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Richard T. Christoph
Dakota State University

Richard D. Puetz
Dakota State University

Jack H. Walters
Dakota State University

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USING SELF-EFFICACY PRECEPTS TO EVALUATE THE INSTRUCTIONAL EFFECTIVENESS OF THE USE OF TABLET PC SYSTEMS IN THE CLASSROOM

Richard T. Christoph, rick.christoph@dsu.edu, Richard D. Puetz, rick.puetz@dsu.edu and Jack H. Walters, jack.walters@dsu.edu, College of Business and Information Systems, Dakota State University, 820 N. Washington, Madison, SD 57042, 605-256-5165

ABSTRACT

This paper provides initial results of a study administered to students enrolled in traditional classroom-based courses at a small public university in the Midwest. This university has a technology mission and requires the use of Tablet PCs by all incoming students seeking bachelor's degrees. The purpose of this study is first, to measure student reactions to components of Tablet PC-based instruction as suggested by self-efficacy precepts, and second, to measure the differences between student groups with regard to perceptions of academic performance when using Tablet PC systems in traditional classroom settings. Initial findings show strong student enthusiasm to the adoption of the Tablet system and also suggest a direct connection between student self-efficacy levels and academic performance expectations.

INTRODUCTION

Dakota State University (DSU) has pursued a technology-based mission since the mid 1980's. As part of that mission, all incoming students are required to lease and use Tablet PCs as their main computing platform. Approximately 1,300 Gateway M275 tablets are in daily operation and connect to the DSU campus-wide wireless network. [16] suggested that additional research is needed to identify factors that impede successful training through the use of technology. [1] called the inability to adapt to new technologies "technostress," stating that it was a negative side effect similar to physical and emotional burnout. One contributing factor of technostress may be the self-efficacy levels of trainees. [13] and [3] suggested that the self-efficacy construct should be considered in the development of instructional technology to enhance the effectiveness of training. In fact, [14] has argued that one of the most promising constructs from a theoretical perspective is the understanding of self-efficacy and related outcome expectancies.

Self Efficacy Concepts

According to [2], self-efficacy refers to "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance. It is not concerned with the skills one has, but the judgments of what one can do with whatever skills one possesses." Computer self-efficacy is a belief in one's capability to use a computer [7]. Computer-based efficacy has been identified as a major factor in a person's decision to use a computer [9]. A study by [8] noted those subjects with higher levels of computer self-efficacy performed better in computer training situations [6] suggest that multimedia self-efficacy can be defined as a judgment of one's capability to understand and benefit from utilizing multimedia-based instruction. All of these studies suggest that there is a significant and positive relationship between an individual's self-efficacy with a specific pedagogy and corresponding learning results. Several studies have found that self-reported measures of computer experiences and software packages used are significant predictors of computer self-efficacy [9], [18],

[4]. Prior computer training and owning a computer have been found to be significantly correlated with computer self-efficacy [18], [11]. [11] also found that high school courses with spreadsheets and databases and having worked at a job with computers contributed to higher computer self-efficacy. However, in [4]’s study, prior training and owning a computer were not significant predictors. A prior high school programming class did not increase computer self-efficacy [11]. [5] focused on technologies used in distance education and defined self-efficacy as a judgment of one’s capability to understand and benefit from distance education courses taught with a high degree of computer-interface requirements (for example, Internet courses). In a study of students in a similar computer literacy class, [15] found that the self-efficacy of the students in one of the classes went down by the end of the semester. [4] suggest that a self-efficacy scale be used to identify students with low computer self-efficacy.

RESULTS

On the first day of class in the fall 2005 semester, a Tablet PC instructional survey of 23 questions was administered to all 308 incoming freshman students taking the mandatory CSC 105 Introduction to Computing class. The survey, using a Likert 1 to 5 scale, sought to ascertain individual students’ self-assessed level of Tablet PC expertise, which serves as a proxy for individual Tablet PC self efficacy.

- **Hypothesis 1:** *There will be no difference between student beliefs concerning the effectiveness of*

Question	N	Mean	Prob>T	Accept/Reject
I would learn more effectively with a Tablet PC.	Familiar → 182 Unfamiliar → 75	1.55 1.62	0.4104	Accept
Having class notes on my Tablet PC helps me learn.	Familiar → 182 Unfamiliar → 75	1.50 1.83	0.0006	Reject
The learning process will be harmed when using Tablet PCs.	Familiar → 182 Unfamiliar → 75	4.11 3.97	0.2126	Accept
My test performance will be enhanced using Tablet PCs.	Familiar → 182 Unfamiliar → 75	2.76 3.04	0.0002	Reject
I would recommend a class using Tablet PCs over classes without Tablet PCs.	Familiar → 182 Unfamiliar → 75	2.37 2.57	0.033	Reject

Table 1 shows a statistically significant difference between students professing high self efficacy levels who more strongly prefer classes be taught with the Tablet PC, and students less comfortable with the technology. High self-efficacy students also expect their test performance to be improved and are more likely to recommend Tablet-based classes than lower self-efficacy students. Three of the five questions in this group statistically reject the null hypothesis in favor of the alternate which states, “*There is a difference between student beliefs concerning the effectiveness of Tablet PC based instruction based on student self-efficacy levels.*”

- **Hypothesis 2:** *There will be no difference in expected level of student in-classroom performance when using Tablet PC systems, based on students’ self-assessment of their level of expertise.*

Question	N	Mean	Prob>T	Accept/Reject
I would be less bored when using a Tablet PC.	Familiar → 182 Unfamiliar → 75	1.76 2.19	0.0001	Reject
I prefer classes taught without using Tablet PCs.	Familiar → 182 Unfamiliar → 75	4.27 3.96	0.0186	Reject
I believe Tablet PC use will tend to distract me from classroom topics.	Familiar → 182 Unfamiliar → 75	3.60 3.34	0.0407	Reject

Table 2 shows that generally, all students believe the Tablet PC will not harm the classroom experience and that they would prefer classes be taught using the Tablet. Self efficacy theory would suggest these beliefs would be stronger in students possessing higher self efficacy levels as based on [2], [7], [9]. This theoretical underpinning is supported by the statistically significant differences between student groups reported in Table 3. Clearly, high self efficacy students believe that they will be less bored, less distracted, and prefer that classes be taught with Tablet PC system than their low self-efficacy peers.

CONCLUSIONS

This paper reports the results of a study administered that finds that self-efficacy concepts clearly play a role in student expectations of success. Students with high self-efficacy levels consistently believe they will be more successful with the Tablet PC system and that Tablets will enhance the educational process. This result supports the findings of other studies [5] and present a very positive, initial review of the incorporation of Tablet PC systems into the classroom. However, it is uncertain how future student perceptions and academic outcomes will actually develop. As a result, this survey should be administered again during the same class to provide additional longitudinal data.

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