Student Feedback Using Adaptive Web Based Surveys

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Abstract

ABET's Engineering Criteria 2000 has caused us to look much more seriously at what we teach, how we teach it, and particularly at how we assess the process and its results. This paper addresses the gathering, processing, and response to student feedback, a very important part of the quality control process.

Most colleges of engineering have traditionally conducted end of course evaluations by students as a means of assessing the quality of teaching and the effectiveness of course structure and content. In addition, senior exit surveys provide an overall evaluation of the educational experience, while alumni surveys give some measure of the strengths and weaknesses of the program when tested in actual application. Our college is in the process of converting from paper based to web based survey systems because they are more flexible in structure and content, can be done at the student's convenience, encourage more thoughtful and extensive responses, allow more extensive analysis of the data, provide timely results, and do not require a special processing agency or anyone to transcribe comments.

After carefully looking at what several other universities have done in this area, we have developed a unique course and teaching evaluation survey system that is flexible, easy to use, and accessed by all users via a web browser. The system contains a library of different question and response formats, which are used to build a unique set of survey questions for each course based on the course structure. In addition, each instructor is encouraged to add a personal set of questions to their own course survey to gain additional feedback on their teaching methods, course content, or new tools or activities that were introduced. A major benefit of the course and teaching evaluation survey conducted via the web is that it can be used at any time during a course to provide in-process feedback and adjustments.

Our experiences with this system are presented as well as the structure and programming methods of the web based system.

I. Introduction

ABET Criteria 2000 clearly requires that processes be in place to assure achievement of the stated outcomes of each engineering program. While the structure and implementation details of

these processes may vary with each academic program, it is clear that the processes in every case must be documented, be followed, and must result in changes when needed. The ability of a course to contribute toward the desired program outcomes is determined by its content, structure, and delivery. Student perceptions of the quality and success of these three elements are what student course and teaching evaluation systems have long sought to measure. Unfortunately, many of these systems have focused primarily on evaluation of the instructor and provide little information about the quality of the course itself. Furthermore, the ability of these evaluations to actually improve teaching is limited by conflicting objectives, as identified by William Cashin when discussing the development of an effective faculty evaluation system:[1]

> "The higher education rhetoric is almost universal in stating the primary purpose of faculty evaluation is to help faculty improve their performance. However, an examination of the systems – as used – indicates that the primary purpose is almost always to make personnel decisions. That is, to make decision for retention, promotion, tenure, and salary increases…"

The end result generally is a limited, rather general set of evaluation questions that no one could object to, but that yield little if any information that might be used to improve teaching or the overall quality and outcomes of the course.

II. Desired Evaluation System Characteristics

The need for a workable system to assess and maintain the quality of course content, structure, delivery, and contribution to program outcomes motivated us to abandon our existing seven question bubble-sheet form and seek something that would have the following characteristics:

1. Flexible – can be used at any time during the progress of a course.
2. General – can meet the needs of all courses taught in the college.
3. Adaptable – can be tailored to the unique needs of a specific course.
4. Timely – provides output data with minimal delay.
5. Changeable – can be easily and quickly modified as we gain further experience.
6. Accessible – faculty can use the system directly.
7. Direct database entry, no transcription of student comments.
8. Provides anonymity for students, yet allows analysis based on student characteristics.
9. Addresses program outcomes.
10. Allows separation of personnel decisions from course and teaching improvement decisions.

III. In-class vs. Web Based

A number of innovative and rather extensive evaluation systems are in use in the educational community. Most have an in-class paper format, with a few also providing web-access capabilities. One such system is that used at Colorado University, Boulder.[2] A web-based

format would fit very well with the evaluation system characteristics we are looking for. There is a risk, however, of low student participation as pointed out by Meg Rolland, the Faculty Course Questionnaire (FCQ) coordinator at Colorado University:[3]

> "FCQs are normally done on paper in the classroom (of 6680 FCQ "packets" for fall 99, only about 60 of them were online, and these were all for online courses). The response rate would be very low if we tried to do online FCQs for in-class courses."

In spite of Meg's caution, we decided to accept the challenge of motivating students to participate so that we could benefit from the flexibility and interactivity provided by a web based system. Using a web-based system allows the evaluations to be completed outside of the classroom, providing several additional benefits:

1. No class time is lost.
2. A longer, in-depth set of questions can provide much more data.
3. The students have more time to reflect on their answers.
4. The students are more likely to provide written comments when requested.
5. Absence from class on "evaluation day" does not prevent a student from participating.

Another system with on-line capabilities is used at the University of Washington.[4] Unfortunately, neither this nor the Colorado system offered the degree of flexibility that we wanted. So, inspired by their examples, we set about developing our own system.

IV. System Development

After reviewing samples of evaluation questions from several universities, we created five sets of college-wide questions for use in the end-of-course evaluation The questions in each evaluation set are of three types; instructor related, course related, and those related to the student and the learning environment. Each set of evaluation questions consists of one of five baseline question groups, depending on the course type:

1. Lecture courses
2. Laboratory courses
3. Courses with both lecture and laboratory elements
4. Team-taught design courses
5. Individual-taught design courses

A faculty committee representing all college departments established the baseline question sets, which run about 50 questions in length. In addition, each instructor has an option to add supplemental questions for his or her own course or section; the student responses to these supplemental questions are available only to the instructor, thus allowing the faculty/student exchange to be open and frank.

Some representative question sets may be viewed at http://www.cse.nau.edu/~webeval/view. Enter EE 188 for the course number; select section A, C, or D for a laboratory evaluation; select section 01 or 02 for a lecture evaluation.

The evaluation system is designed for use at any time during the progress of a course, as depicted in Figure 1.

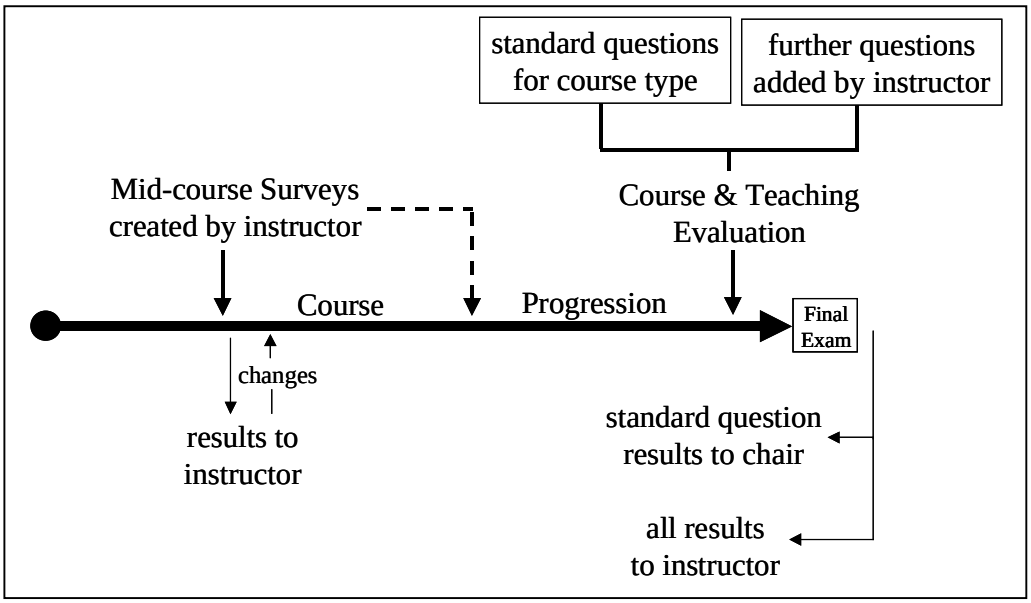


Figure 1 – Evaluation Timeline

A number of mid-course surveys can be created by the instructor to gain immediate feedback on teaching methods, course content, new tools or activities that are being introduced, or progress toward the course objectives. This allows appropriate adjustments and corrections and provides an opportunity for the students to see the results of their survey inputs.

V. System Structure

The system is designed for turnkey operation, in that all users access and use the system via a web browser. Question sets are created and edited, students complete the surveys and evaluations, faculty and staff review the results, and reports are generate all via a web interface. A system custodian maintains the basic structure and security of the system and implements programming changes if needed. These interfaces are depicted in Figure 2.

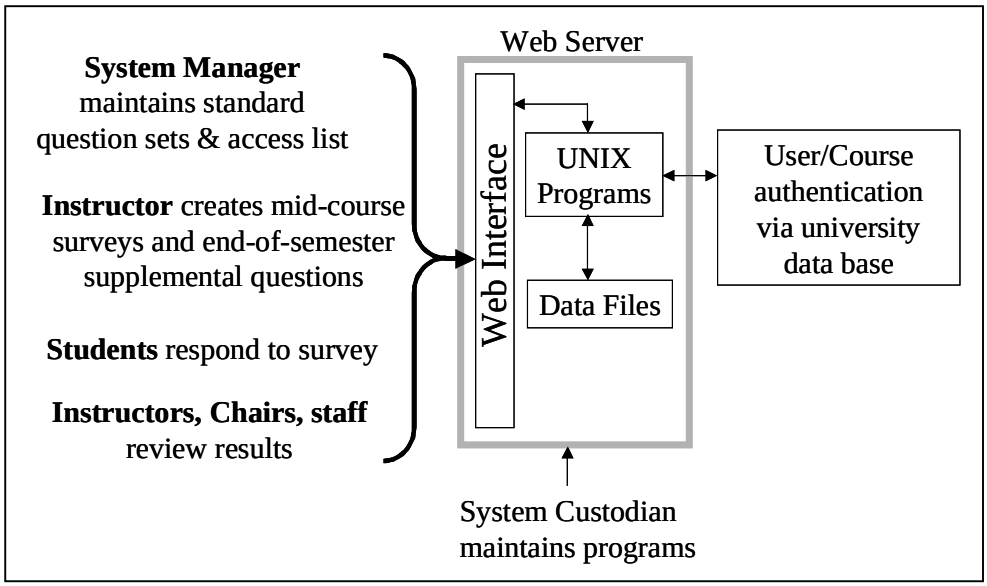
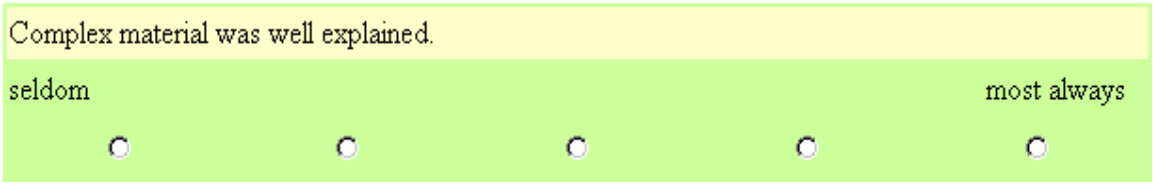


Figure 2 – System Interfaces

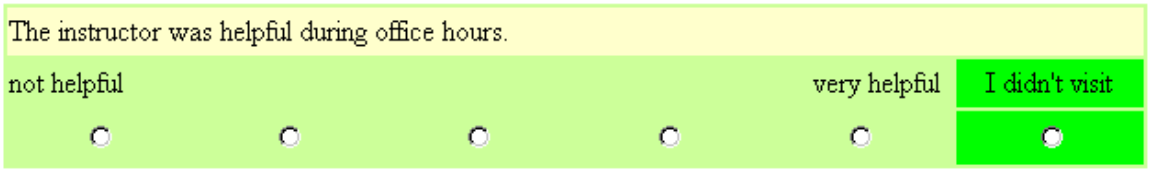
VI. System Operation

Question sets are created using a survey builder web page, which provides a choice of five different response formats:

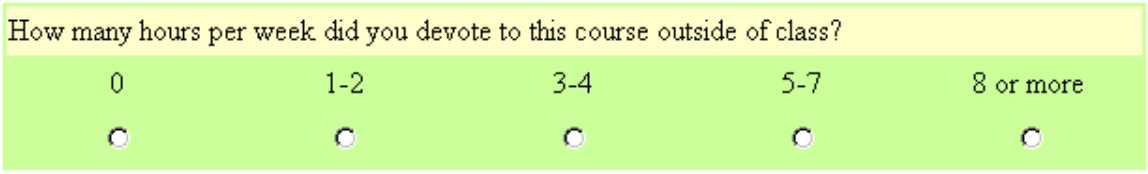
Five button multiple-choice, with range defined by left and right labels



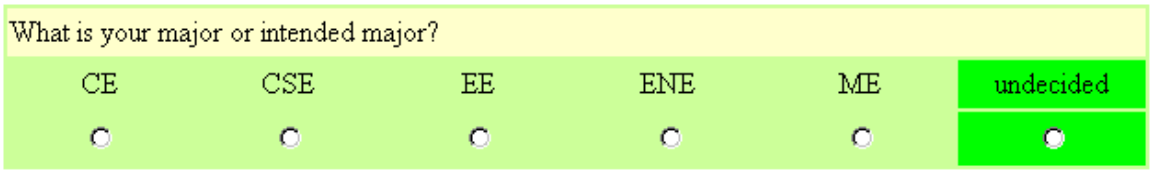
Five button multiple-choice, with range defined by left and right labels, plus "other" choice



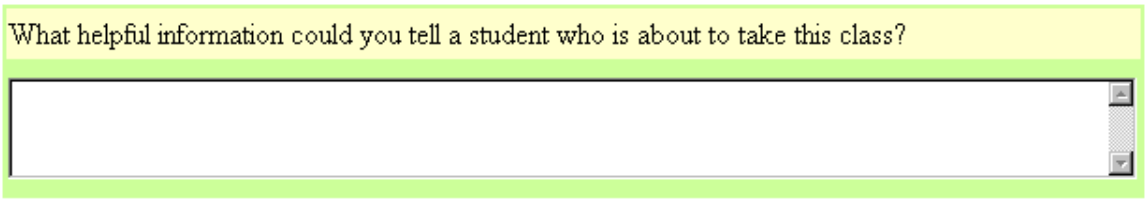
Five button multiple-choice, with each button labeled



Five button multiple-choice, with each button labeled, plus "other" choice



Text response



In using the survey builder, the user first identifies whether the question relates to the instructor, to the course, or to the student and learning environment. A response format is then selected and the question and response label fields are filled in. A new question set can be created, or an existing one can be edited via this web page. When submitted, the question format and content information is stored in compressed form in the question database. Mid-course instructor generated surveys consist entirely of questions created in this manner by the instructor. End-of-course evaluations consist of baseline questions sets (changeable only by the system manager, using the survey builder) merged automatically with supplemental questions created by the instructor, using the survey builder.

A demo of the survey builder can be seen at http://www.cse.nau.edu/~webeval/build_demo.html

When a student completes a survey or performs an evaluation, the system operates as follows:

1. Using a web browser, the student accesses the on-line evaluation web page and enters the prefix and number for the course to be evaluated.
2. On submittal, the web page goes to a perl cgi script (get-sections.pl) which accesses the university data base and returns to the web browser a list of sections, instructor names, and meeting times for the selected course.
3. When the student selects the appropriate section from the list, the section information is sent to another perl cgi script (assemble.pl) via the university authentication system, which allows access only after entry of a valid user identification and password.
4. When the assemble.pl script receives the course section number and student's login identification, the script accesses the university database to verify that the student is enrolled in the course section, checks a local file to verify that the student has not previously submitted an evaluation for this course, and then creates an access key file to be used for the remainder of the evaluation session to validate all interactions with the student.

5. The assemble.pl script assembles the appropriate set of evaluation questions from the database and returns them to the web browser.
6. When the student completes the web evaluation form, it is submitted to a third perl cgi script (process.pl) which validates the student, records the evaluation data without any identification of the student, separately records that the student has completed the evaluation, deletes the students access key file, and finally returns a "thank you" note back to the web browser.

VII. System Implementation

The on-line course and teaching evaluation system was initiated at the end of the Fall 2000 semester in 94 course sections covering five engineering disciplines plus construction management. Student participation in individual classes ranged from 8% to 100%, with an overall average of 54%.

All instructors were provided a printed announcement, explaining the evaluation system, and were asked to hand out copies in their classes; the same announcements were posted throughout the building. The participation averaged 51% for the courses in which the only instructor action was to make a verbal announcement and distribute the flier.

Some faculty went beyond the flier and made special efforts to encourage their students to participate; these actions included such things as a personal explanation of the importance of the evaluation process to the college, making several announcements in class, or sending email messages to each of their students. The participation increased to 65% for this group of courses.

Another group of faculty provided some form of incentive such as a few bonus points or requiring completion of the evaluation to be eligible for the points already built into their grading system for class “attendance and participation.” This group achieved 82% participation.

Student participation in the evaluation process varied also according to the year, discipline, and size of the course. Freshman courses averaged 36%, while senior courses had 63% participation; this is what you might expect given the higher motivation and maturity level of the senior students. Mechanical engineering courses averaged 76%, while civil and environmental engineering courses achieved only 46%; why? Classes of 25 to 94 students averaged 51% participation, while smaller classes achieved 60%.

A number of faculty were concerned about which students would participate and which students would not; in other words, would the results be biased upward or downward by less than full participation? The data were reviewed in two ways in an attempt to address this concern. First, the overall participation was 54%; instructors of courses with higher than average participation received an average rating of 3.35 out of 4, while instructors of courses with lower than average participation were rated at 3.12. For the second look at the data, the courses were split into those giving the instructor a rating higher than the average of 3.28 (out of 4) and those giving a rating

lower than the average; the courses giving the higher instructor ratings achieved a higher participation level of 61%, as compared to 53% for the courses that rated the instructor lower. The specific cause and effect relationships are not known, but the raw data implies that higher participation and higher ratings are related to some degree.

We feel that the on-line evaluation system is a major improvement over the previously used methods used to obtain student feedback. Even with the limited participation levels observed this first time using the system, the results are far more meaningful and useful. As with any new tool, it will become more productive as we learn to use it. Our first step is to achieve high participation levels in every course.

Bibliography

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4. URL: http://depts.washington.edu/oeaias; University of Washington, Office of Educational Assessment, Instructional Assessment System (IAS) Online.

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