Factors Affecting Usage of Web Based Learning Tools

Lisa Seymour
Irwin Brown
E Beck
F Khatree
L Morley

Abstract

Several studies on technology adoption have attempted to develop models, such as the technology accepted model, that can be generally applied to any technology. Typical web-based learning technologies such as WebCT, however, are composed of several distinct tool sets, and student motivations for using each may differ, due to the different purposes and characteristics of each tool. In this study, a different set of factors were found to affect usage intent of the WebCT bulletin board and quiz tool and these differences are discussed. Perceived usefulness and Perceived ease of use were found to affect student intentions to use the bulletin board, while Compatibility with learning style; Self efficacy and Long-term consequences all affected intentions to use the quiz tool. The implications of these findings on designing the integration of these educational technology tools with courses are discussed as well as limitations and future research.

Keywords

computer-based learning; web-based learning; WebCT; Bulletin board; Quiz tool; TAM; learning environments

1 Introduction

With the rise of the Internet there has been increased potential for information technology to be integrated with education. Wernet *et al.* (2000) propose that there is a current research trend to explore new and varied methods of teaching, and educational institutions now have the opportunity to work through infrastructures that support student learning both within the classroom and outside of it. Recognised benefits of using educational technology include increased flexibility, interactivity in learning, improved communication, accessibility and availability (Singh & Blewett 2003). Over the past decade many online learning environments have been developed. One of the most successful of these is WebCT (Web Course Tools), which proclaims to be the world's leading provider of e-Learning solutions for higher education and lists eight South African higher education institutions as customers (WebCT n.d.).

This paper aims to identify the factors affecting intentions to use WebCT tools by tertiary level students. The WebCT environment has five main tool sets from which courses can be designed:

- Course Content (e.g. Syllabus, Content Module)
- Communication Tools (e.g. Chat Room, Bulletin Board)
- Evaluation Tools (e.g. Self Test, Quiz Tool)
- Student Tools (e.g. My Progress, My Grades)
- Content Utilities (e.g. Search, Compile)

Most of the literature reviewed has assessed student reactions to WebCT as a general application and has not reported on differences in user perceptions and usage found between the tools. To overcome this weakness, this study looks at two WebCT tools - the WebCT bulletin board, referred to as Discussions within WebCT, and the quiz tool, and analyses the differing influences on usage intent.

In the following sections, the conceptual background to the study will firstly be presented, before the research propositions are outlined. The research methodology follows and the data analysis and results are

then presented. A discussion of the results and implications for future research are reported, leading to the conclusion of the paper.

2 Conceptual Background

Information technology can be used to facilitate and support the learning process, and serve to integrate information. Kendall (2001:1) states that 'rapid developments in information and communications technology have improved opportunities for individuals and groups to communicate and share information directly with each other through community networks.' Knowledge management tools, such as the Internet, intranets, course websites and online library databases are increasingly being used in course delivery.

WebCT (Web Course Tools) is an online learning management system, which like many similar tools provides educators with a web site template into which content is added, and components customised to suit the particular course (McClelland 2001). WebCT provides access to 'a collection of course-related materials, such as syllabus, assignments, readings, lectures, class notes, study guides, selected papers, and general announcements' (Benbunan-Fich 2002:96). It provides added functionality, with communication tools such as bulletin boards and facilities to send out e-mail that promote interactivity between students, and between the lecturer and students. The bulletin board is an area wherein students and lecturers can hold online discussions and post messages to one another. It can thus be described as interactive, social, informational, and supportive.

Within the evaluation module, the quiz tool can be used to post tests and surveys online, and has a high level of academic relevance, for both revision and testing purposes. In a recent study examining WebCT usage, the quiz tool was found to be the most extensively used (Knol & Vincent 2002). In contrast, to the bulletin board, it can best be described as evaluative, individual, performance-related and in some cases, intense. These different characteristics are expected to yield different motivations for usage intent.

In determining what factors influence intentions to use these tools, this study uses an expanded technology accepted model (TAM) proposed by Brown (2003). This model combines different models, including TAM and the decomposed theory of planned behaviour (Taylor & Todd, 1995). The basis of all extended TAM frameworks is that user perceptions of a technology are important predictors of user acceptance of that technology (Brown 2003).

In the Brown (2003) study, the expected influences on intentions to use the Internet as a learning tool were categorised as cognitive instrumental processes, social influence processes, and perceived behavioural control factors (See Figure 1).

Cognitive instrumental processes are defined by Venkatesh and Davis (2000) as the mental representations that are used in order to decide whether to adopt a technology. Of these factors, Perceived ease of use and Result demonstrability were shown to have little influence on usage intent (Brown 2003). However, only Result demonstrability was excluded from this study, as Perceived ease of use, was shown to be extremely relevant in a prior study that examined WebCT usage (Brown 2002). The remaining five factors considered as influences on usage in this study are defined as follows:

- Perceived usefulness (PU): The degree to which a person believes that using a particular system would enhance his or her learning (job) performance (Davis 1989).
- Long-term consequences (LTC): The increased flexibility to change work or increased opportunities to do more meaningful work (Chang & Cheung 2001).
- Compatibility with learning style (CLS): The degree to which an innovation is viewed as being consistent with the existing learning styles (adapted from Agarwal & Prasad 1997).
- Perceived ease of use (PEU): The degree to which a person believes that using a particular system will be free of effort (Davis 1989).

- Perceived enjoyment (PE): The perceived degree of enjoyment with using a system (Venkatesh 2000).

Of the social influence factors, Subjective norm, which had no influence, was dropped from further consideration. The remaining factor, Perceived voluntariness, was shown to have a significant effect on usage intent, was retained and is defined as follows:

- Perceived voluntariness (V): The extent to which users perceive the adoption decision to be voluntary (Agarwal & Prasad 1997).

Both perceived behavioural control factors, Self efficacy and Facilitating conditions, showed no significant influence on usage intent (Brown 2003). However, a previous study by Brown (2002) examining WebCT usage specifically, found this category to be important and therefore, these factors, defined as follows, were retained for further investigation:

- Self efficacy (SE): An individuals' self-confidence in his or her ability to use a technology (Venkatesh 2000).
- Facilitating conditions (FC): The availability of external support needed to use a technology (Venkatesh 2000).
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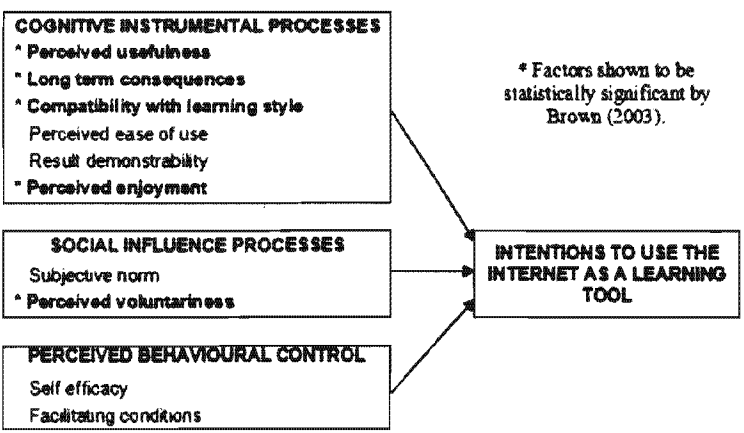

Figure 1: Expanded TAM taken from Brown (2003) and modified

The dependent variable used in extended TAM frameworks to measure technology acceptance, has been either use of the technology or intentions to use the technology, or in some cases both (Venkatesh & Davis 2000). Chang and Cheung (2001:1) claim that 'intention to use a technology is equally important [to usage], not only for promoting a technology but also for encouraging its voluntary continued use.' For this reason, intentions to use rather than actual usage is employed as the dependent variable in this study.

3 Research Propositions

The above set of factors was selected as there was sufficient evidence to expect that they would influence usage intent of learning tools such as WebCT. The contention of this study, however, is that WebCT, and other such learning technologies comprise of a suite of tools, and the relative influence of factors on usage intent for each specific tool may vary, due to their unique purpose and characteristics. Support for this argument comes from Gefen and Straub (2000), who found that the effect of perceived ease of use in e-commerce adoption varied, depending on whether a web site was to be used for a simple enquiry, or for actual purchase of a product. Each of the factors specified in Section 2 will be considered in turn, and their expected relative influence on the bulletin board and quiz tool respectively will be discussed leading to a set of propositions.

3.1 Perceived Usefulness

Perceived usefulness has been shown to be central to technology adoption across a wide variety of technologies and settings, with few exceptions being reported (e.g. Anandarajan *et al.* 2002). This construct has also been described as near-term usefulness, as opposed to the long-term usefulness construct (Chang & Cheung 2001). In the case of the bulletin board, near-term usefulness might be more salient than for the quiz tool. By posting queries and/or reading items already posted to a bulletin board, a learner may be able to acquire information

useful for more immediate concerns relating to the subject at hand. The quiz tool, on the other hand, might provide a testing environment which students would only want to use once they feel prepared enough to do so, possibly at a later stage of the learning process. Thus, its usefulness in the near-term is not as salient as the bulletin board. This leads to the following proposition:

Proposition 1:
Perceived usefulness is a more salient factor for intentions to use the bulletin board, rather than the quiz tool.

3.2 Long-Term Consequences

For the reasons postulated previously, it is expected that conversely, long-term usefulness, or Long-term consequences of use is more salient for the quiz tool, when compared with the bulletin board. In addition, technologies such as the quiz tool would be more likely associated with passing tests and examinations, which in turn students hope, will lead to positive long-term career benefits.

Proposition 2:
Long-term consequences of use is a more salient factor for intentions to use the quiz tool, as compared to the bulletin board.

3.3 Compatibility with Learning Style

The quiz tool is generally associated with testing, and thus may evoke feelings of anxiety amongst students. Students who feel they are not yet ready to be tested, would most likely shy away from the use of such a tool, until such time as they feel prepared. This could lead to postponement of use until absolutely necessary. The bulletin board, on the other hand is not generally associated with such stress, and would be more easily used. As a consequence it is expected that Compatibility with learning style would be a major influence for the quiz tools, but not so much so for the bulletin board.

Proposition 3:
Compatibility with learning style is a more salient factor for intentions to use the quiz tool, as compared to the bulletin board.

3.4 Perceived Ease of Use

Perceived ease of use, like Perceived usefulness, has been found in a wide array of settings to be an influence on usage and intentions to use a technology. A tool that is to be used for social interaction and communication (e.g., bulletin board) is more likely to be influenced by ease of use than a tool that is task-specific and task-oriented (e.g. quiz tool). This follows, as it has been shown that cultures or people that are more social and community-oriented, are more likely to use a tool based in its perceived ease of use than those who are individualistic and task-oriented, whose prime concern is usefulness (Venkatesh & Morris 2000, Anandarajan *et al.* 2002).

Proposition 4:

Perceived ease of use is a more salient factor for intentions to use the bulletin board, as compared to the quiz tool.

3.5 Perceived Enjoyment

Perceived enjoyment has been shown to be closely related to Perceived ease of use, especially as experience with a technology grows (Venkatesh 2000). Thus the arguments that apply to ease of use may also apply to enjoyment. Furthermore, given the generally relaxed informal nature of the bulletin board, its usage is likely to be motivated more by perceived enjoyment than the quiz tool.

Proposition 5:

Perceived enjoyment is a more salient factor for intentions to use the bulletin board, as compared to the quiz tool.

3.6 Perceived Voluntariness

Perceived voluntariness has been shown to be important for usage of learning technologies. Brown (2003), for example, found this factor to be a key influence on intentions to use and usage. Where usage of a technology is mandated for a course, students are more likely to use it, than if usage were left voluntary. It may be expected that quiz tools would be used less, if not mandated, due to the possible anxiety asso-

ciated with testing, and therefore voluntariness may be a more salient factor for the quiz tool.

Proposition 6:
Perceived voluntariness is a more salient factor for intentions to use the quiz tool, as compared to the bulletin board.

3.7 Self Efficacy

Self efficacy embodies the concept of self-confidence with respect to technology use. High levels of anxiety may reduce self-confidence, and thus lead to reluctance to use a technology (Venkatesh & Morris, 2000). The quiz tool is often used to test student ability, and is more likely to be associated with anxiety, and its negative impact on self efficacy. Thus, this construct is likely to be more salient for the quiz tool as compared to the bulletin board.

Proposition 7:
Self efficacy is a more salient factor for intentions to use the quiz tool, as compared to the bulletin board.

3.8 Facilitating Conditions

Facilitating conditions are those factors in the environment that provide support and assistance with technology usage (Venkatesh, 2000). Given the interactive nature of the bulletin board, where discussion postings can be consulted freely, and the tool itself can be used to request for assistance, this factor would be more salient for the bulletin board. For the quiz tool, on the other hand, students could feel that under test conditions, the type of support and assistance is very restricted, thus facilitating conditions are less relevant to its usage.

Proposition 8:
Facilitating conditions is a more salient factor for intentions to use the bulletin board, as compared to the quiz tool.

4 Research Procedure

The propositions were tested through a survey taken during a lecture in a class of first year students at the University of Cape Town

who were reading for Commerce degrees, but none of whom were majoring in Information Systems. Technically focused Information Systems majors were excluded as they could have skewed the data. Not connecting the research sample to a specific major allows broader application of the findings.

The research subjects were specified as first year students who had completed one semester, in the hope that their background influences would be more pronounced than those of students who had been within the university environment for a longer period of time. This was expected to yield more varied and individual responses rather than more homogenous ones. The students had gained exposure to WebCT in a statistics course in their first semester, which was compulsory for all first year Bachelor of Commerce students and had made express use of the WebCT bulletin board and quiz tool.

The questionnaire used in this research was based on three questionnaires used in studies of technology adoption for learning (Brown 2002, Knol and Vincent 2002, Brown 2003). Additional questions were added to establish some of the demographic variables. Each of the independent and dependent variables listed in the propositions were tested for the WebCT bulletin board and quiz tool respectively. Other than for Perceived enjoyment, the constructs consisted of multiple items. Each item was measured using a seven-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (7).

Table 1: Respondent Profile

		Number	Percent
Gender	Female	133	55%
	Male	102	42%
	Did not specify	9	4%
Age	Under 20	172	70%
	20 – 23	59	24%
	Over 23	8	3%
	Did not specify	5	2%

Race	Asian	10	4%
	Black	92	38%
	Coloured	45	18%
	Indian	13	5%
	White	66	27%
	Other / Did not specify	18	8%

The students were given a brief explanation of what the research entailed, and were then allowed approximately ten minutes to complete the printed questionnaire. Incomplete questionnaires were rejected. The remaining questionnaires were captured into Microsoft Excel with values being checked to ensure that they were within range.

At total of 244 useable responses were obtained, out of a potential 500 respondents, giving a 49% response rate. Table 1 shows the respondent profile. About 55% of respondents were female, with the majority (70%) under the age of 20. The race classification depicts the diversity of South African culture, with the major groups represented being Black (38%), and White (27%).

4.1 Reliability and Validity Analysis

Cronbach's alpha was used to test the reliability of the questionnaire's constructs. In order for a construct to be deemed reliable, it should have a Cronbach's alpha value of 0.7 or above (Nunnaly 1978). All of the alpha tests on the research constructs gained values above 0.7, except for Perceived enjoyment which could not be tested, since it only consisted of one item (See Table 2).

Table 2: Reliability Analysis

	Bulletin board	Quiz tool	Number of Items
Perceived usefulness	0.93	0.94	8
Long-term consequences	0.88	0.88	5
Compatibility with learning style	0.90	0.92	3
Perceived ease of use	0.91	0.96	4
Perceived enjoyment	-	-	1
Perceived voluntariness	0.77	0.90	3
Self efficacy	0.86	0.89	3
Facilitating conditions	0.70	0.70	4
Intentions to use	0.85	0.9	2

Table 3a: Validity Analysis for the bulletin board

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PU1	***0.80***	0.04	0.16	0.04	0.01	0.07	0.09
PU2	***0.79***	0.06	0.16	0.01	0.10	0.25	0.06
PU3	***0.81***	0.06	0.15	-0.02	0.07	0.14	0.18
PU4	***0.69***	0.09	0.11	-0.07	0.13	0.30	0.17
PU5	***0.80***	0.09	0.20	0.00	0.03	0.12	-0.03
PU6	***0.78***	0.09	0.20	0.10	0.11	0.14	0.01
PU7	***0.75***	0.21	0.18	0.03	0.10	0.22	0.16
PU8	***0.72***	0.21	0.22	0.10	0.07	0.03	-0.14
LTC1	0.22	0.01	***0.78***	0.06	0.04	0.17	0.01
LTC2	0.26	0.04	***0.70***	0.02	0.02	0.07	-0.08
LTC3	0.27	0.00	***0.83***	0.02	0.02	0.12	-0.05
LTC4	0.15	-0.01	***0.83***	-0.02	-0.02	0.10	0.01
LTC5	0.13	0.03	***0.79***	0.03	0.11	0.00	0.04
CLS1	0.31	0.07	0.22	-0.05	0.23	***0.76***	0.13
CLS2	0.37	0.08	0.16	0.08	0.10	***0.82***	0.05
CLS3	0.34	0.11	0.13	0.07	0.10	***0.81***	0.09
PEU1	0.12	***0.84***	-0.04	-0.06	0.11	0.03	0.18
PEU2	0.10	***0.84***	-0.01	-0.08	0.13	0.04	0.25
PEU3	0.18	***0.85***	0.10	0.04	0.12	0.12	0.18
PEU4	0.17	***0.82***	0.04	-0.02	0.13	0.05	0.17
V1	0.18	0.19	0.03	***0.74***	0.03	0.09	-0.02
V2	-0.01	-0.09	0.01	***0.90***	0.02	0.03	-0.02

V3	-0.04	-0.23	0.04	***0.82***	-0.07	-0.03	0.01
SE1	0.16	0.24	-0.01	0.02	0.20	0.07	***0.83***
SE2	0.10	0.34	-0.09	0.04	0.12	0.09	***0.81***
SE3	0.06	***0.46***	0.02	-0.11	0.00	0.12	***0.70***
FC1	0.00	0.07	0.13	-0.06	***0.66***	0.09	0.13
FC2	0.12	0.08	-0.06	0.04	***0.78***	0.01	-0.10
FC3	0.09	0.13	-0.02	-0.01	***0.73***	0.10	0.14
FC4	0.31	0.23	0.18	0.04	***0.57***	0.24	0.20

Table 3b: Validity Analysis for the quiz tool

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
PU1	***0.85***	0.10	0.06	-0.01	0.01	0.12
PU2	***0.86***	0.10	0.12	-0.02	0.05	0.09
PU3	***0.84***	0.02	0.09	-0.03	0.11	0.05
PU4	***0.79***	0.19	0.18	-0.09	0.01	0.05
PU5	***0.78***	0.17	0.21	0.01	-0.03	0.05
PU6	***0.77***	0.23	0.21	0.00	0.04	0.01
PU7	***0.77***	0.15	0.15	0.08	-0.03	0.14
PU8	***0.71***	0.11	0.27	0.13	0.00	0.02
LTC1	0.27	-0.01	***0.78***	0.05	0.03	0.03
LTC2	0.20	-0.09	***0.73***	0.10	0.02	-0.02
LTC3	0.23	-0.06	***0.84***	0.12	0.03	0.09
LTC4	0.12	0.06	***0.83***	0.08	0.01	-0.10
LTC5	0.13	0.07	***0.77***	0.06	0.10	-0.02
CLS1	***0.72***	0.01	0.08	0.09	0.32	0.17
CLS2	***0.76***	-0.01	0.10	0.14	0.31	0.13
CLS3	***0.73***	0.00	0.08	0.15	0.28	0.08
PEU1	0.14	***0.87***	-0.03	-0.11	0.13	0.28
PEU2	0.17	***0.88***	0.00	-0.09	0.13	0.27
PEU3	0.20	***0.88***	0.02	-0.07	0.07	0.19
PEU4	0.17	***0.90***	-0.02	-0.08	0.05	0.16
V1	0.08	-0.02	0.15	***0.86***	-0.11	-0.03
V2	0.09	-0.14	0.15	***0.90***	-0.08	-0.09
V3	0.06	-0.13	0.08	***0.88***	-0.07	-0.09
SE1	0.20	0.33	-0.05	-0.03	0.10	***0.82***
SE2	0.20	0.32	-0.03	-0.09	0.16	***0.78***

SE3	0.14	0.37	-0.02	-0.11	0.12	***0.78***
FC1	0.04	0.01	0.17	-0.23	***0.50***	0.31
FC2	0.09	0.04	-0.05	0.05	***0.79***	0.07
FC3	0.14	0.19	0.01	-0.18	***0.74***	-0.03
FC4	0.28	0.18	0.25	-0.10	***0.55***	0.30

Factor analysis was performed on the measurement items to ensure the constructs were valid. Validity is demonstrated when items load at greater than 0.4 on their own factor, and less than 0.4 on all other factors, using varimax normalised rotation, and assuming an eigenvalue of 1. Seven factors were expected to load for each of the bulletin board and Quiz tool, corresponding to the seven constructs having multiple items. Perceived enjoyment consisted of 1 item only, and so was not included in the analysis.

The factor loadings for the bulletin board grouped as expected, except for item 3 of self efficacy, which cross-loaded with the Perceived ease of use construct (value = 0.46). It still loaded higher on its own construct (value = 0.7), and so was retained (See Table 3a).

Factor analysis on the same items for the quiz tool shows that all items loaded as expected, with one minor anomaly - Perceived usefulness and Compatibility with learning style loaded on the same factor, demonstrating the close relationship between these two. The variance inflation factors (VIFs) for these constructs were less than 10, however, an indication that multicollinearity would not pose a problem (Tan & Teo, 2000). . Table 3b shows the results of factor analysis.

5 Results

Table 4 compares the means between the bulletin board and the quiz tool, with regards to prior similar experience, respondent perceptions, and usage intent.

In terms of years of experience, the bulletin board has on average been used for a longer period (1- 2 years), than the quiz tool (about 1 year). There is little difference in terms of frequency of use (few

times/month), and intensity of use (about ½ hour per average day). Perceptions on average do not differ much between the tools, except in the case of Perceived voluntariness, where use of the bulletin board is seen to be slightly more voluntary than the quiz tool. All other means are greater than 4, indicating positive perceptions. Intentions to use the tools are high (both 5, on a scale of 1 to 7), which shows that students in general are appreciative of the tools.

Table 4: Descriptive Statistics

	Bulletin Board		Quiz Tool	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Years of use	2.7	1.9	2.1	1.5
Frequency of use	3.3	1.8	2.9	1.5
Intensity of use (hrs/day)	2.3	1.2	2.3	1.2
Perceived usefulness	4.4	1.1	4.6	1.1
Long term consequences	4.1	1.2	4.1	1.2
Compatibility with learning style	4.4	1.3	4.4	1.3
Perceived ease of use	5.4	1.0	5.5	1.2
Perceived enjoyment	4.5	1.3	4.3	1.5
Perceived voluntariness	3.4	1.5	3.0	1.7
Self efficacy	5.2	1.3	5.4	1.3
Facilitating conditions	5.0	1.0	5.0	1.0
Intentions to use	5.0	1.3	5.0	1.4

5.1 Proposition Testing

In order to test the propositions, multiple linear regression equations were created for each tool separately, with independent variables regressed onto the dependent variable, intentions to use. The beta coefficients obtained are shown in Table 5, with the significant values in bold. The beta coefficients were then compared to ascertain if the expected differences were apparent. This technique is similar to that used by Venkatesh and Morris (2000) in their comparison of technology adoption across genders. Propositions were found to be supported if the differences between the two tools were significant and in the same

direction as that proposed. Table 5 also shows the results of the proposition analysis.

For the bulletin board two factors significantly influenced usage intent – Perceived usefulness, and Perceived ease of use. Interestingly, these are the same factors that make up the original TAM (Davis 1989). For the quiz tool, a different set of factors were significant – Long-term consequences, Compatibility with learning style, and Self efficacy.

Comparing the two sets shows that there is support for 5 of the 8 propositions. As proposed, Perceived usefulness (Proposition 1) and Perceived ease of use (Proposition 4) were more salient for the bulletin board, as compared to the quiz tool. Long-term consequences (Proposition 2), Compatibility with learning style (Proposition 3), and Self efficacy (Proposition 7) were more salient for the quiz tool, as compared to the bulletin board.

Three factors, Perceived enjoyment, Perceived voluntariness and Facilitating conditions were shown to have no significant influence on usage intent of either tool. For these factors, no significant differences between the two tools were found and therefore no support could be found for Propositions 5, 6 and 8.

Table 5: Results of Regression Analysis

Factors and Propositions	Bulletin board	Quiz tool	Proposition supported?
	Beta values		
1. Perceived usefulness	***0.30	0.05	Yes
2. Long term consequences	0.00	*0.16	Yes
3. Compatibility with learning style	0.12	*0.21	Yes
4. Perceived ease of use	**0.19	0.13	Yes
5. Perceived enjoyment	0.02	0.01	No
6. Perceived voluntariness	-0.01	0.09	No
7. Self efficacy	0.08	**0.23	Yes
8. Facilitating conditions	0.08	0.05	No

Beta values marked in bold were significant as follows: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

6 Discussion and Implications

The results show that for the sample group, the students had positive perceptions of and high intentions to use both the bulletin board and the quiz tool. The quiz tool is used in summative assessment and therefore was found by students to be less voluntary than the bulletin board. However, other than for Perceived voluntariness, perceptions between the two tools did not differ significantly. In contrast, these results confirm significantly different influences on usage intent between the two tools.

It is interesting that the original TAM factors, Perceived usefulness and Perceived ease of use, were found to influence usage intentions for the bulletin board and not the quiz tool. The TAM model has generally been developed to explain the adoption of technology in work environments, and has been generalised across a wide variety of technologies (Venkatesh & Davis 2000). The bulletin board, in like manner, is a tool whose use is not restricted only to learning environments, but is applicable across a wide variety of contexts where electronic communications and interaction is required. In fact, students may use it for purposes other than learning (e.g. socialisation and entertainment). Thus, this finding is perhaps not surprising.

The quiz tool, on the other hand, is more specifically used for learning purposes, and thus the basic TAM model, developed to serve as a more general theory of technology adoption, is not entirely adequate to explain variations in usage intent. In such contexts, as the analysis reveals, Compatibility with learning style, Self efficacy and Long-term consequences are more important. Compatibility with learning style specifically has been found to be the main influence on intentions to use the Internet in a degree program (Brown 2003).

The implications for practice are that in order for educators to motivate usage of specific tools, they should be aware that "one size does not fit all". For the bulletin board, enhancing perceptions of usefulness, and employing mechanisms to enhance perceptions of ease of use may well lead to greater usage. For the quiz tool, on the other

hand, there needs to be a focus on enhancing compatibility of tool usage with learning styles and development of self efficacy. Emphasising the positive long-term consequences in terms of improving chances of success in tests and examinations will also help.

7 Limitations and Future Research

The research has been limited to undergraduate students of Commerce, and this may limit generalisation across a wider learning context. Future research might therefore involve repeating the study across different faculties to ensure that the results are not biased to one discipline.

Future research might also look at improving on methodological weaknesses, such as the use of a single item to measure Perceived enjoyment. To improve reliability and validity of measuring instruments it is common in social science research to employ multiple items for each construct. However, on that score, an unforeseen area of resistance to the questionnaire came from students' reaction to answering multiple items, which they perceived as being repetitive and indistinguishable in some cases.

Various other factors could also be included in the research framework. For example, the literature points to level of skill, computer anxiety, image and visibility as possible influences on usage intent (Brown 2003). These factors may be responsible for variations in results not explained by the tested constructs.

The demographic data can be used to ascertain the effect of cultural and socio-economic background on adoption of learning technologies, so that the tools can be better used to help in dealing with the wide student diversity present in many tertiary level programs.

Finally, other tools present in WebCT such as the chat room and calendar can also be compared, to ascertain what factors might motivate their usage.

8 Conclusion

Although much research has been conducted on WebCT usage and acceptance, few studies have compared the various tools within the technology. These tools are significantly different from each other, ranging from bulletin boards to quiz tools. Some tools are interactive while others are static, resulting in each tool having unique purposes and characteristics. This study found that a different set of factors affected student intentions to use the bulletin board and the quiz tool respectively, which demonstrates the importance of individual learning tool consideration.

Perceived usefulness and Perceived ease of use were found to affect usage intent for the bulletin board, while Compatibility with learning style, Self efficacy and Long-term consequences affected usage intent for the quiz tool. The findings suggest that different approaches should be used in the introduction of each in a course. It may be necessary for educators to emphasise these differences and the advantages, appropriateness and relevance of the tools for specific tasks.

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Authors' Contact Details

Lisa Seymour (corresponding author lseymour@commerce.uct.ac.za)
Irwin Brown (corresponding author ibrown@commerce.uct.ac.za)
E Beck
F Khatree
L Morley
Information Systems Department
University of Cape Town, Cape Town, South Africa