

Student adoption of web based video conferencing software: A comparison of three student discipline groups



Peter Vitartas, Nicola Jayne, Allan Ellis and Stephen Rowe
Southern Cross University

This paper asks the question – how do differences in year of study and subject studied affect the likelihood of students adopting a new learning environment? Data from a study of students' intention to adopt a Web conferencing environment is examined by the subjects in which they were enrolled. The results show that students' perceptions of using the environment, as measured by a self-efficacy scale and motivation were related however there were few differences between the cohorts in other factors that influenced their intention to adopt the new environment.

Keywords: business education, learning environment, personality traits, elluminate live, web conferencing

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. "Some people find the virtual interaction better than face-to-face and others find it more sterile and less helpful" (Hills 2003 p.40). 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 (Midgley et al. 1998; Marakas et al. 2000). Further, students' perceived ability to utilise new software could limit their preference for adopting new technologies designed to overcome barriers to learning. Further, to facilitate and improve the adoption of new technologies administrators and academics need to have an understanding of the effect of factor that influence students' uptake of the new technologies.

This paper reports on a study of the effect of motivation and personality factors on the intention to use a new Web conferencing environment by students studying in three discipline areas of a business management course. Comparisons are made between the results of the three student groups and between distance and non-distance students. Finally a model of the likelihood of students using Web conferencing software is presented.

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 losing 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).

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 students’ intention to use Web conferencing environments. The focus in this paper is on comparing the results of students studying different subjects and from different years of study in an undergraduate business degree.

Factors affecting use of 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 investments warranted. Three measures identified from a review 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 a general measure of avoidance, trait anxiety, were selected to provide insights into an understanding of students’ adoption were employed. 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 individuals’ 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 persons motivation drives their behaviour the effect of motivation on their perception of their ability to undertake and their intention to use the Web conferencing environment is examined.

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 a persons 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 (STAII)" (Spielberger et al. 1970) was adopted in this study.

Methodology

A Southern Cross University undergraduate degree consists of 24 units of study. A number of units, referred to as 'core units', must be completed as part of the degree. 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.

To increase the potential for more interaction and feedback for students Elluminate Live was adopted for use in the units discussed below. Its inclusion was seen as an opportunity to enhance student learning by providing real-time interaction with other students and teaching staff.

The marketing units

The marketing units included consumer behaviour and marketing research which are core units in the marketing major and designed to give students an understanding of consumers and necessary research skills for 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 adopted for use in the unit 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 unit providing static materials and asynchronous discussion boards. Three online workshops were scheduled during the semester and designed to provide additional support for students. An introduction to the unit, details of the assignments and preparation for the final examination were covered in the online synchronous sessions. In addition a number of tutorials on using SPSS were included in the online sessions for the marketing research unit. The SPSS workshops utilised a feature in the Web collaboration environment in which application sharing is used to demonstrate the use of SPSS including getting started, and several data analysis workshops.

The quantitative analysis units

The quantitative analysis unit included in this study is a first semester first year core unit in the undergraduate Bachelor of Business degree designed to give students the quantitative skills that they will need in their degree. It consists of a mixture of business and financial mathematics and statistics.

Each year the student cohort comprises a mixture of mature age and school leavers. As the university has no formal school-based subject pre-requisites, the students have a wide range of mathematical experience and abilities.

As in the Marketing units Elluminate Live was adopted for use in the unit to increase the potential for more interaction and feedback for distance students. Weekly online workshops are used to provide additional support for distance students and cover the content of the whole unit. Excel (<http://office.microsoft.com/en-au/excel/default.aspx>) workshops in which application sharing is used to show the required Excel skills are available to all students, as are revision sessions at the beginning and at the end of the semester.

The accounting units

The accounting units included in this study were offered in second and third year of an undergraduate Bachelor of Business degree. The subjects, auditing and advanced financial reporting are core and elective units respectively in the accounting major, designed to develop students' skills necessary to meet the professional body accreditation requirements.

Elluminate Live was adopted for use in the core auditing unit as a substitute to existing face-to-face teaching enabling the lecturer to present lecture and tutorial material to students across three campuses

and to distance students simultaneously. This had become necessary as low (less than 12) face-to-face enrolments at two of the three campuses would have meant directing those students to change their enrolment to distance. The lecturer was keen to try the new technology to offer the students a means of regular contact rather than simply withdrawing the face-to-face option. Students at each of these campuses were visited by the lecturer during Orientation week to explain the rationale for the approach, and one face-to-face session was delivered from each of these campuses during the semester. Each weekly session was recorded so that students could review the material, or catch up if they were not able to attend the scheduled session.

The advanced financial reporting unit is run entirely online and involves a weekly meeting using Elluminate Live for students to discuss progress on their assessment tasks, participate in group activities related to those tasks and conduct their accounting issue research presentations to the class. There are no face-to-face sessions and students enrol and participate independent of physical location. Both units also use Elluminate Live to present guest lectures by, and participate in discussions with, graduates.

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 environment.

To monitor factors influencing the adoption of the environment and plan for wider introduction of the environment to other units, a study of the effect of motivation and personal factors was undertaken at the start of the semester. 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 data for classification purposes. The data was analysed using SPSS14 (<http://www.spss.com>). Participation in the study was voluntary and a total of 71 students responded to the survey, an effective response rate of 28%. Females comprised 61% of respondents, males 39% and the majority, 59%, were distance students. Findings from the study are presented in the following section.

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). The greatest indication of using Elluminate Live came from the quantitative analysis and accounting students. For the marketing students however the results were more widely distributed, with 27% of students indicating little or no likelihood of using the environment, 21% indicating some likelihood, and 52% of students indicating they were likely or definitely would use the environment. A comparison of respondents who indicated they were studying by distance mode 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 environment.

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

Table 1: Likelihood of using *Elluminate Live*

	All Students %	Marketing Students %	Quantitative Analysis Students %	Accounting Students %	Distance Students %
No chance	8.5	15.2	0.0	5.6	4.9
Of little likelihood	5.6	12.1	0.0	0.0	7.3
Of some likelihood	19.7	21.2	25.0	11.1	14.6
Likely to use	23.9	18.2	25.0	33.3	24.4
Most definitely will use	42.3	33.3	50.0	50.0	48.8
Total	100.0	100.0	100.0	100.0	100.0

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 confident using the Web conferencing environment. 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, 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 suggest there is no difference in self-efficacy perceptions in different years. This was confirmed with an ANOVA between year of study and self efficacy ($F_{(df=2,68)} = .051$, $p=.950$).

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 (2002) 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 three subject groups ($F_{(df=2,70)} = .711$, $p=.495$) and between year of study ($F_{(df=2,68)} = .407$, $p=.667$).

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 ($F_{(df=2,70)} = 1.923$, $p=.154$) or year of study ($F_{(df=2,68)} = 1.883$, $p=.160$). There was however a difference in task goal orientation between students who studied by distance 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 from the different disciplines.

Factors affecting likelihood of use

To establish whether a relationship existed between the variables of interest and likelihood of using Elluminate Live multiple regression analysis was used. 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 3 presents the final model of 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 p. 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 2: Initial model estimation of likelihood of using *Elluminate Live(a)*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.380	.560		4.251	.000
Self Efficacy	.023	.009	.287	2.440	.017
Task Goal Orientation	.069	.029	.295	2.382	.020
Trait Anxiety	-.042	.043	-.111	-.970	.335

a Dependent Variable: Likelihood of using Elluminate Live

R²=.22Adjusted R²=.19

F=6.36

N=71

Table 3: Final model estimation for likelihood of using *Elluminate Live(a)*

	Unstandardised Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.187	.523		4.181	.000
Self-efficacy	.023	.009	.293	2.495	.015
Task Goal Orientation	.060	.028	.257	2.188	.032

(a) Dependent Variable: Likelihood of using Elluminate Live

R²=.21Adjusted R²=.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 ($F_{(2, 70)}=9.071$, $p=000$) 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 provide an insight into differences between students studying different subjects and between students in different years of studies. In addition, and more revealing are the findings of the factors affecting the behavioural intention for using Web conferencing environments, such as Elluminate Live, which provides 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 environment. 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.

While students indicated different percentages of likelihood of using Elluminate Live with students studying the quantitative analysis and accounting units having a higher proportion indicating a likelihood of using Elluminate Live than the marketing students, the three groups did not differ in their scores for self efficacy, trait anxiety and task goal orientation.

Behavioural intention was measured through respondents indicating their likelihood for 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. It is expected that trait anxiety is a moderating factor that impacts on goal orientations (Thatcher and Perrewe 2002; Vitartas 2006; Vitartas et al. 2007).

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 environments operates much like a demonstration and can lead to improved confidence encouraging these students to become further involved with the environment. Recordings provide a method of introducing students to Elluminate Live without the risk of embarrassment as well as enabling them to “time-shift”.

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, although for distance students it may be that they were responding to greater levels of support.

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.

In introducing new technology to assist and support distance learners it appears a large proportion of distance learners are motivated to try new technologies that will 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 in having students intend to trial the technology. Of course it is equally important that the technology can deliver the desired benefits to students.

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. 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.

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Dr Peter Vitartas, School of Commerce and Management, Southern Cross University, PO Box 157, Lismore 2480, Australia. Email peter.vitartas@scu.edu.au

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