College Student Use of a Computer Authoring System in Agriculture

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Introduction

Computer use in agriculture is increasing rapidly. William and Sutphin (1991) report that microcomputers are used in nearly every phase of agricultural business and industry. Schloss et al. (1985) and Wade (1991) have both noted that agriculture professors have begun to incorporate microcomputer software into their curricula. There has been a tremendous growth in the use of computer hardware and software for educational uses (Randall and Punniper, 1990).

Progress has been made to the point that small, inexpensive computers with expanded capabilities and software are available for many uses. Microcomputers are useful in storing, processing, and analyzing farm records as well as in assisting in such decisions as ration formation for livestock. An agriculturist may use a microcomputer to determine the marketing strategy for beef animals or to maintain farm records, while students in agriculture may use interactive computer programs for problem solving (Foster and Marvin, 1982; Myron, 1982; Norman and Stewart, 1986).

According to Schloss et al. (1985) the popularity of computer assisted instruction has been supported by limited research findings. Recent finding includes, computer assisted instruction and teacher directed instruction as effective methods. Computer assisted instruction may enhance students attitudes toward educational technology and reduce instructional time required for students to master new concepts.

One consistent finding of educational research is that learning of all kinds is enhanced when learners can do something with what they are learning and see the results of what they have done. An authoring system can be programmed for repeated input from and response to users. Authoring systems allow students to attempt learning activities and receive feedback on their attempts (Decker, 1983; Allen, 1987).

Chaille (1989) emphasizes that computers should be used in ways that are compatible with educational goals. Authoring systems provide students with opportunities to control variables and engage in learning experimentation.

Anything that can be written or drawn, can be included in an authoring program. As computer use continues to expand, more curriculum materials will become available in the form authored microcomputer software. If teachers, students and course planners make use of CAI, the use of authoring systems seem to offer a realistic way forward (Foster and Marvin, 1982; William, 1983; Willis, 1983).

One of the newly developed authoring systems called Progenitor (Pg) is still under experimentation in Carbondale at Southern Illinois University. PROGENITOR(c) is an interactive authoring package that has seven main frames. The seven frames are: text, multiple choice, fill in the blank, true/false, matching, free input and student progress reports. This study was undertaken to examine college student uses of Pg software in an agriculture classroom.

Purpose of the Study

The study attempts to use student perceptions and knowledge acquired through prepared lessons to determine the potential of an authoring system Pg in an agriculture classroom.

Statement of the Problem

The problem of this study was to determine the usefulness of the authoring system Pg in an agricultural classroom.

Research Questions and Hypothesis

The study was designed to answer the following research questions.

1. Do gain scores and the time spent using Pg predict student perception scores in usefulness of Pg?
2. Do perception scores and the time spent using Pg predict student gain scores in an agriculture classroom?

Procedure

The subjects used for this study were all 40 students in PLSS 200 (Introduction to Crop Production) class of spring 1992 in College of Agriculture at Southern Illinois University. Student use of the microcomputer authoring system Pg in agriculture was measured in three ways. First, students were given a pretest. Second, students recorded the amount of time Pg was used during a period of three months. Finally, students were given a posttest and a perception questionnaire during the last week of the three months of the study. The

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researcher received all forty of each the three instruments from the subjects.

The dependent variables were perception score (P), and score gained (S). The independent variables were time used (T), age (A) and computer experience (C). Perception score, and score gained were used as both dependent and independent variables. The statistical methods employed included multiple linear regression. In all tests an alpha level of significance of .05 was employed.

Treatment of Data

Characteristics of the subjects were summarized in tables that contain mean, standard deviation, and frequencies. The over all F value, R-Square, SS, df, bj, MS and Adj-R-Square was calculated using SAS (Statistical Analysis System).

Findings

Of the 40 agricultural students surveyed on the use of Pg, the posttest score average was 83.93 and pretest score average was 44.88. See Table 1 for other means and standard deviations.

Table 1 Table of Means and Standard Deviation for Variables (N=40)

VARIABLES	MEAN	STANDARD DEVIATION
PERCEPTION SCORE (P)	30.72	9.45
TIME USED (T)	10.13	2.41
SCORE GAINED (S)	38.18	23.19
AGE (A)	21.68	6.06
MONTHLY HOUR COMPUTER EXPERIENCE (C)	10.23	6.73
POSTTEST SCORE	83.93	9.78
PRETEST SCORE	44.88	20.87

Findings of the Research Question and Hypotheses

Research Question 1

Do gain scores and the time spent using Pg predict student perception scores regarding the usefelness of Pg?

The null hypothesis is: Ho: $ß_1 = ß_2 = 0$

Table 2, is a summary of multiple regression of student perception score (measured on a scale of 45 points total) on student score gained (difference between posttest and pretest, measured on 100 points, respectively) and student time used (measured in hours) for the use of Pg in agriculture. The overall F values for this prediction was significant at alpha = .05 level ($F_{2,37} = 3.91$, P = .0287). The answer to research question one was score gain and time spent using Pg did predict student perception scores of Pg.

The fitted regression equation model is P = 15.12 + 0.15 (score gained) + 0.98 (time used). With R – Square = .175 (see Table 2), only 18 percent of the variance of student perception score was explained by student gain scores and time use.

Research Question 2

Do the perception scores and the time spent using Pg lessons predict student gain scores in the agriculture classroom?

The null hypothesis is: Ho: $ß_1 = ß_2 = 0$

The overall F values (see table 3) for this prediction was significant at alpha = .05 level ($F_{2,37} = 3.24$, P = .0406). The answer is the perception score and time used by students in learning the prepared lessons did predict their gain scores in the use of the prepared lesson written with Pg.

The fitted regression equation model is S = 28.67 + 0.92 (perception score) + –1.87 (time used). With R – Square = .15 (see Table 3), only 15 percent of the variance of student perception score was explained by student score gained and student time used.

Table 2 Summary Table of Multiple Regression of Perception Score (P) on Student Score Gained and Student Time Used

Source	df	SS	MS	F	P	R-Square	Adj R-Sq	bo	b1	b2
MODEL	2	608	304	3.91	.0287	.175	.130	15.12	.15	.98
ERROR	37	2874	77.7							
TOTAL	39	3482								

Table 3 Summary Table of Multiple Regression of Score Gained (S) on Student Perception Score and Student Time Used

Source	df	SS	MS	F	P	R-Square	Adj R-Sq	bo	b1	b2
MODEL	2	3124	1562	3.24	.0406	.15	.10	28.67	.92	–1.87
ERROR	37	17852	482							
TOTAL	39	20976								

Discussion

Progenitor (Pg)

The Pg authoring system was chosen for investigation with regard to its potential use in agriculture. The study demonstrated that it was advantageous for students to use Pg. The students, strongly agree that prepared lessons are useful learning instruments, that Pg application in studying for tests is very important, and that gen-

erally, Pg is useful to them.

This study has confirmed the potential usefulness of microcomputer authoring systems in the agriculture classroom. The Pg authoring system can be used by students and teachers to develop computer based instruction. It is easy to develop tutorial, drill and practice questions using Pg.

Of the 40 agricultural students surveyed on the use of Pg, the sample posttest score average was 83.93 and pretest score average was 44.88. Score gained and time used by students predicted their perception scores regarding Pg. Perception score and time used also predicted student gain scores.

Recommendations

The following recommendations are based on the study's conclusion:

1. Future studies should consider larger sample sizes to increase the power of prediction. This power can also be improved by adding other variables to the model (as in DATA = MODEL + ERROR). Such variables might include availability of Pg software, class subjects to be used and availability of computers.
2. It is recommended that future studies of this nature take into account teachers' perceptions of the efficacy of using Pg.
3. Pg software is recommended to be made available in Agriculture computer laboratories for student use in preparing self study tutorials.
4. It is also recommended that future studies of Pg include experimental studies to compare Pg use with traditional methods of learning.

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