Effectively Integrating Technology in the Audit Course: An Application of the Technology Acceptance Model

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ABSTRACT

Long-term success in their careers requires that accounting students are knowledgeable in the theory of accounting as well as the impact that information technology will have on the application of that theory. There is currently little guidance, however, for faculty to achieve effective integration of accounting and information technology in the classroom. One measure of effectiveness would be the students’ acceptance of the technology integration. To measure the success of a technology implementation in a business setting, many researchers have applied the Technology Acceptance Model (TAM), developed by Davis (Davis, Bagozzi, and Warshaw, 1989). This paper applies the TAM to a curriculum context where computer assisted auditing techniques (CAATs) were integrated into a financial statement auditing class and provides evidence supporting the application.

Keywords  
Technology Acceptance Model (TAM), information technology, Computer Assisted Auditing Technique (CAAT), Audit Command Language (ACL), technology integration

INTRODUCTION

Can the Technology Acceptance Model (TAM) be applied to a curriculum context? The answer to this question is important because educators throughout the world are being required to meaningfully integrate technology applications into their courses (AICPA, 1999; Hastings, Reckers, and Solomon, 2003). Since the TAM has been successful in guiding technology implementations in business contexts (Davis, 1989; Davis, Bagozzi, and Warshaw, 1989), it is possible that the TAM could similarly inform the effective integration of technology into college curricula.

In an effort to enhance teaching effectiveness, the purpose of this paper is to apply the TAM to a curriculum context, referring to the revised model as TAM-C. To test the TAM-C, we consider a classroom context where computer assisted auditing techniques (CAATs) were integrated into a financial statement auditing class at a private business university. The results of a survey administered to 306 students revealed that both perceived usefulness and perceived ease of use were significant in explaining a student’s decision to recommend the continued use of CAATs assignments in the auditing course. The results imply that certain general factors that are important to technology acceptance in a business context are also important in an academic setting.

The remainder of the paper is organized as follows. The next section reviews the background literature and develops the research hypotheses related to students’ experiences with information technology integration. Section three describes the data collection process. Section four presents the results. The final section describes the conclusions, implications, and limitations of this research.
LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The Technology Acceptance Model (TAM)

The TAM is an application of the theory of reasoned action, tailored to model an individual’s acceptance of technology. The goal of the TAM is to explain the determinants of acceptance, across a wide range of technologies and users in a business context (Davis et al. 1989).

The TAM suggests that two specific beliefs of individual users, perceived usefulness and perceived ease of use, are the primary determinants of an individual’s acceptance of technology. In a business context, perceived usefulness is defined as an individual user’s probability (subjectively determined) that the use of a specific technology application will improve his or her job performance (Davis et al. 1989). Perceived ease of use is defined as the degree to which an individual user expects the technology application to be free of effort to use (Davis et al. 1989).

The Technology Acceptance Model – Curriculum

In a curriculum setting, business faculty are motivated to integrate technology into their courses for two reasons: because the business courses should reflect current practice where IT is an integral part of many business activities, and because the faculty believe that the technology will enhance learning of the course concepts. Heretofore, faculty have not had a good model to use to evaluate the success of these integration efforts. In the same way that the integration of technology into the curriculum reflects the integration of technology into business, the evaluation of the curriculum integration should borrow from the information systems literature, using TAM to evaluate the success of the integration.

Therefore, we propose TAM-C (technology acceptance model for curriculum). The main difference between TAM-C and the original TAM model is in the dependent variable used. Since students do not have a choice in selecting the technology in an academic setting, the dependent variable in the TAM-C is an individual’s behavioral intention to use the technology (i.e., we essentially go back one step in the TAM). But, since the integration of the software in the classroom is a limited time application, the traditional behavioral intention variable, whether the individual planned to use the technology in the future, is not relevant. We therefore propose that the students’ recommendation that the software be used in future offerings of the course is a close approximation of a behavioral intention to use in the future. The belief that future students would benefit from using the technology is a surrogate for one’s own perceived benefit from future use.

This student recommendation that the technology should be used in future course offerings replaces the dependent variable often used in education research, learning outcomes. We make this substitution for two reasons. First, we want to determine if students embrace the technology and understand that mastering its use will be important to their future careers. Second, TAM has demonstrated that the two independent variables, ease of use and usefulness, determine behavioral intention to use the technology. As discussed next, this connection, not an assessment of learning outcomes, will provide faculty direction in how to improve their curriculum innovation efforts.

Consistent with the original TAM, two factors are believed to influence a student’s propensity to recommend future use of a technology application, ease of use and perceived usefulness. Ease of use refers to the amount of effort that had to be exerted in order to learn and use the software. Perceived usefulness here relates to the student’s ability to master the course material, in particular, the technology-based component must be perceived as contributing to the student’s understanding of course concepts, in this case auditing concepts and of the use of technology in auditing. Faculty wanting to measure the success of their technology integration efforts can look to the students’ recommendations for future use. To improve that measure, a faculty member can concentrate on making the technology easy to use and connecting the technology component to the course learning objectives to help the students appreciate the usefulness of the technology. The first and second hypotheses follow.

H1: Acceptance of technology integration in the auditing classroom will be positively related to the perceived ease of use of the technology application

H2: Acceptance of technology integration in the auditing classroom will be positively related to the perceived usefulness of the technology application
METHOD

There were three assignments based on an auditing case, two of which required students to perform CAATs using a software called Audit Command Language (ACL). Each student was asked to complete a questionnaire to provide feedback about the assignments. The classes reported on here were taught by two of the co-authors.

Demographic Data – Participants

The data in Table 1 shows that the students included more females (56%) than males, many more full-time (81%) than part-time students, and mostly seniors and post-baccalaureate students (91%). The students had some background in auditing (37%), some or significant computer background (99%) and limited familiarity with ACL before the course (26% with at least some familiarity).

<table>
<thead>
<tr>
<th>Demographic Data</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>135</td>
<td>171</td>
<td>306</td>
</tr>
<tr>
<td>Student Status</td>
<td>Full-time</td>
<td>248</td>
<td>81%</td>
</tr>
<tr>
<td></td>
<td>Part-time</td>
<td>58</td>
<td>19%</td>
</tr>
<tr>
<td>Student Level</td>
<td>Junior</td>
<td>13</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>Senior</td>
<td>219</td>
<td>72%</td>
</tr>
<tr>
<td></td>
<td>Post-baccalaureate</td>
<td>57</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>17</td>
<td>5%</td>
</tr>
<tr>
<td>Accounting Grade Point Average</td>
<td>3.0 to 4.0</td>
<td>204</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>2.0 to 2.9</td>
<td>97</td>
<td>32%</td>
</tr>
<tr>
<td></td>
<td>Less than 2.0</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>4</td>
<td>1%</td>
</tr>
<tr>
<td>Auditing Background</td>
<td>None</td>
<td>191</td>
<td>63%</td>
</tr>
<tr>
<td></td>
<td>Some</td>
<td>107</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Significant</td>
<td>7</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Computer Background</td>
<td>None</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Some</td>
<td>165</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td>Significant</td>
<td>139</td>
<td>45%</td>
</tr>
<tr>
<td>Familiarity with ACL</td>
<td>None</td>
<td>224</td>
<td>73%</td>
</tr>
<tr>
<td></td>
<td>Some</td>
<td>77</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Significant</td>
<td>4</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 1. Demographic Data
Dependent Variable

An important measure of technology acceptance of the ACL software into the auditing course is whether the students would recommend continuing its use in the future offerings of the course. The user acceptance of the software was represented by the item on the questionnaire, “ACL should continue to be used in this course.” As noted in the previous section, this dependent variable replaces the TAM variable, actual use of a technology. It also substitutes for learning outcomes, a variable typically used to measure the success of a curriculum innovation.

Independent Variables

There are two independent variables in this study, ease of use and perceived usefulness. To measure these variables, we identified relevant items from the survey questionnaire that would be most closely identified with these constructs. For ease of use, we combined each student’s responses on three items:

- I was able to use the ACL software on my own without significant difficulty.
- ACL was easy to learn
- I learned ACL quickly.

To represent perceived usefulness, we combined each student’s rating of three items:

- Using the ACL software made coverage of auditing concepts more interesting.
- The use of the software supplemented my understanding of risk and audit procedures.
- The use of the software helped me understand the use of technology in auditing.

Although there is a highly regarded instrument to measure both of these constructs in a business context (Davis 1989), we used items that are both specific and relevant in a classroom context to represent ease of use and perceived usefulness. In addition, the questions were selected to help maximize the content validity of our independent variable measures. There is a high degree of internal consistency among the three questions used to measure each construct, as evidenced by the correlations among each set of three questions, which were all significant (with p-values less than or equal to .01). Based on this, the questions appear to be valid measures of the constructs of interest.

RESULTS

Regression analysis was used to test the relationships between the user acceptance measure and the two measures representing ease of use and perceived usefulness. The results indicate that both measures are significant explanatory variables for the student’s recommendation that the software be continued in the course. The two measures explained about 56% of the variation in the dependent variable. The results of the regression analysis are presented in Table 2. Both hypotheses are supported by the data.

<table>
<thead>
<tr>
<th>Dependent variable: Recommendation to continue using ACL (Acceptance)</th>
<th>Coefficient</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>.33</td>
<td>1.70</td>
<td>.09</td>
</tr>
<tr>
<td>Independent variables: Ease of use</td>
<td>.09</td>
<td>6.22</td>
<td>.00</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>.24</td>
<td>13.27</td>
<td>.00</td>
</tr>
<tr>
<td>Adjusted R² = 55.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ease of use (scale = 1 to 15), is a combination of:
I was able to use the ACL software on my own without significant difficulty.
ACL was easy to learn
I learned ACL quickly.

Perceived usefulness (scale = 1 to 15), is a combination of:
Using the ACL software made coverage of auditing concepts more interesting.
The use of the software supplemented my understanding of risk and audit procedures.
The use of the software helped me understand the use of technology in auditing.

Table 2. Results of Acceptance Model Regression

1 We also plan to incorporate some of the demographic variables as covariates in a model to explain acceptance.
2 Further statistical analysis will include factor analysis and subsequent models that include some version of the factor coefficients.
CONCLUSIONS, IMPLICATIONS & LIMITATIONS

First, our results are qualitatively consistent with the information systems literature with respect to determinants of user acceptance of information technology. We found that both ease of use and perceived usefulness were significantly related to the student’s recommendation that the software continue to be used in the auditing course (a surrogate for user acceptance.) These two measures are positively correlated so it is difficult to say how much each of these individually contributed to the explanation of acceptance of the software. When only ease of use is included, it explains about 30% of the variation in acceptance, and perceived usefulness by itself explains about 51% of the variation in acceptance. While usefulness does appear to be more strongly related to acceptance, ease of use has an additional effect.

The interpretation of the results of this study is limited for a few reasons. First, the students responding to the survey questionnaire were all enrolled in one course in one school with two different instructors. The results may be different at different schools, with different instructors, and with different student profiles. In addition, these students are accounting and accounting information systems majors enrolled in a college that emphasizes the use of technology by students and faculty and the integration of technology into courses throughout the curricula. These students may, therefore, be more adept at using technology and more enthusiastic about its usefulness, than would be the case for students in other programs. Nevertheless, we believe that all students will react positively to technology integration if the technology is perceived as easy to use and useful in the context of the relevant curriculum. Future research is needed to test a variety of students in courses in and outside of business and accountancy.

Second, we are using the well-accepted technology acceptance model framework but have not used the well-tested and accepted instrument from the information systems literature to test the relationships between technology acceptance, ease of use, and perceived usefulness. The questions that are suggested by Davis (1989) are not wholly relevant to the students in this context, but are more relevant in a job situation. Instead, we chose from the questions on our questionnaire, those items that represented to the students ease of use, perceived usefulness, and acceptance.

Even with these limitations, we believe that our experience with ACL in the auditing class can be instructive to others wishing to integrate technology into other classes. We strongly believe that seamlessly integrating pertinent technology into business courses will not only greatly enhance the students’ understanding of the technical content, but also elevate their perception of the relevance of the classroom experience to their future careers. This type of integration would seem to better prepare the students for their futures in an information age business environment. Our conclusions are based on the support found for our two hypotheses. Properly designed technology assignments, those directed at course learning objectives and requiring a reasonable amount of effort to learn the technology, can assist students in learning course content and prepare them for jobs in a technology-intensive work environment.

REFERENCES


