

Applying NAILS to Blackboard

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Abstract

This paper is a desultory litany of complaints written by a first-time user of the enterprise education software Blackboard. It will make you laugh, it will make you cry . . . and it will make you mistrust any button that looks like a useful feature.

1 Introduction

The NAILS (“Never Again! I Loathe Stress”) software survival methodology seeks to identify the most stressful situations which arise when using a piece of software, understand what aspects of the software cause the stress and, if possible, formulate workarounds which diminish the stress of subsequent use.

The particular piece of software discussed is Blackboard 5.5, which has been selected as the enterprise education solution for my university.

From the Blackboard website (<http://www.blackboard.com/>):

Blackboard delivers the industry’s first suite of enterprise software products and services that power a total “e-Education Infrastructure” for schools, colleges, universities, and other education providers.

In this article I describe some practical problems encountered when trying to deliver a subject within this infrastructure.

While the tone of this article is overwhelmingly plaintive, it should be noted that the e-Education software industry is at an early stage of development. It is hoped that this article will be valuable for determining the requirements on later versions of Blackboard and other enterprise e-Education software.

2 Blackboard Enterprise: The mission

... to boldly go where no one has gone before.

Mission of the starship enterprise, *Star Trek*

I conducted a poll near the end of my first semester of using Blackboard and discovered four other lecturers at my university were attempting to use some of the advanced features of Blackboard but none in an

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integral or mission critical way. So why (on Earth) was I?

In late 2001, I was given the task of creating and coordinating a first-year subject for Autumn semester (February-June) 2002. It is the first subject which virtually every undergraduate student does upon embarking on a degree within my faculty. In terms of content, the subject takes the student from computer architecture through to the workings of the Internet. It seeks to teach scholarly discourse and critical analysis by studying the role of the Internet in society, and enforces a minimum level of skill as a computer user before the student may proceed to later subjects and the workforce. The subject has a typical enrollment of 300 students.

As it was the first subject in a new degree, I was excited about exploring the possibilities for innovative delivery and adopted the following strategies:

- *small classes* – all the teaching was conducted in computer labs with at most 25 students, in order to enable the instructors to give hands-on demonstrations and also to encourage personal contact between instructor and class to minimize the risk of students getting left behind in the relatively unstructured university learning environment.
- *team teaching* – to spread the workload, to ensure adequate expertise was brought to bear on content development, and to interact and share experiences in our professional development as teachers.
- *peer support* – where students would be encouraged to support each other’s learning in an exploratory way, rather than seeking guidance from a teacher immediately.
- *continuous assessment* – 50% of the assessment for the subject is via weekly tests and homework, worth between 2% and 10% each week, with the remainder of the mark for scholarly discourse (10%) and skill assessment (40%). The purpose was to deepen learning by forcing early revision and to make the learning experience less stressful by having no single ‘make or break’ assessment.

I won’t go into the pedagogic outcomes of these strategies – that’s a subject for another time. I’ll only refer to them in relation to how they dictated the use of the available technology.

It was clear from the outset that with 300 students and eight staff the success or failure of this vision would depend critically on how effectively it was supported by an information system.

We sought to support small-classes with a practical component by delivering the content in a computer laboratory with lecture material and exercises to be accessed on-line. To be effective, the class size

had to be strictly controlled. We decided to achieve this by assigning students to particular laboratory sessions. The classlist is information we had to be able to access and modify with ease.

Team teaching needed support in the form of shared workspace for developing content, group communication, and information about assignment of responsibilities.

Peer support required topic specific channels of group communication for students which had the ability to retain knowledge, or be a repository for organizational memory.

Continuous assessment required automated student assessment and grading – 300 students each doing 11 tests over the course of the semester would exhaust the resources of the department if manual marking were required.

3 Blackboard 2002: A Cyberspace Odyssey

I'm sorry Dave, I'm afraid I can't do that.

HAL 9000 – *2001: A Space Odyssey*

This section is about things I thought I should be able to do, but Blackboard completely stumped me.

3.1 Shared workspace

I decided to start familiarizing myself with the technology by putting the subject materials into Blackboard as they were being developed. This came to a halt very quickly. I do much of my work from home over a 56k modem connection. The typical Blackboard page has 30-40 graphical elements, which although small, make loading the page very slow – mostly due to the many distinct HTTP GETs executed for each page, so access speed isn't even that great on campus. By the time I'd followed three links to get from the Blackboard entry screen to the subject page I was frustrated. After revising the first lecture a couple of times I was tearing my hair out.

The solution: I just created a website, password accessible to the teachers, where they could exchange course documents.

3.2 Classlists

Organizing 300 students and eight tutors into fifteen small classes in a timetable built on shifting sands was always going to be a hassle. Without a database, though, it would have been impossible. Blackboard had no facility for interfacing with a database to present dynamically generated classlists for the tutorials.

I easily wrote my own website in PHP which is fast and lightweight and supports interaction with a MySQL database. I vowed not to use Blackboard for anything I could do myself with a moderate amount of effort.

4 The Blackboardosaurus Wrecks

John Hammond: *When they opened Disneyland in 1956, nothing worked.*

Ian Malcolm: *Yeah, but John, if the Pirates of the Caribbean breaks down, the pirates don't eat the tourists.*

– *Jurassic Park* (Useless Movie Quotes 2002)

This section is about things Blackboard offers which I couldn't easily do myself, but which were anything from awkward to dangerous, and occasionally fatal to use.

4.1 Discussion boards

We used the Blackboard Discussion Boards to implement forums for peer support and scholarly discussion. We decided against a mailing list (push technology) because of the high traffic, and because most emails would be of interest only once the students got stuck on the problem discussed, and would be ignored otherwise.

For this reason, I decided a web based message board would be ideal. In principle the Blackboard Discussion Board served this purpose, except:

- it is graphics heavy: each message is accompanied by an icon making it ever slower as messages accumulate.
- archiving old messages onto another page speeds access to the forum but defeats the function of organizational memory since older knowledge is hidden on the archive page. There's no facility for summarizing older knowledge on the main page when archiving messages.
- pointing at the URL of a particular message (*deep linking*) in a Discussion Board doesn't work, so it's impossible to direct students to particular discussions from other media, like web-pages or emails.
- For the purpose of marking, it wasn't possible to sort the posts by author so I had them submit their best posts on paper, with some discussion of how the posts fit into the discussion.

4.2 Weekly Tests

To administer and mark 300 tests every week could only be accomplished with appropriate software support. We used the Blackboard multiple choice quiz facility for this. I encountered the following general problems:

- There is no way to prevent students from copying and pasting the exam into an email and sharing it with friends. To combat this we mandated that the students have only one window open while doing the test, namely the Blackboard browser. Each question was randomly selected from a bank of three or four 'equivalent' questions, so that the probability of two students having the same fifteen-question test was 1 in approximately 3^{15} .
- The instructor could not determine who a student is logged in as to verify that the student is doing their own test and not someone else's. The fact that there is no way to monitor this is a major flaw in the design of Blackboard.
- The only way to control access to the test was to change the (global) access password. This was inconvenient when more than one class was running simultaneously, as the teachers had to coordinate to decide on the access passwords and who would change it once the test had commenced so that students could not give their friends access to the test outside class time. A better solution would be to have an individual password for each student, obtainable from the tutor when entering

the classroom. I successfully implemented this solution for automatic Unix testing software.

- Exams can't be duplicated - so if you need to set the same questions for another exam, you need to construct it by hand from the question pools, which is awfully tedious.

The design flaw in the testing facility which caused the most angst was discovered when the laboratories experienced network problems during online tests, before submission. The solution to the network problems involved the students logging off their computers and rebooting. When the student logs back into Blackboard, however, their test is marked as already attempted. The instructor is unable to give the student access to that test without resetting the test, and losing the particular questions which the student was randomly allocated. Consequently, the only way to assess the students without them commencing an entirely different exam was for them to write down their answers on paper before logging off the computer, and give them to the tutor to mark by hand against the test questions recorded in Blackboard.

On two occasions the network failed while about 100 students were attempting the exam in four simultaneous classes, requiring the tutors to collect the student's marks on paper and mark the exams by hand.

4.3 Gradebook

Using the Blackboard gradebook was a solution to the problem of allowing a student to ascertain the results of their tests without other students being able to see their results. Blackboard purports to allow the computation of overall grades for the subject, however, this is limited to weighting each assessment.

- It is not possible to weight, as a whole, a component of the subject which comprises multiple assessments.
- It is not possible to stipulate that certain minimum marks be obtained for some component, in order to get a pass grade.
- It is not possible to make non-linear combinations of marks, for example $\text{Assignment Mark} = \text{Max}(\text{Asst 1 Mark}, \text{Asst 2 Mark})$.

Since the grading scheme for the subject has aspects of all three of these, the grades displayed by Blackboard (which it wasn't possible to suppress) were meaningless, and in spite of FAQs, discussion board messages and face to face explanations, students continued to fret about their grades as computed by Blackboard, and their enquiries generated a considerable amount of work.

Finally, each student does up to four tests in an automated testing environment I developed separately for assessing their level of skill in using Unix. It would be desirable to have the marks so obtained accessible to the students via the Blackboard gradebook, however there is no facility to import marks - marks are either generated via a Blackboard test, or entered by hand. Therefore, making these marks available would potentially involve entering 1200 marks by hand over the course of a semester.

5 Instructor Support

In cyberspace no one can hear you scream

with apologies to the producers of *Alien*

This section deals with requirements for functionality which is invisible to students but which an instructor needs to maintain and improve the subject.

5.1 User Manual

The first and most obvious problem I encountered when using Blackboard from home was the user manual - which is a single 2.5 megabyte PDF file instead of a collection of HTML pages. This makes a farce of the idea of using Blackboard for distance education in a country such as Australia where home broadband access is a rarity.

5.2 Information Gathering

Blackboard has a survey facility which operates much like an online test, however the results are anonymized to protect student privacy. This is particularly useful for making simple measurements of the student population such as their previous exposure to various ideas and technologies, and also how they were enjoying/coping with the subject. Due to the anonymity restrictions however, a single survey response was not accessible as a whole, making it impossible to investigate the data more deeply - for example, to understand the extent to which previous exposure to the material correlated with enjoyment and understandability of the subject. The effectiveness of the survey in helping us improve the subject was severely impaired by this limitation.

Similar criticism applies to the ability to analyse the results of online exams. Even though one can see a particular student's exam script, it's not possible to access the data as a Student \times Question matrix of marks to understand which students found which questions difficult or easy. The most information one can obtain from Blackboard itself is the average, standard deviation, variance, high and low of results for a particular exam.

In contrast, the Educational Testing Centre (<http://www.etc.unsw.edu.au/>) which administers multiple choice exams, produces a statistical analysis of the results including identification of:

- questions which were done well and poorly
- questions which confused good students
- questions where poor students performed better than good students
- questions where there may have been more than one correct answer
- questions which were too easy or hard

This feedback helps to improve an exam.

Also compare with the technology used by Pitman (Pitman, Gosper & Rich 1999) where online educational software was used to collect detailed statistics on the relationship of marks, gender, and usage patterns by cross referencing student data with marks.

Finally, it would be most helpful to be able to collect student evaluation of online materials and readings, using a "rate this article" feature which has become popular in many e-zines.

5.3 Administration and Security

Blackboard borders on dysfunctional in terms of backup and restore. In the first semester where this subject was given I had two teaching assistants entering and maintaining the multiple choice quizzes. Late one night when one of them was tired, he made unavailable the previous day's exam ignoring, in his tiredness, the warning that this would delete the students' marks. Unfortunately, Blackboard has no rollback feature, nor does it have any way to restore a particular course from backup. In order to retrieve the previous day's backup with marks intact would involve a week's work from three system administrators who would have to restore the whole enterprise system onto a backup server and extract the course from there, modifying by hand such information as dates before inserting the data into the production server. This amount of work could not take place without the influence of two department heads and a great deal of political strife, so I ended up retrieving the marks by trawling through the browser caches of various teaching assistants. The next time it happened (as it inevitably would with overtired teaching assistants), we had exported the gradebook and were able to restore the marks (but not the exam scripts which were also deleted) by entering the 300 marks by hand.

This story illustrates that access permissions, audit trail and rollback are serious deficiencies of Blackboard.

Rollback is a feature of any reasonable accounting system, but Blackboard has no record of what transactions have occurred, making it impossible to reverse them in spite of the fact that its data is held in an Oracle database which does have rollback.

A consequence of this fact is that there is also no audit trail to track changes to the marks. When there are eight teaching assistants, all of whom have permission to change marks, the university is vulnerable to allegations of corruption in case inexplicable, untraceable changes take place.

The fact that the teaching assistants all had permission to change any mark is a result of the fact that they had to be able to enter the homework marks for their classes, and there is insufficient granularity in the access permissions, to allow them to enter marks for certain assessment items for certain students but not change (or delete all of!) the marks for other assessment items. In fact, a cursory glance at the Blackboard manual (Blackboard User Manual 2002) confirms that the permission structure does not correspond to any useful separation of roles in even a medium scale subject, except the distinction between student and teacher.

Finally, once a student is unenrolled from a subject, their marks and more particularly, their exam scripts (the record of their questions and answers) are all lost. My university has a policy of keeping exam scripts for six months after the end of the semester in case of student appeals. Once again, since students are automatically unenrolled from a subject at the end of the semester, the only way of accessing the exam scripts is to restore a full archival copy of the enterprise system on a backup server with the many days of labour that entails.

6 Conclusion: How I learned to stop worrying and love the bomb

The whole point of the doomsday machine is lost if you keep it a secret . . . Why didn't you tell the world, ay?!

—Dr. Strangelove (Useless Movie Quotes 2002)

The use of enterprise education software is essential to achieve the level of continuous assessment and student interaction designed into this subject. Since I'm committed to this pedagogic style and my university has chosen this particular enterprise solution, the future of this subject is linked to the Blackboard system, but we are mindful that in some ways, quality is compromised:

- ability to keep test questions secret
- veracity of grades through lack of audit trail
- reliability of marks collection through poor backup and restore

Blackboard has failed to realize the obvious potential of an e-Education system because:

- sophisticated analysis of student and grade data is impossible
- there is a lack of integration with other testing software
- grades must be computed externally when flexible grading formulas are needed
- multiple portals to the subject were required due the inability to interface with back-end databases, and due to the sluggish, graphics-heavy web pages which are impractical to use over a low-bandwidth connection.
- the inability to search messages, summarise progress and do deep linking cause Blackboard to fail as a repository for organizational memory.

Due to the diverse possibilities offered by this type of tool, it is very easy to find oneself in uncharted territory. This raises the question of how best to support people in their use of Blackboard.

The issues I raise here are not easily solvable by local technical staff and appear to require quite serious redesign of certain parts of the Blackboard system. My recommendation to any institution using Blackboard would be to attempt to collate user experiences using the NAILS methodology and make clear what is well understood usage and what usage is 'uncharted territory' and inadvisable for mission-critical functions.

References

- Blackboard User Manual, *Course User Roles*, http://resources.blackboard.com/scholar/general/pages/ictraining/Bb5_Roles.pdf
- Pitman, A. J., Gosper, M. and Rich, D. C. (1999), 'Internet based teaching in geography at Macquarie University: An analysis of student use', *Australian Journal of Educational Technology*, **15**(2), 167–187. <http://www.ascilite.org.au/ajet/ajet15/pitman.html>
- D. C. Douglas, *Useless Movie Quotes*, <http://www.uselessmoviequotes.com/>