

Choosing a Web-Based Learning Tool: Focussing on the Needs of Users

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Abstract

This paper reports the findings of the second of two evaluations of Web-Based Learning tools conducted at the University of Technology, Sydney. The evaluations have been conducted under the direction of a Flexible Learning Action Group on Internet use, a group concerned with the use of Internet based tools to provide virtual learning environments and to facilitate communication between students and lecturers. The first evaluation reviewed the small number of online learning tools available at that time (Feb 1997) and TopClass [HREF1] was selected as the tool with the best overall feature set. However, since that decision several competing tools have appeared in the market place, which have equal or superior feature sets and which are less expensive in terms of licensing costs. In addition, academic staff now have three years experience in using online learning tools and are in a more informed position to evaluate the range of tools. This paper provides some background to the current evaluation, outlines its methodology and process, presents the results of the user survey, software testing and product evaluation forums and concludes by making some preliminary recommendations for adoption of a new tool to be trialed in Spring semester 2000. The outcomes of this trial will highlight any usability issues from the student, instructor and administrator perspectives and would inform the decision to ramp down the UTS commitment to TopClass, beginning Spring semester 2000. The two systems would be operated in parallel for the next 12 months to June 2001 when the use of TopClass would be discontinued.

Keywords

E-learning, Evaluation, Web-based learning, Web-based learning tools

Introduction

A centralised approach to the selection, adoption and support of a Web-Based learning (WBL) tool was adopted at the University of Technology,

Sydney (UTS) in 1997 and was reported in Sawers & Alexander (1998). The selection process led to adoption of TopClass as the WBL tool supported at UTS for e-learning activities and since its implementation the take-up has been exponential. In 2000 there are around 10,000 students in over 200 subjects who are engaged in online learning activities. Uses of the tool range from basic communication such as class announcements and peer-to-peer communication to higher level uses such as discussions, role-plays and simulations.

During the three-year period of using TopClass to teach online, academics developed a more sophisticated view of their requirements in a WBL tool. At the same time, a plethora of new or improved tools have received significant publicity, leading to claims and counter-claims of the superiority of other tools. In 1999 the Flexible Learning Action Group (FLAG) on Internet use which had researched, trialled and implemented TopClass decided to review the University's ongoing commitment and instigated a project to review the needs of academics and to match those needs to the new WBL tools available.

Methodology and Process

Using an action research methodology the following multi-stage evaluation process was determined by the FLAG group, and communicated to the UTS community for comment:

- Conduct interviews with a cross-section of academics currently using TopClass about the features in use, desired features and any other issues they wished to raise;
- Analyse transcripts of these interviews to identify issues for inclusion in a survey to be distributed to the TopClass-UTS community (an email listserv dedicated to the pedagogical, administrative and technical issues related to the use of TopClass at UTS);
- Develop and pilot a survey of the ways in which academics are using TopClass, and the ways in which they would like to use a tool;
- Modify survey as appropriate and make it available on the web to all academics at UTS;
- Develop a functional specification for an online learning tool for use at UTS using results of the survey. Input to be sought from the Information Technology Division (ITD) as to the necessary administrative features required;
- Distribute draft functional specification to the Deans and the TopClass-UTS community for addition and comment;
- Identify a list of potential WBL tools for evaluation, to be distributed to the Deans and the TopClass-UTS community for addition and comment;
- Contact suppliers of these tools and invite them to provide an operational version of their software for evaluation;
- Identify a shortlist of tools based on the response from the vendors;
- Install the short-listed tools; Form evaluation teams of academics by calling for volunteers from the TopClass-UTS community.

- Conduct evaluation forums for each of the tools (open to TopClass-UTS community);
- Invite vendors to present their products and vision for online learning to all UTS staff;
- Conduct evaluation (based on functional specification) of each of the short-listed companies;
- Present evaluation report to the FLAG group for discussion;
- A preliminary recommendation was made by the FLAG group, subject to the company evaluation resulting in a positive outcome;
- Conduct detailed evaluation of company providing the product;
- Develop an implementation plan;
- Develop staff development plan;
- Forward recommendation to the Vice-Chancellor's Management Group.
- Conduct pilot based on decision from that management group.

This process is represented graphically below:

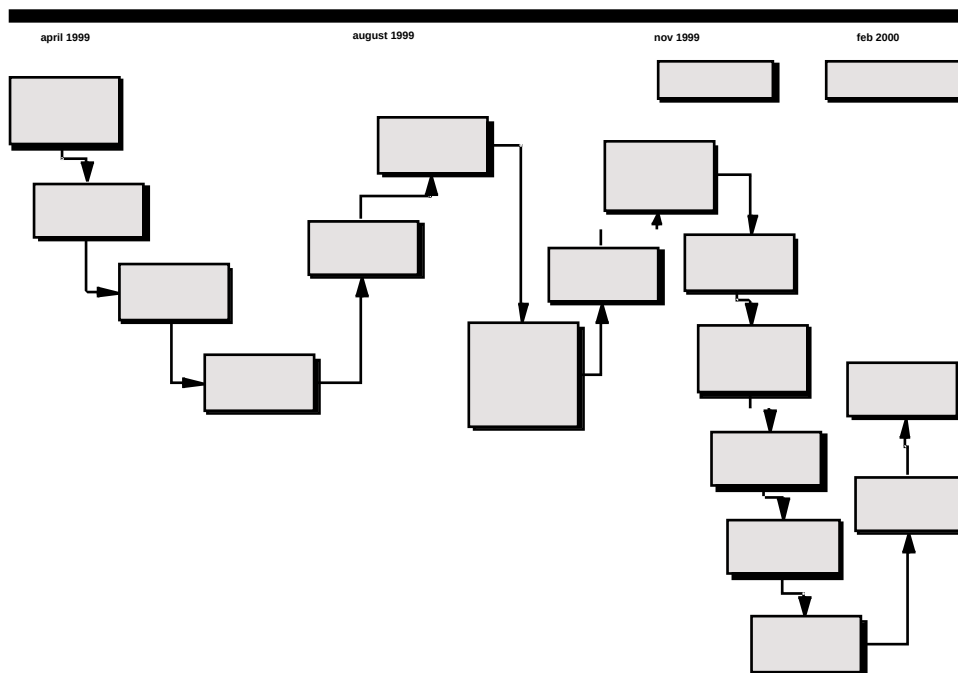


Figure 1: Evaluation process – overview and timeline

Results

Interviews

Interviews were conducted with ten academic staff across the university, selected to reflect a diversity of faculty, uses of TopClass, length of experience using TopClass and academic appointment. The majority of interviewees reported significant benefits in the use of TopClass for students who cannot attend face-to-face activities for various reasons including work and family pressures, and place of residence (interstate and overseas). A majority also reported the ease of learning TopClass for staff and students, the latter commonly needing only a half-hour introduction to be able to use it effectively.

As expected, a range of uses of TopClass was reported:

- the weekly posting of lecture notes, the least common (one academic).
- posting of class announcements, the most common (eight academics).

Other uses reported included:

- online discussion groups
- formative assessment quizzes
- online debates and role-play/ simulations
- maintenance of Frequently Asked Question (FAQ) lists.

Interviewees raised a number of areas in which they believed that TopClass as a software tool was not as effective as it might be. The major area of weakness identified was the email system:

- it did not provide notification that an email had been sent (resulting in some cases of up to 10 identical messages from students, who did not realise the original message had been sent);
- it did not keep a copy of messages sent (no outbox); and
- there was no functionality to send the same message to multiple recipients.

The second issue most commonly raised was the confusion of some students about the functionality of different icons. The icon to send a private message (a closed envelope) was often confused by students with that for a public message (an open envelope) and academics reported spending significant periods of time in moving the messages around. Finally issues relating to the ease of moving messages around different folders (messages retained their original threading and location information when moved which made for very confusing navigation indeed), the difficulty of creating private group discussion areas and of embedding multiple media in messages were raised. These issues were used to inform the development of the pilot questionnaire reported below.

User Questionnaire

The user questionnaire sought to determine the extent to which the findings of the interviews reflected the needs of users across the university. The questionnaire asked users about the online teaching activities that they most commonly used (ref. Table 1). They were also asked about features they may have previously used but no longer used because of technical or other difficulties and finally academics were asked about other features they considered important in an online learning tool and these can be seen in Table 2.

Online teaching/ learning activities	Frequency of activity
Posting class announcements	100%
Sending and receiving private messages to and from students	98%
Posting subject guides or outlines	81%
Providing for threaded discussions	77%
Sending and/or receiving assessment work	66%

Table 1. The online activities most commonly carried out using TopClass by frequency

The questionnaire also sought users' views on teaching and learning activities that they would like to engage in, but are currently unable to do so because of inadequacies in the software. It also sought areas in which the current tool could be improved.

Features most asked for	Percentage reported
<i>A record of outgoing mail kept (ie. an outbox)</i>	93%
<i>Group work - facility to divide students into groups with a private work space</i>	86%
Ability to format text in messages	86%
Easier integration of other media (graphics sound etc.)	84%
<i>Notification that email messages have been sent</i>	81%
Send email to groups	80%
Ability to track students through material and discussions	72%
Capability to develop multiple choice tests offline	69%
Real-time chat facility	61%

Table 2. The features most commonly asked for in TopClass or any other tool

Functional specification

The most commonly used and requested features above were then translated to a more specific and detailed set of functional requirements, resulting in a total of 30 specific evaluation criteria. For example, two of the most important features of a tool according to the questionnaire and interviews were the public and private communication facilities via discussion threads and email. The **discussion thread** requirements of an online tool were determined to be:

- Can users post public messages?
- Is there a facility to thread public messages?
- Is an email (external) sent when new message is added?
- What ability is there to format text in messages?
- Ease of archiving of discussion threads.
- Ease of deleting threaded discussions by instructor.
- Indentation of messages in a thread ie. how many levels deep).
- Ability to move postings from one thread to another without loss of original user information
- Ability to include multiple media (graphics, sound etc) in message
- Ability to set access rights in discussion threads and folders at group level
- Ability to search postings
- Ability to export discussions to flat files
- Identification of messages unread
- Display of only unread messages
- Facility for user to sort by date, sender or topic
- Ability to download messages for reading offline

The requirements of a **private messaging system** via email were determined to be:

- Can users send private messages to another user?
- Can users send private messages to multiple users?
- Does the system keep a copy of the outgoing private message?
- Can users send/receive mail messages using another email system?
- Notification that email or other message/s have been posted
- Inclusion of text of message received when replying
- Ability to search messages

At the same time, five online learning tools were shortlisted – Blackboard’s CourseInfo [HREF 2], FirstClass [HREF 3], WebCT [HREF 4], Learning Space [HREF 5] and TopClass. Software for each of the short-listed products was installed and extensively matched against the defined functional evaluation criteria. The results of this phase of the project for the tools which were in the final short-list can be seen in Table 3. Each product was given a score if a feature from the functional criteria was present and a total rating for each of the tools is presented.¹

<i>Function by frequency of use reported in survey</i>	<i>CourseInfo Version 4.06</i>	<i>WebCT Version 2.0</i>	<i>TopClass Version 3.1</i>
Posting class announcements by teacher (100%)	1	0	1
Sending and receiving private messages to and from students (98%)	7	5	2
Posting subject guides or outlines (81%)	4	4	5
Providing for threaded discussions (77%)	13	13	9
Sending and/or receiving assessment work (66%)	1	1	1
Total rating	26	23	18

Table 3: Most used features matched against the functional evaluation criteria

Clearly, the differences between CourseInfo and WebCT were marginal, but TopClass exhibited a significantly lower number of the required features that matched the requirements of UTS academics and administrators engaged in online learning. Evaluation of these tools

¹ Note: The data gathered for FirstClass and LearningSpace are not included here as the FLAG group made a unanimous decision to remove both these tools from the evaluation. This was because of the need to install client software on the local computer in order to do any administration at both the instructor and admin levels. This total lack of browser administration was seen as a significant drawback if classes/subjects could not be managed from anywhere with a just an Internet browser.

according to responses to the questionnaire regarding activities which academics would like to carry out but were not possible because of limitations of TopClass are presented in Table 4.

The next phase of the evaluation was to hold focus groups with academics across the University who were experienced online teachers.

<i>Function by percentage reported in survey</i>	<i>CourseInfo Version 4.06</i>	<i>WebCT Version 2.0</i>	<i>TopClass Version 3.1</i>
Small group email (100%)	1	1	0
A record of outgoing mail (ie. an outbox (98%))	1	1	0
Notification that email messages have been sent (81%)	1	1	0
Ability to divide students into groups (77%)	2	2	2
Ability to track students through material and discussions	1	1	1
Ability to format text in messages	1	1	1
Easier integration of other media (graphics sound etc.)	1	1	1
Capability to develop multiple choice tests offline	1	1	1
Real-time chat facility (66%)	4	3	0
Total rating	13	12	6

Table 4. Features most asked for matched against the functional evaluation criteria.

Focus group sessions evaluating the alternative tools

Members of staff were invited to participate in two focus groups where demonstrations were made of each tool and comments were sought as to the perceived usability and functionality of each of the areas defined in the user survey. At the end of the sessions a vote was held and a ranking of the tools was agreed as to the most suitable tool for UTS. Fifteen members of staff attended, representing a range of faculties and academic units. The ranking of suitability of tools from the user evaluation sessions was as follows:

1. BlackBoard CourseInfo
2. TopClass
3. WebCT

A range of comments were made in the focus groups about perceived strengths and weaknesses of the tools:

BlackBoard CourseInfo

The groups believed that if this tool was selected, it would be relatively easy to make the transition from TopClass. General comments included the following:

- it appeared feature rich and very user friendly;
- support for group-work was very strong;
- integration with Internet e-mail was seen as very powerful;
- provision of an individualised student 'portal' onto relevant campus information resources was seen as a sound foundation for the proposed UTS staff-student 'intranet';
- the product's use of an industry standard database was seen as a significant leap forward in terms of scalability, reliability, manageability and integration with other university systems;
- batch enrollment capabilities were very sophisticated and the product was fast and very stable on the Windows NT platform.

WebCT

The interface was considered comparatively difficult to manage. The content interface was felt to be problematic. A certain level of HTML knowledge was required and the remote directory management was little more than a browser based FTP client which it was felt that academics would find challenging. Lack of true database integration was seen as a serious barrier to scalability however version 3.0 of WebCT (due later in 2000) claims to address this problem. User management was problematic and there was confusion over the roles of course 'designer' and 'instructor'. On the Windows NT platform the tool (v2.0) was very slow and extremely unstable on multiprocessor hardware and this was an admitted problem in the release notes accompanying the product. This also seriously affected the potential scalability of the product.

Summary of evaluation outcomes

The three WBL tools were evaluated quantitatively against an agreed set of functional criteria defined from a user survey and qualitatively during user forums where the tools were demonstrated and the relative strengths and weaknesses of each discussed. Those groups then agreed upon a ranking as to the most suitable tool for UTS. BlackBoard CourseInfo rated first and was considered by the groups to have:

- the strongest groupwork capabilities;
- the best interpersonal communication;
- the most user-friendly interface;
- the highest level of stability and scalability;
- a high level of affordability.

The following Table presents the agreed ranking of the products, totals the results of the functional evaluations and shows the associated software costs. It can be seen that CourseInfo rates above WebCT (except on cost) and rates significantly higher than TopClass in both categories.

Product	FE rating	Cost in \$US for 10,000 students per year.
BlackBoard CourseInfo v4	39	\$5000 per server, unlimited students
WebCT v2.0	35	\$3000 per server, unlimited students
TopClass v3.1	24	\$42,000

Table 5. Ranking of products by functional evaluation (FE) rating and associated costs

The outcomes of both the quantitative and qualitative evaluations indicate that BlackBoard CourseInfo is the product that best matches the requirements of academics at UTS. In our particular study it rated as functionally superior to the other evaluated tools and was considered by the user evaluation forums to be ‘*very user friendly*’ and ‘*not difficult to use if one was familiar with TopClass already*’.

Since the evaluations have been conducted (Nov 1999-Feb 2000) BlackBoard has released an ‘Enterprise’ version of their software which is expressly designed to further improve scalability and completely integrate with student records, email systems, student payments (Bursar), exam results, online bookshops and many University legacy systems. This is priced at US\$50,000 per year and BlackBoard will provide consultants at a fee to manage the integration. A number of lessons were learned in the trial and implementation of TopClass at UTS and CourseInfo or its Enterprise version could address several of these issues. Some of these problems were identified and reported by Sawers and Alexander (1998) and have impacted strongly on our decision to adopt a WBL tool with an industry standard database backend:

“TopClass uses a proprietary backend database which does not co-exist with existing legacy (student records, exam results etc) and desktop (class lists, student grades etc) database systems. TopClass can not as yet be programmed or scripted to query and import records from an SQL datasource, so the enrolment of students at present is a tedious and error prone manual process.”

BlackBoard CourseInfo stores data in the Microsoft SQL Server, MySQL or Oracle industry standard Relational Data-Base Management Systems and this would allow better integration with the existing, or planned student records system. It would also be possible to script customised reports to produce student lists, grades etc.

“TopClass has no integration with central directory services such as LDAP (Lightweight Directory Access Protocol) which is an increasingly used standard for the central storage of user information (names, addresses, phone numbers, email addresses etc, etc.) that would make sense as the foundation for next generation records management systems.”

Because of the open nature of the CourseInfo data structure it would be possible to synchronise student accounts via the new central LDAP database integral to the new UTS email system. This would mean that students and staff would require only one username and password pair in order to access both their e-mail and the online learning environment, with associated potential in lowering support costs related to lost/forgotten usernames and passwords.

“TopClass has poor integration with existing and emerging internet mail standards such as POP 3 and IMAP which makes TopClass difficult to integrate with existing email networks.”

CourseInfo leverages existing Internet e-mail infrastructure for private messaging as opposed to the closed environment of TopClass. Any mail client that conforms to the POP or IMAP protocols is suitable and this includes such software as Eudora, Outlook, UTS WebMail, Hotmail etc. This would solve many longstanding frustrations experienced with the TopClass internal mail system such as lack of an outbox, no search capability, no multiple recipients etc.

Recommendations

The recommendations made to UTS management by the FLAG Internet group are:

1. Adopt Blackboard CourseInfo
2. Phase out TopClass over 12 months beginning Spring 2000
3. Produce a pilot implementation plan for BlackBoard CourseInfo.
4. Scope the process of migrating to BlackBoard Enterprise which integrates with student records, LDAP servers has an in-built webmail system and allows staff and students to access courses and University resources with a single username and password.
5. Produce and implement a Staff development plan for all staff wishing to move to e-learning.

Conclusion

Many of these evaluations have been conducted and probably number in the hundreds and perhaps even four figures. However, the UTS FLAG group conducted their own because they found the bulk of evaluations had been conducted by groups who were first time users of a WBL tool, and did not clearly understand or articulate the users' needs. The UTS evaluation was designed to be a 'next-phase' re-evaluation of products by experienced users with clearly researched and articulated user needs from both the teaching, learning and administrative perspectives, and which has focussed not only on '*what the tool can do*', but by '*how the tool is and can be used*'. In conducting this lengthy and detailed evaluation UTS is confident that it has chosen the product that best matches the needs of its users at this particular time.

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[HREF 5] LearningSpace <http://www.lotus.com>

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