity to practice handling specific situations. CBI has also been sited as offering a solution to satisfying the need for one-on-one instruction (Azzaro & Cleary, 1994). Gillian Flynn (1995) offers the following ten advantages in using computer-based instruction which utilizes multimedia: reduced learning time; reduced cost; instructional consistency; privacy; mastery of learning; increased retention; increased safety; motivation; increased access; and increased enjoyment. Computer-based instruction offers a tremendous opportunity to provide timely cross-cultural instruction for students and professionals.

Methodology

A quasi-experimental research method known as a nonequivalent control-group design (Borg & Gall, 1989) was employed to compare and contrast the effectiveness of delivering a cross-cultural module via traditional classroom instruction and computer-based instruction to two separate groups of undergraduate students. This research design was employed because the study involved the testing of intact groups and thus did not allow for random assignment of subjects to groups. Students randomly enrolled in one of four non-honors sections offered for AGED 440 at Texas A&M University. Two of the four sections were assigned to the control group (traditional classroom instruction) and the remaining two sections were assigned to the treatment group (computer-based instruction).

A pretest was administered to both the control and treatment groups to establish a cross-cultural knowledge baseline for each student prior to being exposed to the cross-cultural training module. This baseline information allowed the researcher to distinguish between pre-existing differences and differences as a result of the treatment. The pretest also included demographic questions. Students marked their nine-digit student identification number on the completed instrument to allow proper identification and coding of data.

The cross-cultural module consisting of the traditional classroom instruction was administered to the two sections assigned to the control group approximately four weeks following

the pretest. The classroom instruction took place during the regularly scheduled meeting time and in the normally scheduled location. The cross-cultural module consisting of computer-based instruction was administered to the two sections assigned to the treatment group approximately four weeks following the pretest. The computer-based instruction took place during the regularly scheduled meeting time in a university computer lab designated by the researcher. A facilitator was available during the computer-based instruction to ensure that computers were operational and to assist students in the operation of the computer if necessary. No assistance in regard to cross-cultural content was provided by the facilitator.

Both the traditional classroom instruction and the computer-based instruction took place during the same time period. Following this instruction, the posttest was administered to both the control group and the treatment group during the next regularly scheduled meeting time in which all groups attended which was approximately five days following exposure. The posttest measured the amount of cross-cultural knowledge gained by the students and also measured the students perceptions concerning the appropriateness of computer programs as educational tools. The students marked their nine-digit student identification number on the completed instrument to allow proper identification and coding of data. The cross-cultural knowledge posttest was administered a second time to both the control and treatment groups approximately five weeks following the original completion of the posttest to measure the amount of cross-cultural knowledge retained by the students. The results of the pretest and posttests were tabulated and analyzed using the Statistical Package for the Social Sciences (SPSS) available in a Windows version for the personal computer.

Development of the Cross-Cultural Module

A cross-cultural module was developed for delivery by two different instructional methods: traditional classroom instruction and computer-based instruction. The traditional classroom instruction module consisted of lecture and teacher/student interaction. The computer-based instruction module was developed using Authorware and includes the use of multimedia. The cross-cultural module consists of approximately 50 minutes of instruction for both the traditional classroom instruction module and the computer-based instruction module. The same information was used in both modules. The modules were created by the researcher in consultation with experts in the field regarding accuracy and appropriateness to ensure content validity of the materials. The content of the module covered the definition of cross-culture, the primary categories to consider when evaluating a culture, the importance of understanding one's own culture, an overview of the "global village" concept, and skills for interacting globally.

Instrumentation

Two instruments were constructed by the researcher to collect data: a pretest and a posttest. The pretest consisted of questions designed to assess the cross-cultural knowledge of the students and questions designed to describe the population. The posttest consisted of the identical questions used in the pretest to assess cross-cultural knowledge and also contained a series of statements regarding all students' perceptions concerning the appropriateness of computer programs as educational tools. Students responded to a series of statements using a Likert-type scale by marking Strongly Agree, Agree, Unsure/No Opinion, Disagree, or Strongly Disagree. Students responded to the pretest and the posttest on scantrons provided by the researcher. The instruments were evaluated by knowledgeable reviewers prior to implementation of the study.

Pilot Test

The test instruments and traditional classroom instruction module were pilot tested during the Summer of 1996 with students enrolled at Texas A&M University in AGED 440, "Principles of Technological Change." The CBI module was pilot tested by a panel of undergraduate students prior to implementation of the study.

Preliminary Findings

The data collected as a result of this study are currently being evaluated by the researcher. The findings that are presented in this section are preliminary.

There were a total of sixty students who participated in the study. Due to attrition, the sample size decreased to twenty-six students. Of these students, 50% were male and 50% were female providing an equal distribution of males and females. The participants were predominately Caucasian and between the ages of twenty-one and twenty-two years of age. Evaluation of the pretest scores revealed similar cross-cultural knowledge levels for both the lecture group and the computer-based instruction group. There was no significant difference between the two groups' combined pretest scores. Therefore, it is believed that any difference found between the two groups' posttest scores can be attributed to exposure to the cross-cultural instruction.

Evaluation of the combined posttest scores revealed that both the lecture group and the computer-based instruction group obtained higher combined scores than their corresponding combined pretest scores. The computer-based instruction group obtained a higher combined score than the lecture group, the difference between the two groups was significant. Evaluation of the post-posttest scores revealed that the lecture group's combined score was actual lower than their original posttest score. The computer-based instruction group's score was higher than their original posttest score. A significant difference between the two groups' post-posttest was found with the computer group showing a higher combined score than the lecture group. The following table illustrates the mean scores for each group and displays the t-values computed in the comparison of the groups.

Table 1

Means and t-values for the Lecture Group and the Computer-based Instruction Group

	Mean	t Value	p <
Pretest Score			
Lecture Group (n=13)	.5046		
C-B-I Group (n=13)	.5277	-.734	.470
Posttest Score			
Lecture Group (n=13)	.6415		
C-B-I Group (n=13)	.7338	-2.610	.015
Post Posttest Score			
Lecture Group (n=13)	.6138		
C-B-I Group (n=13)	.7446	-2.847	.009

The finding that students exposed to cross-cultural material via computer-based instruction scored higher than those exposed to the same material via lecture provides encouragement for consideration of computer-based instruction as an effective means of providing cross-cultural education. The findings also imply that computer-based instruction may possibly encourage greater retention than traditional classroom instruction.

Evaluation of the responses given by the students to statements regarding students' perceptions concerning the appropriateness of computer programs as educational tools revealed that students agree that computers are an important part of school and work but they prefer that computers be used in the classroom with an instructor present rather than using the computer on their own. As a group they do not feel that they are willing to eliminate traditional classroom instruction. The following table illustrates the students' responses.

Table 2

Means and Standard Deviations of Perceptions of Computer-based Instruction for Control and Treatment Groups

Statement: (n = 40)	Mean[a]	Std. Deviation
I have used the World Wide Web to locate information.	4.50	.78
I have sent and received messages by electronic mail (e-mail).	4.60	.84
I have taken classes requiring me to get information using a computer link.	4.70	.52
I prefer to use a typewriter rather than a computer when writing papers.	1.25	.71
Computer-based instruction is a good method to use for learning at home.	3.52	.93
Computer-based instruction is a good method to use for learning in the classroom.	3.22	1.12
If given the choice, I would select computer-based instruction over traditional classroom lectures.	2.30	1.02
If given the opportunity, I would choose to take classes away from campus via computer-based instruction with no fixed schedule, rather than attending traditional classroom lectures on campus.	1.93	1.10
Computer-based instruction is just as interactive as classroom instruction.	2.05	.93
Computer-based Instruction provides more effective feedback than traditional classroom instruction.	2.03	.95
I believe computer-based instruction can be used successfully without the presence of an instructor for college classes when appropriate.	2.60	1.28
Computer usage will be an integral part of my future job.	4.03	.95
I enjoy working with computers.	3.85	1.10
I believe computers can enhance learning.	4.18	.75
I prefer to learn in a traditional classroom setting.	4.12	.82
I find computers frustrating.	2.98	1.21
I enjoy using computers to learn about new topics.	3.83	.78
Learning with computers is more comfortable than traditional classroom instruction.	2.22	.77
I believe computers can be used as a teaching tool in the classroom for appropriate college classes.	4.15	.70

[a] A value approaching 5 indicates agreement with the statement;
A value approaching 1 indicates disagreement with the statement.

The majority of the students believe that a combination of traditional classroom instruction and "stand-alone" computer-based instruction or computer-based instruction in a lab setting with an instructor present would be the best instructional method. Thus, students who participated in this study did not believe that using computer-based instruction at home (self-directed) would fit their needs.

Preliminary Conclusions

The results of this study suggest that computer-based instruction may serve as an effective means of delivering cross-cultural education for agriculturalists. In fact, results suggest that computer-based instruction may be more effective in assisting learners to retain knowledge than traditional classroom instruction. Given the fact that computer-based instruction has the potential to be

provided in a timely manner, at a reduced cost, and to an increased number of students, this method of instruction should be considered by educators within the field of agriculture to teach cross-cultural education.

Based on the responses by the participants to statements regarding the appropriateness of computer programs as educational tools, one can be certain that students expect computer-based instruction to become a part of mainstream educational techniques. However, the students did express hesitation toward using computer-based instruction in a stand-alone situation without an instructor present.

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