A Comparative Analysis of Web-Based Testing and Evaluation Systems

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The World Wide Web (WWW) technology holds a lot of promise as an educational tool. However, the current generation of WWW tools and servers was designed for browsing and information retrieval, and not as components of an active learning system. Therefore, these tools lack a number of features that an advanced educational environment requires [1].

Web-based educational systems, like any other computer-based education (CBE) system, must provide certain basic instructional functionalities [4]. Many researchers have used Gagné's nine events of learning as the basis for developing CBE systems [3]. Three of these learning events are:

- Evaluation of the student's understanding of each concept,
- Provision of the student with feedback concerning his/her performance during the evaluation, and
- Assessment of the student's complete understanding of each concept.

Presenting the student with questions is the only way to ensure that learning is occurring. The courseware on the Web must follow the well-established theories of learning, and should incorporate some form of knowledge testing. Unfortunately, facilities for tracking and evaluation of user knowledge, and for interactive feedback, are precisely what is lacking in the Web interfaces that are readily available today (e.g., browsers). This has motivated a number of researchers to discuss and develop systems that support development of Web-based courseware, as opposed to Web-pages. In this paper, we describe testing and evaluation features that Web-based courseware should offer and survey some of the existing systems.

The Web-based testing and evaluation systems that we have examined are Mklesson[1], Eval[2], Tutorial Gateway[3], and the Open Learning Agency of Australia's (OLAA) system [2]. While none of the systems in the selection is perfect, they each have some unique and interesting feature.

We have based our comparison on six principal issues that need to be addressed: testing, material access and response tracking, grading, tutorial building, implementation issues, and security issues. If the instructor keeps students notified of their progress and mastery of the lesson material then the students are more likely to continue learning [4]. When comparing

[1]See Mklesson User Guide at *http://lglwww.epfl.ch/Ada/Tutorials/Lovelace/userg.html.*
[2]See Eval's homepage at *http://usurp.calvin.edu/html/Eval.home.html.*
[3]See *http://www.civeng.carleton.ca/ nholtz/tut/doc/doc.html.*

testing capabilities, we were concerned with features such as the types of questions, feedback, help and hints, retries, and the use of multimedia.

It is essential that a testing and evaluation system provide tracking capabilities. Tracking entails remembering where the student has traveled within the lesson and recording the student's performance on test questions and answers. There are three levels of grading feedback: to the course coordinator, to the instructor, and to the student. Each of these three types of users requires a somewhat different amount and class of information.

Tutorial building refers to whether the testing and evaluation system supports automatic tutorial inclusion. We limit our attention to two implementation-related issues: ease of use and platform issues. Ease of use focuses on how easy it is for authors of the courseware and instructors to learn how to use the testing system to construct courses. It is assumed that an instructor using the WWW as a CBE tool already knows the HyperText Markup Language (html) used in Web-based documents. The platform issues include server functionality, availability of viewers, and the ability of the hardware to support video, sound, adequate networking, etc.

As any instructor knows, providing students with an on-line test involves various security considerations. This includes security for the test material, security for the student tracking information, security for the html source code, and security for ensuring that only registered students take the test.

In our comparison, we have found that each of the system considered provides most of the desirable features, with the exception of tracking of student progress which is not supported by any of these systems. These systems are continually being updated and improved upon. While none of these systems is a clear front-runner, each of them have many strong points. Currently, we are developing a testing and evaluation system that meets all the criteria discussed in this paper.

References

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