Student Responses to the Initial Use of a Computer-Based Tutorial in an Introductory Agricultural Economics Course

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Abstract

This paper offers a comparison of the results of two questionnaires designed to measure students' initial and subsequent attitudes toward the use of the *AECONIntro*™ *A DiscoverEcon*™ *Tutorial* in an introductory agricultural economics course. The results indicate little change in student attitudes after using the tutorial. The lack of change is maintained to be a function of the hazards of failing to understand the limitations of computer-based tutorials, and the overly optimistic expectation that students would be interested in using this educational tool any more than the text on which it is based.

Introduction

The development of computer-based tutorial programs that supplement the standard text-lecture learning approach represents an important attempt by authors and publishers of undergraduate texts to provide students with an additional tool for mastering basic aspects of a subject. As noted by Kupchella (1994, p. 2), new technologies, such as computer-based tutorials, "involve students in learning by making learning more interactive . . . ," or at least they should. As the application and development of computer-assisted learning programs become increasingly common features of textbook offerings, instructors and students will need to become more accustomed to their use and better informed about the limitations of their applications (Albright and Graf, 1992; Cox, 1989; Dahlgran, 1993).

Reliance on the assumption that students will gravitate toward the use of computer-based tutorial programs may limit the effective use of tutorials by students, especially if student predispositions affect their willingness to fully utilize a computer-based tutorial. Thus, the two purposes of this study are: (1) to determine if students are positively or negatively predisposed toward using a computer-based tutorial, and (2) to determine if their attitudes change after they have been exposed to the tutorial. If students naturally gravitate toward the use of computer-based tutorials, then their initial attitudes toward the tutorial should be positive. In addition, subsequent measures of student attitudes should increase if the benefits obtained as a result of using the tutorial (e.g., better grades, increased knowledge, easier mastery of course material) exceed the costs associated with its use (primarily the amount of time devoted). Given that the use of only one tutorial program is examined in this study, a discussion of the merits and problems associated with the use of this program is included to provide possible explanations for the results.

Procedures

The subjects used in this study were all members of the same introductory agricultural economics class taught during the fall term of 1994 through the Department of Agricultural Economics and Rural Sociology at the University of Tennessee, Knoxville. Use of the *AECONIntro*™ *A DiscoverEcon*™ *Tutorial* (*AECONIntro*) represented the first time that students in this introductory agricultural economics course were exposed to a computer-based tutorial. Though students may have used different computer-based tutorials in other courses, it was assumed that initial student attitudes toward the *AECONIntro* tutorial were not based on specific experiences with this tutorial. Instead, it was assumed that their initial attitudes were based on some underlying predisposition toward using computers and on the generic use of computer-based tutorials as learning tools.

The initial survey was conducted at the beginning of the term, prior to demonstrations or class assignments that required the use of the tutorial. Students were asked to rate, on a scale from 1 to 9, their level of agreement or disagreement with statements that were framed in terms of the students' expectations (e.g., "I expect that the *AECONIntro* tutorial will help me master the course material").

A follow-up questionnaire was distributed at the end of the course after students had been exposed to the tutorial through homework assignments, in-class presentations, and a graded assignment in which students individually demonstrated their ability to maneuver through a chapter in the tutorial and use some of the tutorial's features. Statements in the follow-up questionnaire were framed in terms of the students' experiences (e.g., "I found that the *AECONIntro* tutorial helped me master the course material").

Students were asked to anonymously and voluntarily respond to the two questionnaires. The survey statements were

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patterned after questions used in a study by Butler and Herbig (1992) that examined the application of a computer export simulation program by business students.

Thirty-three students were enrolled in the introductory agricultural economics class during the period this study was conducted (the fall term of 1994). Twenty-nine of these students responded to the initial questionnaire and 21 responded to the follow-up questionnaire. No effort was made to determine the reasons for nonresponses. However, it is likely that the response rate was heavily influenced by student classroom attendance on the days that the questionnaires were distributed.

Background

Although the use of computer simulation packages is fairly common in agricultural economics courses, the *AECONIntro* tutorial is one of the first widely distributed computer-based learning tools produced for an introductory course in agricultural economics. Given that this tutorial represents a recent innovation in agricultural economics education, the literature review for this study concentrated on the general use of computer-assisted learning programs in college courses and, to a lesser extent, on the use of simulation programs. In general, the literature review revealed that computer-assisted educational software typically is designed: (1) to address perceived difficulties that instructors experience in teaching subjects, (2) to augment or reinforce information and concepts presented in texts and lectures, and (3) to overcome perceived problems that students encounter in learning certain concepts (Abouserie et al., 1992; Jones and McCormac, 1992; Legacy et al., 1994; McCaslin and Torres, 1992; Lambert, 1991; Neapolitan, 1989; Schmidt and McCracken, 1988). Nonetheless, the extent to which programs deliver these benefits is affected as much by their design as by the applications and attitudes of the students and teachers using the programs (Albright and Graf, 1992).

The *AECONIntro* tutorial was developed in 1994 by G.C. Nelson and W.D. Seitz to accompany a text co-authored with H.G. Halcrow entitled *Economics of Resources, Agriculture, and Food*. [Refer to Nelson and Seitz (1994) and Seitz et al. (1994), respectively, for complete citations.] Although a companion student workbook was available from the publisher, only the textbook and the electronic tutorial were used by the students during the course. As noted in the user's manual that accompanied the computer diskette, this software was developed by the authors to allow students "to review concepts covered in lectures, to experiment with these concepts in an interactive environment, and to show mastery of these concepts with exercises" (Nelson and Seitz, 1994, p. 1, user's manual).

The *AECONIntro* computer tutorial, which is based on Asymetrix Toolbook™ software and features a menu-driven program, enabled the users to combine text, graphs, and "movies" related to concepts presented in 12 of the textbook's chapters. The tutorial also included multiple-choice and fill-in-the-blank questions that were corrected automatically, and a glossary of important terms used in the textbook. Terms used in the text of the tutorial that were contained in the tutorial's glossary were italicized to signify that definitions were available for reference, and that the user could call up those definitions by "clicking" on the italicized word using the mouse cursor.

The *AECONIntro* tutorial also provided users with a brief operations guide and instructions on installation and troubleshooting, all of which, according to Walbert (1988), are important features for computer-based tutorials. In terms of the tutorial's actual usefulness, however, the content quality of the 12 individual tutorial chapters varied. As noted by Walbert, one of the more limiting features of many tutorial programs is that they do not allow students or instructors to do more than serve as electronic page turners, and this proved to be the case for portions of every chapter in the *AECONIntro* tutorial.

Furthermore, as reported by Laurillard (1987), most computer-assisted learning programs embrace a rather didactic model of teaching, and the *AECONIntro* tutorial examined in this study was no exception. Although mathematical results may not be negotiable, most economic concepts are open to interpretation; even at an introductory level, the art as well as the science of economics needs to be communicated to students. In addition to some minor technical annoyances (discussed in detail by Stallman, 1994), the coordinated use of the tutorial with the text was limited because it did not appear that a pragmatic effort was made to effectively integrate these two resources. For example, references about the use of the tutorial were presented in the text, but there were no helpful suggestions about ways to augment class-based or outside activities with the tutorial.

Although many concerns about the *AECONIntro* tutorial emerged during the semester, the use of the tutorial was not suspended during the term. Thus, some rather substantial differences between the results of the initial and subsequent questionnaires were expected.

Results

If values of 5 and higher (on the scale from 1 to 9) can be assumed to signify that students are in agreement with the statements in the questionnaire, then the survey results presented in Table 1 suggest that students initially were somewhat positive about the use of a computer-based tutorial. However, the results also indicate that student attitudes did not change appreciably following their actual exposure to the *AECONIntro* tutorial. One might speculate that the initial mildly positive, but subsequently unchanged, student attitudes indicate that students' expectations about the tutorial were maintained, but not exceeded. If this is the case, then the previously discussed problems associated with the use of the tutorial may not have been sufficiently serious to affect the students' attitudes toward the tutorial. However, the tutorial's weaknesses may have dampened the students' motivation to use the tutorial more frequently.

Table 1. Survey Results of Student Perceptions Related to the *AECONIntro*™ *A DiscoverEcon*™ *Tutorial*

Survey Statements	Before Tutorial Use	After Tutorial Use
(1) Expected that using the tutorial would help master the course material.	6.66 (1.97)	6.48 (1.53)
(2) Expected that using the tutorial would make the course more interesting.	6.86 (1.63)	6.43 (1.47)
(3) Expected that using the tutorial would enable students to apply the course material to real-life situations.	6.48 (1.79)	6.33 (1.67)
(4) Expected that using the tutorial would provide an understanding of agricultural economics issues that were related to, but went beyond, the material covered in the course.	6.72 (1.76)	6.91 (1.31)
(5) Expected that using the tutorial would be enjoyable.	5.97 (1.75)	5.67 (2.44)
(6) Recommended using the tutorial in other introductory agricultural economics courses.	7.25 (2.05)	7.00 (1.45)
(7) Thought that the tutorial should be used in class as part of the lecture.	6.90 (2.01)	6.38 (2.19)
(8) Expected that students' efforts to learn and use the tutorial would enable them to obtain a better grade in the course.	7.79 (1.35)	6.91 (1.90)
(9) Thought that the tutorial exercises were especially helpful after reading the corresponding chapter in the textbook.	7.62 (1.19)	6.67 (1.58)
(10) Recommended the continued use of the tutorial in future sections of the course.	N/A (N/A)	7.29 (1.55)

Notes: The scale for survey responses ranged from 1 to 9, with 1 = "strongly disagree" and 9 = "strongly agree." Numbers in parentheses are standard deviations.

The before and after responses to a few of the statements presented in Table 1 provide some interesting insights into students' attitudes. For example, responses to statement 5 reveal that students thought that using the tutorial would be (and was) enjoyable, but their level of support for this statement was at best modest (with before and after scores of 5.97 and 5.67, respectively). Nonetheless, students were fairly supportive of statement 6, which dealt with recommending the use of the tutorial in other agricultural economics courses (reflected by scores of 7.25 before and 7.00 after).

The responses to statement 8, which dealt with receiving better grades as a result of using the tutorial, showed one of the greater declines in agreement by the students (dropping from 7.79 to 6.91). However, this decline may have been due to the fact that students had more information on which to base their expected course grades by the end of the term. The negative change also may indicate that students did not perceive that time spent using the tutorial contributed to their exam grades. Karrer (1991) found, for other computer-assisted learning materials, that the quality of the tutorial was related to academic achievement. If student perceptions about their grades are an indication of how much they have learned, then this result may suggest that the tutorial failed to enhance student experiences in the course. However, it is important to note that some researchers argue against the use of student opinions in the assessment of computer-assisted learning programs (Jones and McCormac, 1992).

The greatest decline in agreement by the students is shown in their responses to statement 9 ("the tutorial exercises were especially helpful after reading the corresponding chapter in the textbook"), with before and after scores of 7.62 and 6.67, respectively. This decline in the perceived usefulness of the text/tutorial approach may reflect a number of issues, including the possibility that students relied more heavily on individual sources of information than on a combination of their lecture notes, readings, and tutorial resources. This result also may imply that students did not use the tutorial as often as anticipated by the software authors (and the course instructor) for the tutorial's intended purposes of reviewing concepts covered in lectures, experimenting with these concepts in an interactive environment, and demonstrating mastery of these concepts with exercises.

Finally, students reported that they favored the continued use of the tutorial in future sections of this course (statement 10). This result reveals that the students probably recognized the tutorial's value as a learning tool, even if they did not take full advantage of it. Given the time constraints that students place on themselves during a typical semester, it may have been difficult for them to allot time to use the tutorial in any fashion beyond what was required to complete course assignments. Unfortunately, this explanation implies that the potential gains associated with using the tutorial did not offset the perceived negative aspects associated with its use.

Summary

The results present an interesting dilemma with regard to the continued use of the *AECONIntro* tutorial. The initial responses indicate that students were at least mildly interested in using computer-based tutorials, suggesting encouragement for its continued use. However, the follow-up responses indicate that initial experiences by the students with the *AECONIntro* tutorial did not kindle any special enthusi-

asm for this learning tool. Unfortunately, neither the data used in this study nor informal conversations with students provide any clear insights as to why student attitudes about usefulness of the tutorial did not improve. Possibly the tutorial was not the labor-augmenting technology that students and the instructor expected.

Clearly, the authors and publishers of this tutorial did not produce a program that can be universally considered a student-inspiring learning tool. However, the tutorial remains an additional medium through which information can be conveyed to students. Although the merits of the use of this tutorial are called into question by this study, this outcome may be as much a function of the way the tutorial was utilized as it is a function of the weaknesses in the *AECONIntro* tutorial (or any other computer-based tutorial for that matter). Certainly, the benefits of this tutorial as a learning tool cannot be dismissed without first determining what might replace it (e.g., additional review sessions, class projects, or readings).

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