Exposing the Myths and Realities of Web-Based Learning Tools

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Outline

- Website usability
- Web-based learning tools
- An experiment to evaluate web-based learning tools:
  - Research goals
  - Methodology
  - Results and observations
  - Suggestions and recommendations
  - Unanswered questions
- Discussion on the Ethics of using students to evaluate web-based learning tools
Website usability

- Information Architecture is about understanding and conveying the big picture of a web site
- Users don’t notice the information architecture of a site unless it isn’t working!
- Known item searching versus casual browsing
- There are no natural landmarks
- “Scent of Information”
- Consistency is king!
What bothers users the most when using web?

- Delays/speed
- Lack of trust, privacy
- Traps, broken links, mystery meat navigation
- Easy to get lost
- Need for plug-ins
- Frames; overdone Flash animations; and gratuitous flashscreens
- Hard to read
- Availability
- Accessibility
Web-based learning tools

- *Web-based learning tools* provide integrated environments of various technologies to support diverse educators’ and learners’ needs via the Internet

- Goal -- enhance face-to-face instruction and to deliver distance-learning courses

- Main features:
  - course note posting
  - news
  - assignment submissions
  - quizzes, interactive exercises
  - communication features
“No longer is the student waiting for the teacher to teach. Rather the effective learner takes control of their educational program and utilizes the tools provided by the learning institute...”

From Both sides now, by Laurie P. Dringus
Evaluation of web based learning tools

• Very little evaluation has been done…
• Not clear if the expected advantages outweigh potential disadvantages
• Do they positively or negatively impact students’ learning?
• Few case studies
  • one exemption, students just used one tool (WebCT) the result – no undue burden placed on students, but many found it difficult to use (?)
Research goals

- Evaluate web-based learning technologies
- Make recommendations to the University of Victoria
- Make recommendations to the software developers
Research questions

- How would students rate the usability of the separate components of these tools as well as each tool's overall navigation?
- How much effort was required by the students to learn how to use web-based learning tools?
- Are the tools usable from both the instructors' and administrators' perspectives?
- What are the students' perceptions of how these tools impact their learning?
- How do students feel about the deployment of these tools in university courses?
Research team

- Professor from Computer Science (me)
- Professor from Experimental Psychology (Janet Bavelas)
- PhD (ABD) – Bruce Phillips, research interests were in computer mediated communication
- PhD student – Social Sciences background, interests effects of the internet on youth
- Masters student – Computer Science, web-based learning tool evaluation (HCI)
What we did

- Selected web-based learning tools
- Simultaneously deployed tools in a university undergraduate course
- Compared and evaluated candidate tools
Tool Selection

- WebCT 2.0
  - used by 1,350 institutions
  - cost (US)$3000.00/per year/per institution

- Blackboard 4.08
  - used by more than 3,300 institutions
  - cost (US)$5000.00/per year/per institution

- Generic website
- Learning space…
Generic website

SENG 310 -- Human Computer Interaction

Instructor: Dr. Margaret-Anne Storey

Lecture Hours:
M 10:00 - 11:30 in CIT 116
R 10:00 - 11:30 in Cle A201

Office:
EOE 313

Office Hours:
Monday 12:15 - 1:15 pm
Thursday 1:30 - 2:30 pm
Or by appointment

TA: Bruce Phillips

Office:
TBD

Office Hours:
TBD

Email: bruce@uvic.ca
Blackboard

Research goals

Methodology

Results

Issues

Suggestions

Questions

Human Computer Interaction
Announcements

Subject: Thursday, April 06th 2000
Posted by Mei Wang on Apr 6, 2000
Reminder: the final exam is on Monday, April 10th at 9am in CIT 105.

To discuss the results from the WebCT/Blackboard tool study, we have planned a pizza/debriefing party for April 14th at Noon. Everyone is welcome! Location is now confirmed in Cle A301. If you cannot make this time, please email mecht@uvic.ca to arrange an alternative session.

Subject: Questionnaire Two (After switching tools)
Posted by Mei Wang on Apr 5, 2000
The second questionnaire regarding your use of the learning tool has been posted online.
Please fill it in before the end of Friday (April 7th) if at all possible so that we can open all of the tools for your use.
Thank you for your participation!

Subject: Thursday, March 30th 2000
Posted by Mei Wang on Mar 30, 2000
See here for hints/tips/questions and extra office hours for the Final exam.
We have planned a pizza/debriefing party for April 14th at Noon. Everyone is welcome! Location TBD.

Subject: Monday, March 13th 2000
Posted by Mei Wang on Mar 15, 2000
Chuck Hamilton is giving a guest lecture on March 20th. See here for an abstract of his talk.
Setting

- Deploy tools in a course to provide an in-depth and realistic comparison
  - Undergraduate course in Human Computer Interaction
- Qualitatively and quantitatively compare the two tools from three different perspectives:
  - Administrators
  - Instructors
  - Students
Format

- Students used generic web site for the first few weeks of term
- Then students randomly assigned to two groups
  - Each group used one tool for 4 weeks
  - Then switched to the other tool for 4 weeks
  - Followed by a free period of 1 week
- Questionnaires
  - For each tool period:
    - One questionnaire at half way point to test for ease of learning on how to use the tool
    - A second questionnaire to test for effectiveness and ease of use
  - A final questionnaire to compare the two tools and the generic web site and solicit feedback
Selected Results

- administrators
- instructors
- students
Administrator opinions

Research goals

Methodology

Results

Issues

Suggestions

Questions
## Administrator opinions

<table>
<thead>
<tr>
<th></th>
<th>Blackboard</th>
<th>WebCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>easy</td>
<td>easier</td>
</tr>
<tr>
<td>Registration</td>
<td>easy</td>
<td>difficult</td>
</tr>
<tr>
<td>Access Control</td>
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<td>easy</td>
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</table>
## Instructor opinions

<table>
<thead>
<tr>
<th></th>
<th>Blackboard</th>
<th>WebCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post course content and information</td>
<td>easy</td>
<td>difficult</td>
</tr>
<tr>
<td>Construct online quizzes</td>
<td>easy/moderate</td>
<td>moderate</td>
</tr>
<tr>
<td>Online grading, posting grades</td>
<td>flexible</td>
<td>inflexible</td>
</tr>
</tbody>
</table>

### Research goals

- Methodology
- Results
- Issues
- Suggestions
- Questions
Student Questionnaire Results *before* switching tools
Blackboard Student Questionnaire Results

before switching tools

Category: overall
WebCT Student Questionnaire Results

before switching tools

Category: overall
Student Questionnaire Results

before switching tools

Category: overall
Student Questionnaire Results after switching tools
Student Questionnaire Results after switching tools

- Blackboard student users

![Bar chart showing student satisfaction with Blackboard](chart.png)

Category: overall
Student Questionnaire Results after switching tools

- WebCT student users

Category: overall
Student Questionnaire Results after switching tools

Category: overall

Research goals
Methodology
Results
Issues
Suggestions
Questions
Before switching:

- Research goals
- Methodology
- Results
- Issues
- Suggestions
- Questions

After switching:

- Research goals
- Methodology
- Results
- Issues
- Suggestions
- Questions
Some comments from students:

“I think they definitely aid my learning, especially if I have to miss class. It makes it much easier to keep up to date.”

“The layout of WebCT is very very very poor. ... The webpage from the beginning of the class is way better and if anything my mark is suffering from using this tool...”

“Major interface improvement needed before I would happily use this tool. I found that I spent most of my time learning WebCT and not course material. A “learning” tool should not be making life more difficult for me.”
In general....

- Students generally feel positive about web-based learning tools, when they are:
  - well-designed, easy to learn, easy to use
  - when the tool is good as support, not as replacement of lectures
  - when the use of diverse tool features, i.e. chat, bulletin board, is relevant and tied into the specific course structure and content
Issues

- Central issues to be considered in tool implementation:
  - Connectivity of tool features to course content
  - Maintenance (keep up to date, readable documents)
  - Training of instructors and students in tool use
  - Administration time
  - Accessibility for all students
Issues (2)

- Do web-based learning tools enhance learning?
  - Tools seem to enhance learning when they are perceived as being invisible
  - When tools are hard to navigate (i.e. frustrate the user), then students responses suggest that they can not only have a neutral but negative effect on learning
  - Tool usability can impact students’ learning
Suggestions for tool designers

- From students point of view:
  - Keep navigation and layout simple and clear, make tool easy to learn and easy to use (follow basic HCI principles)
  - Ensure compatibility with other platforms and programs
  - Maintain tool simplicity and functionality of features (no unnecessary features, such as popup windows)
- *Usability testing is important!*
Suggestions for university

- Provide adequate training for instructors and students
- Carefully consider the needs (of instructors, students, administrators) before selecting a technology
- Provide integration, standardization, flexibility and accessibility in tool/program choices
- Ensure universality in access and usability across campus and universities for every student
Open Questions

- When is a tool preferable over a customized web site?
  - Limitations
  - Advantages
- Standardization versus diversification of environments for learning
  - Can one solution meet all needs?
- How do we measure learning enhancement?
Is it ethical to evaluate web-based learning tools using students?

Some ethical issues we faced were:

- relationships among research participants (students) and experimenters (instructors and graduate students)
- research process (informed consent, minimization of harm, competence and confidentiality) and
- unevaluated tool deployment within a university class
Common issues in codes of ethics

- informed consent
- minimization of harm in relation to merit
- competence
- confidentiality
Free and informed consent refers to the dialogue, information sharing and general process through which prospective subjects choose to participate in research

- **Issues:**
  - We carefully followed the procedures… but there may have been some coercion to participate (due to bias of the instructor involvement)
  - Alternative assignment (harder, less attractive?)
  - Students could withdraw from the experiment but not the assignment!

- **Justification:**
  - We needed this tight integration to evaluate the tools in this way
  - Participation would enhance student learning in HCI
Minimization of Harm

- **Issues:**
  - Additional stress of learning two new web-based environments
  - Tools had bugs (maintained almost 24/7 vigil to ensure access)
  - Some students did feel the tools impacted their learning

- **Justification:**
  - More experience in learning about interfaces
  - Would know what it is like to be a “user” in a study
  - Tools have bugs anyway and are being deployed without as much support or vigilance
Competence

• **Issues:**
  - Inadequate experience with the tools
  - The way we set up the environments may have negatively impacted the results (there were choices)

• **Justification:**
  - We had technical background, and these tools are supposed to be used by all teaching professionals
Confidentiality

• Issues:
  • Collection of electronic data not well understood by traditional ethics review boards
  • Tools collected masses amount of data which was identifiable!

• Justification:
  • We didn’t access the non-confidential data
  • We were careful not to collect any unnecessary data and to remove any identifying data
Summary thought....

Although there may be ethical concerns about doing this study using students, is it ethical to deploy these tools without such an evaluation!
Discussion