

STUDENTS' SELF-EFFICACY, OUTCOME EXPECTANCY, AND ATTITUDES REGARDING THE USE OF ELECTRONIC TEXTBOOKS

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ABSTRACT

There are a variety of technological advances which continue to impact learning both inside and outside the classroom. One of these technologies is electronic textbooks. Electronic textbooks are adopted and used for a variety of reasons. One is to facilitate learning by assisting students in fashions better suited to their learning styles. Another is driven by costs. The research presented examines students' attitudes regarding the use of electronic textbooks using a model grounded in social cognitive theory. The empirical study is based on 604 student responses to a questionnaire regarding their attitudes toward electronic textbooks. The results were produced using structural equation modeling and showed significant positive relationships between both students' self-efficacy and outcome expectancy/usefulness to students' attitudes toward electronic textbooks.

INTRODUCTION

New educational applications of technology have increased and changed over the years. Instead of using film strips and overhead projectors, professors now use interactive tools like YouTube, podcasts, blogs, and wikis [14]. Some of the technologies are used in the classroom, some outside the classroom. Often, such applications facilitate learning by assisting students in fashions better suited to their learning styles, while others are driven by costs. The application of technology examined in this research, electronic textbooks (i.e., e-texts), focuses on both.

Specifically, the research examines students' attitudes regarding the use of e-texts instead of traditional texts. It is based in a model grounded in social cognitive theory. The objective is to link student attitudes to key variables that faculty may influence. The ultimate hope is to be able to make recommendations regarding how faculty can impact these manageable variables to appropriately influence students' attitudes regarding the use of electronic textbooks.

THE LITERATURE

The rising cost of paper textbooks is causing students to consider electronic alternatives to traditional textbooks. On average, a college textbook costs \$125 with many texts not resalable on the used textbook market. The total textbook cost for a typical year of classes is close to \$1,000 [6] [18]. The expressed concerns of students, parents, state legislatures, federal agencies, university bookstores and book publishers have made textbook costs an important and controversial issue on college campuses [5] [13]. To address textbook costs, various options have been created such as an extensive electronic materials library, free e-books, textbook rentals, and advertising-supported books [6] [18]. Providers of electronic content access are experimenting with different, lower-cost text pricing models. Some are free, while others have a quarterly or semester fee, or request a donation to a cause/program [18] [19].

Even though it is a lower cost textbook option, the shift to electronic material has been slow. The electronic medium changes the mechanics of reading textbooks. The lack of comfort reading from the computer has slowed the acceptance of electronic textbooks [4]. Eye strain from a computer screen and back and neck problems are also a concern [7]. Although new electronic readers such as Amazon's Kindle have improved the ability to read electronic textbooks, students were "trained" to use traditional textbooks [4]. Many students want to be able to pick up the textbook as needed, as opposed to being tethered to a computer. On the other hand, students spend around five hours a day using a computer or mobile device, watching a television screen, or playing video games [14]. On college campuses computer ownership, the Internet, social networking, and short text messaging have become ubiquitous [8]. College student's acceptance of various communication devices and technology creates the possible impetus for changes in college textbooks.

Accepting a technology depends, at least in part, on whether individuals (e.g., students) believe that the technology will benefit them. Predicting and perceiving individual's beliefs for future computing use can be based on self-efficacy theory or social cognitive theory [3]. The theory [1] [2] links an individual's cognitive state to a variety of outcomes. In self-efficacy theory, expectations (e.g., motivation, performance, and feelings of frustration associated with repeated failure) determine reactions in numerous situations. If a technology is perceived to be useful, an individual is more likely to adopt and use it in the future [11]. Furthermore, the extensive use of technology in the classroom requires some degree of non-volitional technology use.

Previous research using self-efficacy theory has explained individual's reactions in a variety of contexts including reactions to information technologies [11] [20]. Bandura [2] separated the affective and behavioral outcomes into two distinct types, self-efficacy and outcome expectancy. An individual's belief that he or she possesses the skills and abilities to successfully accomplish a specific task represents self-efficacy. Outcome expectancy/usefulness is an individual's belief that by accomplishing a task, a desired outcome is attained.

Within this context, in order to receive a return on an investment in new technology such as the purchase of an electronic textbook, individuals must use it [21]. Acceptance depends on the student's belief that the electronic textbook is beneficial or useful (i.e., outcome expectancy/usefulness) and that they have the capabilities to complete needed tasks (i.e., self-efficacy). The hypothesized model relates both self-efficacy and outcome expectancy/usefulness to students' attitudes about electronic textbooks. Additionally, self-efficacy is hypothesized to directly impact outcome expectancy/usefulness.

THE EMPIRICAL STUDY

The data to empirically test the presented model were collected using a survey of students at a mid-sized university in the western United States. The questionnaire was web-based and distributed using Qualtrics. An invitation to participate was distributed via a student listserv to 11,957 students. A total of 1382 responses were received producing a 11.56% response rate. Among these 1382 responses, 646 respondents or 46.74% reported prior use of an electronic textbook. However, not all of the respondents answered all the items. Eliminating the responses with missing values produced 604 usable responses from those who have used an electronic textbook. These 604 responses compose the sample.

The demographics of the respondents were collected. For the amount of daily computer use, the most frequently reported category at nearly 49% was 3 to 5 hours per day. Six to nine hours per day was the

second most frequently reported category at just over 30%. Nearly 62% of the responding students reported that they did not own a desktop computer while almost 95% said they had a laptop computer. Over 58% of the respondents were female and the average grade point average was 3.36 with a range from 0.97 to 4.00. The students were also asked to self-report the college in which they were enrolled. The most frequently reported colleges were business and economics and liberal arts and social sciences at almost 23% each. The next most often reported college was engineering at almost 16%.

The measures used in the study were formed by collecting student responses to a number of questionnaire items. For all items, students were given a statement and a scale upon which to respond. The scale had anchors of 1-Strongly Disagree; 2-Disagree; 3- Neither Agree or Disagree; 4-Agree; and 5-Strongly Agree. All the standardized path coefficients for the items in the measures were estimated using a confirmatory factor analysis in which all latent variables were exogenous and allowed to pair-wise correlate. The estimation was performed using Calis in PC SAS and maximum likelihood estimation.

The items forming the measures and the psychometric properties of the measures are shown in Table 1. The students' attitudes regarding e-texts had four items. The standardized path coefficients were between 0.89 and 0.94. The shared variance for this measure was 85% and its reliability was 96%. Outcome expectancy/usefulness was developed using four questionnaire items. The standardized path coefficients ranged from 0.94 to 0.96. The reliability coefficient was 0.97 with shared variance of 90%. The two self-efficacy items had standardized path coefficients of 0.57 and 0.81. Its reliability coefficient was 0.65 and its shared variance was 49%.

Table 1: THE INDICANTS AND MEASURES

Indicant	Standardized Path Coefficient	Reliability Coefficient	Shared Variance %
Outcome Expectancy/Usefulness		0.97	90%
Using an electronic textbook helps....			
1. me do a better job in my classes.	0.94		
2. improve my quality of academic work.	0.94		
3. make me more successful in class.	0.95		
4. improve my academic performance	0.96		
Attitudes		0.96	85%
5. The likelihood of purchasing an electronic textbooks is...	0.89		
6. My willingness to buy an electronic textbook is...	0.94		
7. Next time I have the choice, I plan to use an electronic textbook.	0.93		
8. In the future, I plan to use an electronic textbook.	0.93		
Self-Efficacy		0.65	49%
16. I feel more competent using electronic textbooks than most of my classmates.	0.81		
17. I know enough to successfully use electronic textbooks..	0.57		

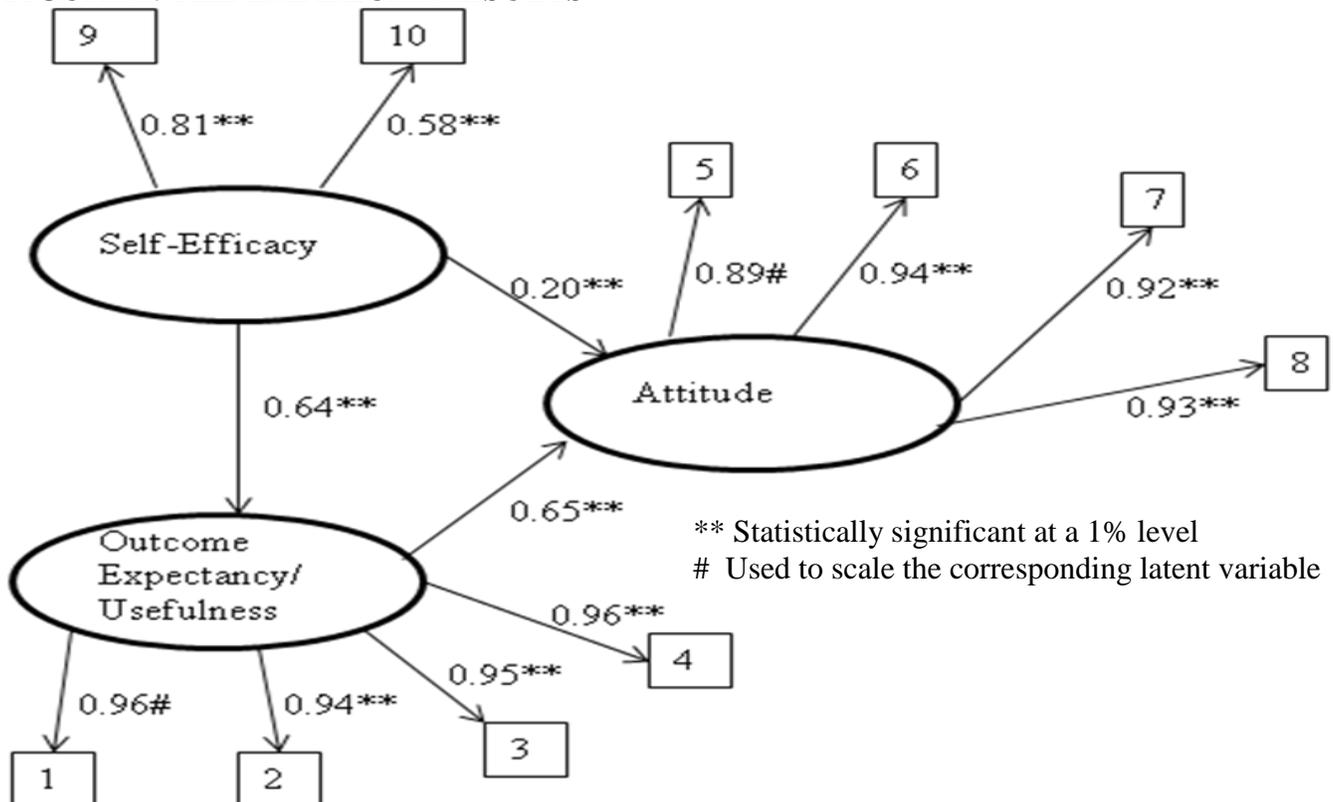
Based on the magnitude of the standardized path coefficients, it can be argued that item reliability is satisfied, with the possible exception of one item in the self-efficacy measure [17]. This item had an

estimated path coefficients of 0.57 while all the other items had standardized path coefficients of 0.81 or higher. In terms of measure reliability, all the measures except self-efficacy demonstrate adequate values of this trait [17]. The self-efficacy measure had a reliability coefficient of 0.65, slightly below a generally accepted cutoff level of 0.70 [15]. The remaining measures had reliability coefficients of 0.96 and 0.97. These results indicate that the measures, with the exception of self-efficacy, satisfy convergent validity [12].

Discriminant validity was also examined by comparing, for each pair of measures, their squared correlation to their individual percentage of shared variances. If discriminant validity is satisfied, the items within a measure share greater common variation among themselves than with the items between the two measures. All the values were calculated using the confirmatory factor analysis results. Discriminant validity is satisfied for each measure pair if the individual measures' percentage of shared variance are greater than the squared correlation between the two measures [9]. Based on the estimated values, discriminant validity is satisfied for all pairs of measures.

The above provide mixed results regarding the psychometric properties for the measures. The self-efficacy measure appears to lack convergent validity. All the other measures satisfy both convergent and discriminant validity and hence construct validity [10]. The self-efficacy measure requires additional refinement.

FIGURE 1: THE EMPIRICAL RESULTS



The model displayed in Figure 1 was defined by the measures and their indicants and estimated using a structural equations approach. The estimation was done in PC SAS version 9.2 using procedure Calis

and maximum likelihood estimation. The questionnaire items were used as reflective indicants of their respective measures. The quality of the fit between the model and the data was summarized by several statistics. Overall, the quality of the fit was good. This is demonstrated by the goodness of fit index of 0.93, Bentler's comparative fit index of 0.98 and the incremental fit indexes range from 0.96 to 0.98. The root mean square residual was 0.02. These values satisfy the general levels of acceptable fit [10]. The remaining fit statistics provide less clear indications of the fit's quality. The adjusted goodness of fit index of 0.88 which was slightly less than the typical cutoff of 0.90. The chi-square statistic was 172.75 and significant at a 1% level. The normed chi-square statistic was 5.40.

All the estimated paths between the indicants and their respective measures were statistically significant at a 1% level. The empirical results for the structural model indicate that self-efficacy and outcome expectancy/usefulness have significant impacts on students' attitudes regarding electronic textbook use. In addition, self-efficacy has significant impacts on students' attitude through outcome expectancy/usefulness. All these paths are statistically significant at a 1% level.

DISCUSSION

Based on these results, it appears that if faculty want to encourage students' positive attitudes regarding electronic textbook they can do so by encouraging positive evaluations of self-efficacy and outcome expectancy/usefulness. These results are consistent with those found by Park [16] in the context of students' willingness to adopt and use e-learning technologies. Encouraging positive evaluations of self-efficacy by students have positive impacts on students' attitudes regarding electronic textbooks both directly and indirectly through outcome expectancy/usefulness. Furthermore, outcome expectancy/usefulness directly and positively impacts students' attitudes as well.

The key question is how can faculty impact students' self-efficacy and outcome expectancy/usefulness directly and indirectly their attitudes toward e-textbooks? Theoretically, there are categories of antecedents impacting self-efficacy and outcome expectancy/usefulness. These categories can be searched for variables at least partially controllable by faculty which positively influence self-efficacy and outcome expectancy/usefulness. For example, providing students with experiences using e-textbooks (personal mastery) impact both expectancies. Another potential technique would be to explain and demonstrate the use and advantages of e-textbooks (vicarious experience). Finally, faculty encouragement to use e-textbooks (verbal persuasion) could be helpful. These approaches are probably more helpful for students' future use of e-textbooks as opposed to current use.

CONCLUSIONS

Electronic textbooks are a growing trend in higher education. As with any new technology adoption, its success or failure depends on numerous factors. The research presented here identifies that students' self-efficacy and outcome expectancy/usefulness significantly impact students' attitudes towards using electronic textbooks. Additional research is needed to identify and more fully understand the factors directly influencing students' self-efficacy and outcome expectancy/usefulness regarding electronic textbooks. Hopefully, these factors will be at least partially controllable by faculty.

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