

## Web-Based Student Evaluation of Instruction: Promises and Pitfalls

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### **ABSTRACT**

This paper describes the implementation of online student evaluation of instruction in the colleges of engineering at two national universities. The paper reviews the history of development of the online processes, and the benefits and challenges of using Internet technology for student evaluation of course instruction.

### **INTRODUCTION**

The advent of web-based online student surveys has become an established practice at many institutions of higher education (Hmieleski, 2000). A natural extension of this practice is the use of online technologies to administer student evaluation of course instruction. This paper describes the implementation of online course evaluation in the colleges of engineering at two national universities. Both universities have utilized online evaluation for the past three years with differing levels of success.

The impetus for transitioning from a traditional paper and pencil approach to an online course evaluation process was the need to meet new accreditation standards developed by the Accrediting Board of Engineering & Technology (ABET), which requires assessment of 11 student learning outcomes (ABET, 1997). With the requirement to measure specific course objectives and student learning outcomes, a course evaluation process had to provide faculty with the flexibility to create individual surveys for each course offered. Collecting this information in a paper-based process, and especially student feedback, was problematic since the learning outcomes varied by the course of instruction. The labor overhead and expense of paper-based evaluation processes led both national universities to examine using the Internet for course evaluation in 1998.

While the motivation to develop an online course evaluation system was the same for both universities, the starting point was different. Historically, course evaluation in the College of Engineering at Drexel University was conducted on a voluntary basis, with no formal process for dissemination of the results, nor any formal feedback loop for continuous improvement of the curriculum. The aim of this initiative was to develop a formal process to be conducted regularly and uniformly across the college, including every course each term, with results documented, analyzed, disseminated to students

and faculty, and ultimately resulting in a continuous quality improvement (CQI) process (Scoles, Bilgutay, & Good, 2000).

Columbia University, on the other hand, had implemented a regular, ongoing course evaluation process for several years. The survey and its use had the full approval of the engineering and applied science faculty. End of term survey administration was mandatory, while the use of the survey for mid-term corrections was voluntary. The objective of transforming the School's traditional paper and pencil course evaluation system to an online application was to improve the assessment, feedback, and actions taken to advance the quality of academic programs offered. The hope was that an online system would provide all constituents with timely feedback, thus enabling continuous improvement at both the course and program level (McGourty et al, 2001).

## **WEB-BASED EVALUATION SYSTEM DEVELOPMENT**

The College of Engineering at Drexel University began the process of developing a uniform format for assessment in the Summer of 1998, with support from the Gateway Engineering Education Coalition. Assessment tools from other Gateway Coalition schools, especially Cooper Union, were reviewed and revised for use at Drexel. The Gateway Coalition, through its central operations, had advocated a standard process for defining course objectives and measuring student learning outcomes (McGourty, 1999). The Drexel assessment team determined that it could develop a new outcomes-oriented evaluation tool by placing more emphasis on questions that determine how successful the course was in delivering the needed technical material.

The evolving evaluation tool, still paper-based at this point, was pilot tested in five courses from the Electrical and Computer Engineering (ECE) Department in Fall 1998/99. A paper-based survey was administered for all ECE courses (19) and 11 courses from the balance of the college at the conclusion of the Winter 1998/99 term.

The labor overhead and expense of the paper-based evaluation process prompted an examination of using the Internet for course evaluation. The existing evaluation tool was converted to a web-based form. Rather than developing a web-based evaluation process from scratch, Drexel received software from Polytechnic University, another Gateway Coalition partner (Ingham, 2000). With some modifications to web pages and CGI (Perl) code, the Polytechnic survey method was adapted to Drexel's question and response format. Faculty submitted their questions for each course through email, on a template that was provided, and the evaluation forms were uploaded to the web host.

Web-based course assessment was conducted for the first time in Spring 1998/99. Evaluation questions for 31 engineering courses from four departments, which represented 1,252 student enrollments, were available for a period beginning two weeks before the end of the term and closing the week after final exams. A student would log into the system with their last name and social security number. They were then presented with a list of courses for which they were registered and could then evaluate.

Multiple choice and typed responses were stored directly into a database and evaluation reports could be generated for faculty review from the stored data.

The College of Engineering now has 220 undergraduate course objective sets. Each set contains up to six outcome statements customized for each course. In Fall 2001, a total of 12,741 student course evaluations were possible for course assessments. All graduate courses in the College are evaluated each term as well, but course objectives are supplied on a voluntary basis.

Some small changes have been made to the student interface since inception. Students now log in with first name, last name, and birth date. Drexel has recently stopped using social security numbers as the student identifier, and students are more comfortable with the birth date for privacy issues. For Fall 2001, lecture and recitation assessments for the same course were combined into a single form. This makes the list of courses presented to the student for evaluation at login much less intimidating, especially for first- and second-year students, who have many multiple-section courses.

Columbia's development history was quite different from Drexel's. As a starting point, the initial paper and pencil survey was designed by a small group of faculty and the Dean and Vice Dean. The philosophy circa 1996 was to create a short survey that would focus on both course and instructor quality. The survey was comprised of 10 Likert-scale questions and a section for student comments. After the first year of the survey's administration, the Vice Dean worked with student groups and faculty to develop a comprehensive web-enhanced course evaluation system to improve academic programs and courses as well as measure learning outcomes. The genesis of the system began in the Fall 1997 with a student project, funded by the NSF Gateway Coalition that allowed faculty evaluation data to be uploaded to a website for student review. The website allowed students to review evaluation data by course or professor to guide them in course selection. The introduction of public ratings had a profound impact on the culture of the School. While cause and effect are always difficult to ascertain in these conditions, there is little doubt that by making the ratings public, the process increased the awareness of teaching and course quality for both students and faculty. Today, the public rating system is an integral part of a student's decision process for selecting which courses to take. In December 2001 alone, students accessed the public site for course evaluation information over 12,000 times.

As a complement to the public site, a second student group, partially funded by NSF Gateway, developed a prototype web-based course evaluation system to link to the existing site. The result was the current web course evaluation system (WCES) that allows faculty to customize course surveys reflecting relevant learning outcomes for every course they teach. Administratively, the system is linked to the Registrar's Office to ensure that all course information matches university records and that security is maintained. One of the major benefits of WCES is its capacity to provide timely feedback to faculty, staff, and students.

## COMPARISON OF WEB-BASED EVALUATION SYSTEMS

When comparing both online systems, there are several similarities and some unique differences. Both systems successfully collect student opinion data and electronically distribute the results with differing levels of detail to students, faculty, and administration. A college committee centrally administers Drexel's system, and faculty must submit changes to their course outcomes statements to this committee for incorporation into the course evaluation survey. Survey results are not distributed outside the department or school. At Columbia, on the other hand, faculty have direct access to a subset of the survey questions and results of course assessments are distributed widely to students, faculty, department chairs and deans.

Drexel's web-based course evaluation forms are assembled from several information sources using SQL, perl and html code. The Access database of course objectives is converted to SQL. Student registration information, including courses taken and their primary (lecture) and secondary (recitation) instructors, is downloaded from the university records system. Results are inserted in an SQL database. Columbia's survey system is based on SQL, PHP, and html code. Class and student information come from the registrar's office and is easily downloaded into the web based database.

Each term, Drexel faculty are requested to review the objectives for their courses and to submit new or revised statements. All COE course objectives are posted on a web page that is accessible to faculty and students. A list of courses that do not have objectives in the database is generated. The members of the COE Assessment Committee are responsible for making contact with faculty in their own departments and collecting responses. Objectives are sent by email for inclusion in the assessment system.

At Columbia, there is no formal procedure for faculty to update their course objectives beyond what is submitted in the initial application to the Committee on Instruction at the School. However, departmental and course objective workbooks are available to support those faculty who are interested in updating their syllabi.

Once the course evaluation system is ready for release at Drexel, students are sent an email with the URL and the time window for responses. Through the three-week response window, students receive several emails reminding them to review their courses. The messages come from the system administrator, the department head, and then the undergraduate associate dean. When students have filed their responses they are removed from the email list.

Columbia's communication strategy is similar to Drexel's in that email is the main mechanism for communicating with students throughout the process. Using exception reporting, survey administrators are able to target emails to students who have not completed all of their course evaluations. As with Drexel, they are taken off the list when they have completed all their applicable course surveys. Announcements and reminder emails come primarily from the Dean of the Engineering throughout a two-week window.

In addition to the emails, posters are placed in prominent locations throughout the school promoting the benefits of the course evaluation process for the students.

At both Drexel and Columbia, faculty members receive an email announcement of the assessment start date and the URL for the results web page. These pages show the real-time student response rates for all courses, so faculty can follow the progress of the evaluation and take action to promote responses if necessary. Administrators can also follow these response rates and communicate suggestions for specific courses whose response rates fall behind as the evaluation period continues.

## **BENEFITS OF ONLINE COURSE EVALUATION**

The benefits of conducting online student evaluation are similar to the benefits of any web-based survey application, such as immediate availability of data for analysis and reporting and more extensive qualitative responses from students to the open-ended questions. In addition, the online evaluation tools enforce uniformity for the evaluation of all courses while also providing faculty with the flexibility to add items specific to their courses to address ABET accreditation requirements (Scoles, Bilgutay, & Good, 2000).

### Timely Feedback of Evaluation Results

One of the primary benefits of a web-based course assessment system is the timely manner that feedback is provided to all constituents. The Hmieleski report found that the majority of institutions studied (65%) did not provide the faculty with results from their traditional paper and pencil assessments until one to two months after survey administration. In addition, the majority of the schools did not provide results to students at all (Hmieleski, 2000). Web-based systems allow for flexible and immediate dissemination of survey results.

At Columbia, survey results are immediately emailed to each faculty member, with summary information sent to department chairs and dean's office at the end of the evaluation period. The faculty report includes the student response rate, quantitative ratings of core and custom questions, and qualitative comments. A new feature, instituted in 2002, is the professor's report that allows faculty members to document what actions they plan to take to improve a specific course based on the student feedback. The screen provides the professor with data from the current course and compares the ratings against the last time he or she offered the course. Both rating improvements and reductions are highlighted. This feature allows faculty and departments chairs to document what actions are taken and review future results in light of these actions.

Columbia's summary reports provide department chairs and deans with aggregate survey data by department and faculty member. In addition, the student's public site provides all students with final ratings for the course (not the comments). WCES is designed to provide all constituents with feedback regarding the course in a very timely

manner – a major benefit of the system. The report generation application offers administrators and faculty several templates by which they can have results reported. With this flexibility the administrators and faculty can easily design various types of reports for various survey constituents.

At Drexel, course evaluation results are distributed to faculty approximately two weeks after the close of the assessment period. Faculty members receive an email with the results for all of the courses they taught during the previous term. These results include the averages and standard deviations of the Likert-scale questions and all text comments. The same report is provided to the faculty member's department head.

### Flexibility in Course Assessment Instrument Design

A second benefit to online assessment systems is the flexibility for survey design and development. Faculty are encouraged at Drexel to submit specific course objectives for inclusion on their course evaluation surveys. The Columbia course evaluation system is designed to allow administrators to add customized questions to measure specific program objectives. Faculty also can provide questions to support the measurement of intended learning outcomes based on specific course objectives. Both institutions see this as a primary mechanism for gathering continuous improvement data for the academic programs. If learning outcomes for specific courses are to be evaluated, the system must have the flexibility to allow for customization based on specified boundaries and policies.

This is a critical feature for measuring course objectives and learning outcomes as prescribed in EC2000 criteria. Columbia faculty can add any number of questions to the survey based on specific course learning objectives and intended outcomes. The system allows the faculty member to design various types of survey questions including scaled items, open-ended questions, or multiple-choice items. Administrators can place a limit on the number of questions that can be added if there is a concern for survey length. The typical professor adds about 5 questions. Currently, no restrictions are placed on the number of items that can be added to the core survey. Additionally, the system has a survey item library that provides professors with ready-made questions that can be easily added to a specific course survey. While the system can accommodate any number of item libraries, faculty have focused on a database of items related to ABET EC2000 learning outcomes. Based on research by a national group of researchers and supported by NSF, a database of survey items for each of the eleven ABET learning outcomes are available to include in the library (Besterfield-Scare et al, 2000; McGourty et al, 2002). Faculty can select various EC2000-related survey questions based on the specific learning objectives of their course offering. At any time during the survey design process faculty can insert additional questions from the survey database or save a question to a customized database for future use. Question databases allow administrators and faculty to quickly build a survey using professionally developed items.

### Convenience for Students

A third benefit for web-based systems is that students have the opportunity to complete course evaluations on their own time, without the time constraints of in-class surveys. The convenience for students to complete surveys online has been identified in other studies as an advantage of this methodology (Hardwerk, Carson, and Blackwell, 2000). The urgency involved in completing surveys during class may cause students to fill them out in a cursory manner. Since much of the surveying must occur at the end of the course, in-class data collection often cuts into valuable instructional time. In contrast, course evaluations posted on the web may generate more detailed and thoughtful responses from the students, as found in two recent studies (Handwerk, Carson, and Blackwell, 2000; Hmieleski and Champagne, 2000). Faculty members at Columbia have also observed a significant increase in written comments from the web-based course evaluation surveys.

### Data Warehousing

Finally, the warehousing of several terms of course evaluation data in a consistent format provides for efficient analysis of trends by course, department, and college over several academic terms. Trend data is helpful for departmental planning and program evaluation, and also serves to meet ABET accreditation requirements. This year Columbia has further built on this capacity to data warehouse information by adding a new feature to help faculty document actions to be taken as a result of survey responses. Columbia faculty are able to review their results from a specific course over the history of collecting survey data and can enter into the database actions that they plan to implement to improve specific areas based on student feedback. This capability allows faculty to document and subsequently monitor their improvement activities on future survey responses.

## **THE CHALLENGES**

The challenges of web-based systems include achieving adequate response rates and the strategies to improve them, student concerns for privacy and anonymity, changing the culture to support online student evaluation processes, and insuring that students are aware of the evaluation process.

### Response Rates

The experience to date of return rates of 30% to 40% at best appears to be the most pervasive problem among those who have converted to web-based surveys, which influences schools' to maintain their current paper-and-pencil systems (Hmieleski, 2000). However, if completion of web-based surveys is strongly encouraged by administrators and faculty, web-based evaluations can achieve response rates comparable to traditional methods.

When the new web-based process began, Drexel University achieved dismal response rates, as low as 10% in one academic term. Even with lottery prize incentives, the highest response rate of 50% was achieved in Fall, 2001 (see Table 1). Columbia has experienced response rates as high as 85% in recent web-based course evaluations. Success is due to a combination of technology-mediated communications, incentive packages, and internal marketing strategies. The Columbia system allows us to monitor response rates during the survey administration period and target e-mails to both faculty and students where incremental urging is required. The combination of monitoring and targeted communication is a primary reason for the high response rates. We also provide several types of incentives because no one incentive will motivate all potential respondents. Successful incentives have included palm pilot give-a-ways and pizza parties associated with completing surveys in designated computer labs.

Table 1  
Course Evaluation Response Rates for Drexel and Columbia Universities

| Term      | Response Rate |          |
|-----------|---------------|----------|
|           | Drexel        | Columbia |
| Fall 1999 | 21%           | --       |
| Fall 2000 | 31%           | 70%      |
| Fall 2001 | 50%           | 85%      |

Low response rates generally raise the concern of non-response bias. An investigation of non-response bias was conducted at Drexel University for Fall 2001 term to determine if some types of students were more likely to complete their course evaluations than others. The study examined various student demographic characteristics including student sex, minority status, class standing, and cumulative grade point average (GPA). The completion rates are shown in Table 2. The study revealed that student sex, class standing, and cumulative GPA were predictors of student completion of the course evaluation process. Interestingly, women were more likely than men to complete the course evaluation process. Women completed about 54% of the potential course evaluations whereas the male students completed only 49% of their assigned course evaluations.

Juniors and seniors were more likely to complete course evaluations than sophomore and pre-junior students (the majority of students at Drexel University are enrolled in five-year programs). The seniors completed 54% of their assigned course evaluations, while junior completed 46% of their potential course evaluations. Interestingly, the freshmen completed the greatest percentage of assigned course evaluations, 58%. Since the courses enrolled tend to follow class standing, these results suggest that additional encouragement should be directed to sophomore and pre-junior classes by having faculty in those classes encourage students to complete the evaluation process.

Perhaps not surprising, students with higher cumulative GPAs were more likely to complete the online course evaluations than those students with lower cumulative GPAs. This finding may affect the results of the course evaluation process since students who are performing less well academically are not equally represented in the



course evaluation responses. However, it is not clear what effect the under-representation of this population has on the overall course evaluations.

Table 2  
Comparison of Response Rates by Drexel Student Demographics  
Fall 2001 Course Evaluations

| Student Demographic Characteristic | Course Evaluations | % Completed |
|------------------------------------|--------------------|-------------|
| <b>Sex</b>                         |                    |             |
| Female                             | 2,466              | 54%         |
| Male                               | 9,363              | 49%         |
| <b>Minority Status</b>             |                    |             |
| Minority                           | 3,350              | 50%         |
| Non-Minority                       | 6,831              | 49%         |
| <b>Class Standing</b>              |                    |             |
| Freshman                           | 5,338              | 58%         |
| Sophomore                          | 2,250              | 32%         |
| Pre-Junior                         | 702                | 38%         |
| Junior                             | 1,380              | 46%         |
| Senior                             | 2,159              | 54%         |
| <b>Cumulative GPA</b>              |                    |             |
| Less than 1.0                      | 311                | 35%         |
| 1.0 - 1.9                          | 959                | 36%         |
| 2.0 - 2.9                          | 5,005              | 47%         |
| 3.0 - higher                       | 5,554              | 56%         |

### Culture Change for Course Assessment

Some of the other challenges can be encompassed under the need to create a culture that embraces online course evaluation. Changes in culture affect both faculty and students. The faculty can be instrumental in increasing response rates by demonstrating commitment to the evaluation process. Something as simple as promoting the evaluation process in class provides added incentive for students to take the time to complete the course evaluation online. Additionally, as experienced at Columbia, Drexel expects students will be increasingly responsive to the evaluation process as they become accustomed to receiving the email announcements each term and use the online evaluation reports to review instructor evaluations from prior terms.

At Columbia, the focus is on creating a climate that motivates all constituents to participate in the evaluation of courses and instructors. One of the primary motivators is structuring the development and implementation of the system so that all constituents feel that they have input into the project. From a faculty perspective, training seminars are held that focus on the rationale for course evaluation and how to best implement the system in the classroom. These training sessions also allow faculty to provide input into the design of the system and future features. One of the ways we measure faculty buy-

in is the percent of faculty that use the system to customize their surveys and conduct mid-term evaluations that are voluntary. Columbia has experienced steady growth in both areas over the past two years with up to 20% of faculty using the system to either customize their surveys and/or administer interim, formative evaluations.

The students have plenty of opportunity to provide administrators with feedback regarding the course evaluation system. The Columbia dean's office receives several hundred emails a year regarding how to improve the system or describing concerns. By broadcasting email messages, the Dean has addressed several concerns including the privacy of students, the relationship between evaluations and grades, and the timing of reports to the faculty.

### Privacy and Confidentiality

In the initial development of the course evaluation process, both Drexel and Columbia students expressed concern regarding the confidentiality of their course evaluation responses. To alleviate this concern, student identifiers are stripped from the course evaluation submissions to insure not only confidentiality of responses but also anonymity.

### Use of Email for Participation Announcements

Students receive notification of the web-based course evaluation process through their university-assigned email addresses. This presents another challenge since there are no assurances that students are actively reading email from their university accounts. To alleviate this concern, advertisements are placed in the campus newspaper and posters are displayed in the hallways of the engineering buildings that announce the opening of the web-based process. Moreover, faculty members are encouraged to announce the online course evaluation process in their classes.

## **SUMMARY**

This paper presented the experiences of two national universities in developing and implementing web-based instruments for students to evaluate course instruction. The primary benefits of web-based course evaluation include flexibility and uniformity of course evaluation items, immediate availability of course evaluation data from students to assist faculty and departments in course planning, and data warehousing for trend analysis.

While the Columbia and Drexel experience suggests that web-based student evaluation can be successful, the challenges of increasing response rates and building a culture of continuous assessment remain.

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