Web conferencing software: strategies to assist adoption by students

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ABSTRACT
How do factors such as a student’s motivation and personality affect the likelihood of them adopting a new learning environment? This study compared the perceptions of business students studying across three years and from three subject areas regarding the likelihood of using a Web conferencing environment. The results show that students’ perceptions of using the environment, as measured by a self-efficacy scale, and motivation were related to behavioural intention to use the environment. Trait anxiety however was not found to be related to the use of the environment.

Keywords: Business education, Learning environment, Personality traits.

INTRODUCTION
The introduction of Web based student learning systems have been adopted by universities as one means to overcome many of the limitations of face-to-face and distance learners and to provide learning environments that improve contact and increase student interaction. Research into the use of online learning systems have reported mixed results however. For example Hills (2003) reported online sessions may not be beneficial for all students. In a recent study of an e-learning environment Wei and Johnes (2005) concluded that there was less interaction and it was less immediate than traditional face-to-face environments, leading possibly to a sense of isolation. As a result Wei and Johnes (2005) recommended that Internet tools supplement, not replace, traditional teaching methods.

A possible reason for students reporting difficulty with online learning systems and low uptake of such systems could be related to students’ motivation and anxieties. Further, students perceived ability to utilise new software could limit their preference for adopting new technologies designed to overcome barriers to learning. To understand which students are likely to participate and what barriers they may face a knowledge of student characteristics and motivators is needed (Galusha 1997). One barrier which may exclude students from participating fully in online workshops and activities is a lack of confidence using the technology. This paper reports on a study of the effect of motivation and personality factors on the intention to use a new Web conferencing environment on students in a business management course.
E-LEARNING TECHNOLOGIES

Developments in e-learning technologies such as Web conferencing environments have progressed a step closer to Morgan’s (2001) “third generation learning system” where high bandwidth supports virtual classrooms and collaborative as well as complex simulations. Morgan’s (2001) three stages of e-learning applications include: stage one, where technology was used as a delivery mechanism and stage two, where learning needs of students drive the design of the environment. The third stage builds on the second’s philosophy of adapting to the learner’s needs but with high bandwidth. “The educational system adapts to the learning, not the other way around – as in the ‘text or course online’ models” (p.209).

A lack of feedback and contact with other students and lecturers has been found to lead students to lose motivation (Galusha 1997). This lack of contact can partially be overcome by phone contact, email and asynchronous discussion boards but these do not allow real-time discussion and interaction with other students. Second generation audiographics software, now commonly described as “Web conferencing”, “virtual meetings” or “collaborative” software are available that create environments where integrated instructional tools (VoIP, shared whiteboards, shared applications, video windows and archival recording) are available. Examples include Centra 7, Webex, Breeze 5, Live Classroom, Elluminate Live!, Citrix MeetingToGo, ASAP pro and Microsoft Live Meeting (see Rowe and Ellis (2006) for a more detailed review). These second generation Web-based products allow the instructor to connect to relatively large numbers of individual users at non-specific locations, communicate using phone quality connections, use a whiteboard and share software applications, record sessions for future playback, create breakout rooms, use polling tools and have the ability to remotely control other computers for demonstration or training purposes. In addition these functions are all possible over very low user connectivity speeds (28Kbps).

In developing and adopting these learning tools universities need to understand the value they provide to students and how to make a smooth transition to these environments. The results presented in this paper come from a research project whose purpose was to develop an understanding of the underlying student factors and motivations that determine a student’s intention to use Web conferencing environments. The focus in this paper is on the results of students who have studied two marketing subjects in an undergraduate business management degree.
FACTORS AFFECTING PERCEIVED ABILITY TO USE WEB CONFERENCING ENVIRONMENTS

There is a generally held view that a greater understanding of the development of an individual’s computer skills and their decision to use computers will lead to an improvement of training, education, implementation and acceptance of computers (Taylor and Todd 1995; Marakas et al. 1998). Likewise when introducing a new program, such as the Web conferencing environment of interest in this study, an understanding of factors affecting its adoption is important to ensure user satisfaction is obtained and the investment in the technology is warranted. Three measures identified from a review of the literature were selected for examination. The first, a measure of an individual’s ability to use the new Web conferencing environment, the second a measure of students’ motivations to use the environment and the third a general measure of avoidance, trait anxiety. Each were selected to provide insights into a student’s adoption of the Web environment. Self-efficacy has been used as a measure of perceived ability to use new technology (Marakas et al. 1998) while trait anxiety has been found to limit its use (Harrison and Rainer 1992). Recently goal orientation has been found to affect learning and satisfaction outcomes (Kickul and Kickul 2006). Each of these constructs is outlined in more detail in the following sections.

Self-efficacy

Self-efficacy refers to “an individual’s belief in his or her capability to perform a specific task” (Bandura 1986). The construct is important in social psychology and is based on social cognitive theory which posits “people learn by watching what others do” (Ormrod 1998). Compeau and Higgins (1995) and Compeau, Higgins and Huff (1999) introduced the concept of computer self-efficacy into the information technology literature and defined it as an individual’s beliefs with regard to their ability to use a computer. Since then a body of literature has developed in computing and teaching-learning settings (Madorin and Iwasiw 1999; Hasan and Ali 2004; Hayashi et al. 2004) with findings indicating that higher levels of self-efficacy lead to better learning performance.

The measure of self-efficacy does not refer to component skills, like the ability to use the Internet or specific computer skills, but instead relies on the students’ judgments of their ability to apply their skills to the overall task. In addition the measure of self-efficacy used in this study provided information on the magnitude of the level of capability and the strength or level of conviction about the judgment made by the student (Compeau and Higgins 1995).
Motivation
A number of studies have examined the relationship between goal orientation in learning, both in the classroom and in training programs (Midgley et al. 1998; Johnson et al. 2000; Kozlowski et al. 2001; VandeWalle et al. 2001). A learning, or task, goal orientation is where a person aims to prove their competency through the acquisition of new skills and knowledge for the sake of learning and to demonstrate mastery of a situation.

As a person’s motivation drives their behaviour this study investigates the effect of motivation on their perception of their ability to undertake and their intention to use the Web conferencing environment.

Trait Anxiety
A number of personality traits have been identified as influencing IT acceptance and use (Marakas et al. 2000). Trait anxiety refers to a general tendency to experience anxiety when confronted with problems or challenges (Spielberger et al. 1970). Trait anxiety is part of a person’s psychological make up and will have a strong influence over their behaviour. In particular trait anxiety has been associated with computer anxiety (Thatcher and Perrewe 2002) and a measure of it based on Spielberger’s “State-Trait Anxiety Inventory (STAI)” (Spielberger et al. 1970) was adopted for use in this study.

METHODOLOGY
The study was conducted at the beginning of a semester as an on-line, pre-class survey, conducted in units that were scheduled to use Elluminate Live. The survey was undertaken in five undergraduate business units, which included two marketing, two accounting and a quantitative analysis unit. The quantitative analysis unit was offered as a first year unit, while the marketing and accounting units had second and third year students. In this paper the focus is on presenting results related to responses from students enrolled in the marketing units and comparing these with responses from the other units surveyed. In addition further analysis of students who indicated they were studying as distance students is included to highlight differences between this group and those not studying by distance.

The Marketing Units
The marketing units included in this study were offered in second and third year of an undergraduate Bachelor of Business degree. The subjects, consumer behaviour and marketing research, are core units in the marketing major and designed to give students research skills necessary in their major. The student enrolment comprises a mixture of mature aged students.
and school leavers. Students had completed an introductory marketing foundations unit as a pre-requisite to the units.

Elluminate Live was the Web conferencing software adopted for use in the units to increase the potential for student-staff interaction and to provide greater feedback to students on expectations in the units. Its inclusion was seen as an opportunity to enhance student learning by providing real-time interaction with other students and teaching staff. A student management system (Blackboard) was also utilised in the units providing static materials and asynchronous discussion boards. Three online workshops using Elluminate Live were scheduled during the semester that introduced students to the unit, reviewed details of assignments, worked through a case study and exam questions and provided a review of the units at the end of semester. At the end of each Elluminate Live session a recording was made available to students through the Blackboard website. In addition a number of tutorials on using SPSS were included in the online sessions in the marketing research unit. The SPSS workshops utilised a feature in the Web conferencing software in which application sharing is used to demonstrate the use of SPSS including getting started, and several data analysis workshops.

As many students, and increasingly on-campus students, are time-bound due to work and other commitments all online sessions were recorded and made available to all students enrolled in the unit. This means any student can review any session at any time increasing students’ flexibility and control over their learning. Further, as students in the unit have a wide range of skills and ability there is a danger in online or face-to-face sessions, where material is presented at a standard pace, that slow students become demoralised and good students become bored (Wei and Johnes 2005). By recording online workshops this danger is overcome as students can review and reflect on the material at their own pace.

While the adoption of Elluminate Live into the unit design was seen as offering a unique learning advantage to students it was important that students adopt the environment themselves. This required a change in behaviour from their traditional learning methods and care was undertaken to ensure information was provided to students on the use of the Web conferencing software.

Students were undertaking study from four campus locations including distance mode. The online questionnaire was divided into four sections, each section collected information on one of the attributes of interest, namely; intended use of Elluminate Live, self-efficacy regarding the use of Elluminate Live, task goal orientation and trait anxiety. The final section collected
FINDINGS

Likelihood of Using Elluminate Live

Respondents were asked to indicate the likelihood of using Elluminate Live during the semester. Responses were recorded on a five point scale of 1=no chance to 5=most definitely will use it. The majority of students indicated they were either likely or most definitely will use Elluminate Live indicating that there is a high level of interest in trialling new technology to support learning (Table 1). For the marketing students however the results were more widely distributed, with 27% of students indicating little or no likelihood of using the software, 21% indicating some likelihood, and 52% of students indicating they were likely or definitely would use the software. A comparison of respondents who indicated they were studying by distance mode (marketing and non-marketing students) revealed support for the new learning environment among this cohort. Of the distance students there was also evidence of higher preparedness to use Elluminate Live with a lower percentage indicating ‘little likelihood’ or ‘no chance’ and a higher proportion indicating they were ‘likely to use’ or ‘most definitely will use’ the Web conferencing software.

Table 1: Likelihood of using Elluminate Live

<table>
<thead>
<tr>
<th></th>
<th>All Students surveyed</th>
<th>Marketing Students only</th>
<th>All Distance Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>Percent</td>
<td>Percent</td>
</tr>
<tr>
<td>No chance</td>
<td>8.5</td>
<td>15.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Of little likelihood</td>
<td>5.6</td>
<td>12.1</td>
<td>7.3</td>
</tr>
<tr>
<td>Of some likelihood</td>
<td>19.7</td>
<td>21.2</td>
<td>14.6</td>
</tr>
<tr>
<td>Likely to use</td>
<td>23.9</td>
<td>18.2</td>
<td>24.4</td>
</tr>
<tr>
<td>Most definitely will use</td>
<td>42.3</td>
<td>33.3</td>
<td>48.8</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Self-efficacy

Self-efficacy of using Elluminate Live was measured using ten items adapted from Compeau and Higgins (1995). The ten items were measured on a scale of 1 to 5 with 1 being not at all
confident using the software to 5 being totally confident using the software. Where respondents indicated they would not be able to use the scale under the conditions identified, a score of zero was used. The scale had a mean of 20.04 and a standard deviation of 15.81 indicating the sample, on average, were moderately not confident using the Web conferencing software. The reliability of the scale was acceptable, with a Cronbach alpha of .935. An analysis of variance between the three student groups; marketing, quantitative analysis and accounting, also revealed no difference in self-efficacy scores ($F_{(df=2,70)}= .004$, $p=.996$). As the three subjects included students studying across different years the findings indicate there is no difference in self-efficacy perceptions based on the year of study.

**Trait Anxiety**
Trait anxiety was measured using four items drawn from Lehrer and Woolfolk (1982). Respondents were asked to report feelings of anxiety and mental preoccupation with problems experienced during a typical day. Results were measured on a five point scale with 1 being strongly disagree through to 5 being strongly agree. The scale has been tested by Thatcher and Perrewe (Thatcher and Perrewe) who confirmed the items’ reliability and validity. The scale had a mean of 8.62 and a standard deviation of 3.35 indicating low task anxiety. The four items had a Cronbach alph coefficient of 0.78 which is above the suggested level of 0.70 (Nunnally 1978). There was no difference in the scores between the students studying the three subjects ($F_{(df=2,70)}= .711$, $p=.495$).

**Task Goal Orientation**
Task goal orientation is the goal to develop ability. The construct consisted of six items and had a mean of 19.89 and a standard deviation of 5.39 indicating that respondents were task goal oriented. The Cronbach alpha was 0.85 indicating acceptable reliability. There was no difference in the scores between the three student groups ($F_{(df=2,70)}= 1.923$, $p=.154$) although there was a difference in task goal orientation between students who studied in external mode compared to those who were studying in a face to face mode ($F_{(df=1,69)}= 6.547$, $p=.013$). The findings indicate that distance students have a stronger goal orientation to developing their ability than internal students and that this is apparent across all three groups of students studying the different discipline subjects.

**Relationship between factors and likelihood of using Elluminate Live**
Table 2 presents the results of the regression analysis to determine whether a linear relationship existed between the three composite factors identified in the study and likelihood of using Elluminate Live.
Table 2: Initial Model Estimation of Likelihood of using Elluminate Live (a)

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.380</td>
<td>.560</td>
<td>4.251</td>
<td>.000</td>
</tr>
<tr>
<td>Self Efficacy</td>
<td>.023</td>
<td>.009</td>
<td>.287</td>
<td>2.440</td>
</tr>
<tr>
<td>Task Goal Orientation</td>
<td>.069</td>
<td>.029</td>
<td>.295</td>
<td>2.382</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>-.042</td>
<td>.043</td>
<td>-.111</td>
<td>-.970</td>
</tr>
</tbody>
</table>

a Dependent Variable: Likelihood of using Elluminate Live
R²=.22
Adjusted R²=.19
F=6.36
N=71

Table 3 presents the final model estimation based on a stepwise elimination where only factors that are statistically significant in the model for likelihood of using Elluminate Live are retained. Tabachnick and Fidell (2001, pg. 135) explain that stepwise multiple regression “is used to develop a subset of IVs [independent variables] that is useful in predicting the DV [dependent variable], and to eliminate those IVs that do not provide additional prediction to the IVs already in the equation”. An advantage of stepwise multiple regression is that the independent variables are entered based on individual consideration and the influence of two or more variables together is not recognised (Tabachnick and Fidell 2001). Hence only those factors that make a significant contribution to the prediction of the dependent variable alone are included in the final model, and mediating factors influencing significant contributions in other variables are not considered.

Table 3: Final Model Estimation for Likelihood of using Elluminate Live (a)

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.187</td>
<td>.523</td>
<td>4.181</td>
<td>.000</td>
</tr>
<tr>
<td>Self Efficacy</td>
<td>.023</td>
<td>.009</td>
<td>.293</td>
<td>2.495</td>
</tr>
<tr>
<td>Task Goal Orientation</td>
<td>.060</td>
<td>.028</td>
<td>.257</td>
<td>2.188</td>
</tr>
</tbody>
</table>

(a) Dependent Variable: Likelihood of using Elluminate Live
R²=.21
Adjusted $R^2 = .19$
F-significance = .000
N=71

The results from the stepwise multiple regression indicated that only self efficacy and task goal orientation are included in the model of likelihood of using Elluminate Live. The model was significant ($F (2, 70)=9.071, p=0.000$) and provided an adjusted $R$ square of 0.19. Each variable is significant at the 0.05 level providing evidence of the independent variables being related to likelihood to use Elluminate Live.

**DISCUSSION**

The results from the analysis in this study provide an insight into the factors affecting the behavioural intention for using Web conferencing environments, such as Elluminate Live and provide guidance for the development of training and support for students undertaking classes using the program.

The study found that there was support among students for the online learning system that created an online environment where students could use text, audio and graphics. In particular distance students were found to be more motivated to use the software. These findings are contrary to previous studies of online learning environments (Hills 2003; Wei and Johnes 2005) that do not incorporate the latest technological advances which incorporate audio and graphic interfaces. Behavioural intention was measured through respondents indicating their likelihood of using the Web conferencing environment. Students’ motivation, as represented by task goal orientation and their perceived ability to use the Web conferencing environment, were found to be significantly related to behavioural intention. Of importance was the finding that trait anxiety was not shown to be significantly related to behavioural intention as expected (Thatcher and Perrewe 2002). It could be that trait anxiety is a moderating factor that impacts on goal orientations (Thatcher and Perrewe 2002; Vitartas 2006; Vitartas et al. 2007) rather than having a direct impact on intention.

If trait anxiety is operating through motivators like goal orientation it can be reduced by conducting introductory sessions about the interface where students can try out the tools in a safe and supportive environment. Wei and Johnas (2005) found that being able to contribute anonymously to asynchronous discussion boards was one of the positive features of e-learning as it encouraged freedom of expression. In the case of Elluminate Live allowing students to enter a session under their first name, or possibly an assumed name, could encourage any students experiencing anxiety to attend the online sessions. Furthermore, having students
access recordings in the first instance can lead students to understanding how the environment operates much like a demonstration and can lead to improved confidence encouraging these students to become further involved with the environment. Recordings also provide a method of introducing students to Elluminate Live without the risk of embarrassment as well as enabling them to “time-shift” or undertake the activities at a time that is convenient to them (Warde et al. 1998).

The students in the marketing units were found to have moderate to high levels of likelihood of using Elluminate Live. This is attributed to the level of pre-semester advice and instruction provided to students during orientation week. The high level of likelihood resulting from this activity provides confirmation that such activity encourages students to adopt new technologies. Higher levels of motivation as evidenced in the task goal orientation scores among the distance students also revealed higher levels of likelihood to adopt the new technology. The distance students were found to have significantly higher task goal orientation scores than students who were studying in a face-to-face mode. The distance students also indicated higher levels of intended adoption. This could also be attributed to distance students finding the new environment gave them more contact with their lecturer and other students.

No differences were found between students studying marketing, accounting and quantitative analysis in terms of motivation, anxiety and their perceptions of ability to use the Web conferencing environment. As the quantitative students were first year students and the marketing and accounting students from second and third year the findings indicate there is no difference in these scores across years of study, at least as they relate to business students. The findings suggest that any strategies implemented for first year students should also be applied to second and third year students, at least until adoption of the environment has been made across all years of the course.

The measure of perceived ability to use the Web conferencing environment, self-efficacy, was also found to be a useful indicator of intention to use the technology. The scale provides researchers the potential to have students assess their perceptions through feedback and provide further support for “at risk” students. The potential of this scale also provides opportunities for further research which utilises the self-efficacy scale for other software programs.
Conclusions
The findings reported here indicate that business students are motivated to adopt new Web conferencing environments, such as Elluminate Live. In particular respondents who are task goal oriented will utilise technology that is designed to assist them with their study. In introducing new technology to assist and support learners the use of introductory sessions and providing access to recordings was found to be supportive in efforts to have students adopt the technology. It appears a large proportion of distance learners were motivated to try the new technology indicating the continued need to break down barriers to distance and provide additional support for their learning. The experience reported in this study was that providing early information and training in the technology is important to having students intend to adopt new technology.
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