

## STUDENT ASSESSMENT WITH *INTERNETQUIZ*

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The curriculum of the Computer Technology Department of the Purdue School of Engineering and Technology at Indiana University Purdue University Indianapolis (IUPUI) is undergoing a major reengineering effort to keep pace with the dynamic changes in technology. This reengineering effort features faculty collaboration in five sub-disciplines: general education, information systems, database management, telecommunications / networking, and multimedia applications. IUPUI is a non-residential, commuting campus serving primarily non-traditional working students who live in the Indianapolis metropolitan area.

University administration actively supports course offerings via traditional on-campus locations, off-campus sites in the metropolitan area, correspondence courses, and course offerings via local cable outlets. Recently, research into distance education, both process and product, has been strongly encouraged by the administration. Stage Four of the departmental curriculum reengineering effort began during 1997. Web based examinations were introduced in the introductory Systems Analysis and Design, COBOL Programming, and Topics in COBOL Programming courses during the spring semester. During the summer semesters, the examination software was utilized in the Using a Personal Computer, and Introduction to Data Processing courses. A student majoring in Computer Technology created the software, *InternetQuiz*, as part of a course project. *InternetQuiz* allows the creation, administration, and grading of assessment examinations and surveys via the World Wide Web. This paper reports on a project to use *InternetQuiz* for student assessment.

The package contains two programs. The first program is MS Windows© based and allows the user to create tests from scratch or from test banks using advanced filtering and search capabilities. For quizzes and examinations the software supports questions of the following types: multiple choice, true or false, essay, matching, and fill-in-the-blank. When creating the questions from scratch, the instructor selects the question type, enters the question text, and indicates (or types in) the correct answer, as appropriate. If using a test bank, the instructor merely selects the questions. The instructor can also assign point values to each question (or question type). The program produces all files necessary to administer a test via the Web, an answer key, and plain text and html versions of the tests. Finally, it allows configuration choices such as Test Settings and Program Settings through simple text and list boxes. With General Settings the instructor can specify a time limit for taking the test and whether the software should automatically submit the test at the conclusion of the time limit. Also, the exam administrator can allow or not allow multiple submissions and can require user validation. Finally, the instructor can select items to be returned to the browser for student review at the conclusion of the test session. Under User Settings the instructor indicates the Username and Password for each student taking the exam. Access Settings allow the instructor to specify starting and ending times for test access and, if desired, restrict exam access to specific workstations (IP addresses).

If start / end times are inserted, the software will not allow students to access the examination prior to the start time and will deny access following time expiration. Thus, great flexibility is provided to the exam administrator in structuring the testing environment.

The second program manages actual test taking. All test activity is logged. This log file contains a complete history of test activity (accesses, submissions, and errors). This program also grades the tests, sends the results to the student, and keeps a master file of all responses. Students can complete an examination in an asynchronous mode from any workstation having access to the Internet and the World Wide Web via Web browser software. This permits exam administration from a central site while students taking the exam can be anywhere. Administration of tests in this asynchronous mode enhances flexibility for students in choosing the time and place for taking the exam. Alternatively, the professor may administer the exam in a laboratory equipped with sufficient workstations. The only requirement is access to the Web and Web browser software.

When students take an examination their status is verified through the password file created by the test administrator. The student selects answers by clicking on a radio-button corresponding to the answer of his/her choice for multiple-choice, rating, and true or false questions. For matching questions, students select from answers in scroll boxes. Answers can be changed if the student wishes. When the student has completed answering the entire test, he / she clicks on the "submit test" button. An information database is created and used by the instructor to review test activity and grade the examinations. Immediate feedback is provided to the student. A Web page is displayed at the student's workstation showing a summary of test results (number of questions by category, number correct by category, and total points earned on that examination. In addition, options can be selected by the professor to have the program return the question text, the student's response, the correct response, and any explanatory comments.

Administration options allow the professor to view test responses, the test log file, and quiz statistics. The log file contains a complete history of test activity. The quiz statistics file provides a question item analysis for all students taking this examination. The "responses" file has entries for each student taking the exam and indicates the student id, the time submitted, elapsed time for taking the exam, and the raw score earned by the student. This file also allows the instructor to "grade" each exam taken by a student. While the program automatically grades objective questions and questions for which the instructor has inserted a "correct" answer, the instructor can review the point value awarded for each question and make adjustments. Also, the instructor can grade and make comments on the essay type questions and award points earned for each question. When finished the instructor clicks on the "save changes" button and any changes made cause the exam to be rescored. This "administrative" capability provides great flexibility to the test administrator for managing test administration.

Once the instructor has finished grading examinations, students can re-access their test and review the grading and comments made by the professor. This capability is available to the student from any computer workstation with access to the Internet and having Web browser software.

Results to date from using *InternetQuiz* for test administration have been quite positive. In the spring semester of 1997, 3 exams were administered to approximately 80 students in four programming classes. The first two exams used the traditional paper-based format. The final exam was developed and administered with *InternetQuiz*. No significant differences in test scores were found between the two test administration formats. During the summer of 1997 *InternetQuiz* was used in two more classes. These were an introductory computer technology concepts course and a microcomputer applications class with about 45 students total. Again, three exams were scheduled. The professor intended to utilize *InternetQuiz* software for all three exams but computer network problems precluded administering the 2<sup>nd</sup> exam in an on-line mode. The test was printed out, copies made, and administered in the traditional manner. Again, no significant differences were found between test scores of the 1<sup>st</sup> and 3<sup>rd</sup> exams administered on-line with *InternetQuiz* and the 2<sup>nd</sup> examination administered in a traditional manner.

Informal feedback was solicited from students regarding test administration using the *InternetQuiz* program. Results were predominantly positive. Many students were very excited with the software, citing the immediate feedback on their performance as the prime reason. Others liked the “anytime / anyplace” capability, which, when used by the instructor, gave them the ability to take an examination on their own time schedule, and from locations other than in the scheduled classroom. Negative opinions voiced by students centered around their being uncomfortable with this testing environment. For example, students cited their preference for being able to page back and forth through the test at will, although it is possible to scroll back and forth with *InternetQuiz*.

Instructor feedback was also positive. Most view the main advantage to using the software as the greater administrative management capability provided. Also noted was the fact that this software made results available to students more quickly than with traditional methods.

The *InternetQuiz* software continues to be refined. Additionally, more faculty in the department are using the software. This software affects the process of distance education and results to date are promising. Research on the appropriateness and suitability of this software is continuing.

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