WEB-BASED TEACHING EVALUATION SYSTEMS

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ABSTRACT

One of the primary means of evaluating teaching effectiveness in higher education is through the use of end-of-term student ratings of teacher performance. Collection of the evaluation data from students are usually done through paper based questionnaire survey. The paper process is labor intensive, requiring significant staff time and resources to manually preparing, packaging, distributing, collecting data, and then analyzing and reporting the results. Higher education institutes are now starting to convert the teaching evaluation process to electronic online systems. Our objective in this paper is to give recommendations for planning, designing, and implementing a good Web-based (online) teaching evaluation system using the up to date new technology.

Keywords: Teaching Evaluation, Online Evaluation, Web-Based Evaluation, MYSQL, PHP.

1. INTRODUCTION

At Higher Education Institutes or Universities every course is evaluated by students each time it is offered. A portion of class time is set aside for students to fill out paper evaluation forms at the end of each semester. The evaluations include a variety of quantitative and qualitative questions designed to assess the course and the instructor’s effectiveness. Responses are collected and tabulated by the department to give the faculty feedback on teaching performance, and for use in personnel actions, including merit, promotion and tenure cases.

The paper process is labor intensive, requiring significant staff time and resources to manually tabulate quantitative ratings and to transcribe or photocopy qualitative comments. The workload can be substantial, in particular for large undergraduate courses. Faculty sometimes waits months to see the evaluation results, which are not always presented in a
useful report format. In most cases students do not have access to the evaluation results to help them make decisions about which courses to take.

While many other administrative tasks, such as course registration and the posting of grades, are usually worked as online processes, student course evaluation is still primarily a paper process. Some studies show that few educational institutions used a wide online course evaluation system to collect student ratings. The studies concluded, however, that the number of institutions using online evaluation systems is growing.

The World Wide Web (Web) opens up the possibility of collecting data from students on-line. This report presents some useful recommendations for designing and implementing an online teaching evaluation system. It describes an attempt to develop and implement a simple Web-based (on-line) system for student Evaluation of Teaching, to support end-of-semester teaching evaluation. Our simple system can be upgraded to include several features needed in these types of systems. In this report we will discuss the planning, designing and implementation of a good online evaluation system using new software programs such as PHP and MYSQL Database management System (DBMS).

This report will talk about: reasons for going on-line in section 2, methodology in section 3, literature review from previous studies of similar systems in section 4, design of the project in section 5, implementation of the system in section 6, discussion and analysis in section 7, conclusion and future work in section 8.

2. WHY GOING ON-LINE

In the paper faculty evaluation process, evaluations are conducted during the last two teaching weeks of each semester and are done in class. This process needs a lot of heavy work to be done by the responsible persons of the process, such as: update the database of classes taught in each semester; find out which departments will use additional questions; package and distribute questionnaires to departments at appropriate times; receive answer sheets and carry out optical scanning procedures; perform data analysis; generate a number of different reports and distribute these to individual instructors, department heads, school deans and university administration; ensure security of evaluation data during data processing and report generation; ensure an appropriate turnaround time so that instructors can use results to upgrade courses in the following semester or for academic review purposes; Issue guidelines for conducting evaluations to all instructors, departmental office managers and people who administer the questionnaire; and Issue instructors with guidelines for interpreting evaluation reports.

Such delays in performing these tasks will seriously affect the usefulness of the results with respect to either informing the revision and improvement process or providing up to date information on individual performance.

In the online faculty evaluation process there are a lot of advantages over the paper process, such as

- Increase in efficiency in the data collection process: data collection involves only the inputting of student and instructor data into the system, and this data may be already in electronic format. Students can access the questionnaire using any computer at any time they choose within a specified period. Their responses will be transmitted back via the Internet and stored in a server.
• Increase in flexibility: on-line system with the processing power of its host computer allows greater flexibility in performing different tasks in the system, such as supporting complex questionnaire designs and other tasks.

• No need to schedule time for teaching evaluation: students can do the evaluation anywhere and at any time and not in class time.

• Flexibility in questionnaire design: on-line system allows great flexibility in questionnaire design. In an on-line system, questionnaires can always and easily be modified to contain additional sections to evaluate any number of instructors in the course.

• On-line system can support complex branching in presenting the following questions according to the student answering in the previous questions, and this is difficult to be done in paper evaluation.

• In an on-line system questionnaires can also be customized in accordance with the needs of the individual course or instructor.

3. METHODOLOGY

In this paper we will investigate, develop recommendations, plan, design, and implement an online course evaluation system for our University.

To implement a system like this, it needs to conduct a stakeholder (students, faculty, and staff) analysis to determine the requirements for this project. This step needs to: Study the existing evaluation system used at the university, Research best practices at peer institutions, Investigate student needs, Investigate faculty needs, and Investigate staff needs.

Existing Systems: this need to interview persons, who are responsible about the current evaluation system. Interview other departments at university, who used the existing system. It needs to investigate how these systems work, the challenges to implementation, the costs of transition, etc.

Best Practices: identify peer educational institutions currently using online evaluation systems for their departments. Conduct interviews with those involved with the development, planning and implementation of successful systems and programs at some local institutions in Jordan.

Students: this can be done through web-based or paper surveys. The most effective method for reaching a large number of students would be to conduct an online survey. In addition, a paper version of the survey can be distributed to students.

Faculty: This need to identify a list of deans, department chairs, and chairs of key Academic Senate committees to be interviewed. It can be done by interviews with them, or receive written responses to a questionnaire.

Staff: conduct interviews with administrative staff who have responsibility for the management of the evaluation process for their department, as well as those staff who would need to be involved in the development and implementation of an evaluation system.

After collecting the above data, data need to be compiled for review and analysis.
4. LITERATURE REVIEW

Some previous studies for five universities in USA that implement successful online-evaluation systems gave us some recommendations about the features that need to be considered in this type of systems.

Existing Systems: From previous studies, several key features for an Online Course Evaluation system were identified and need to be considered. For application requirements, some requested features include: Flexibility to customize questions, reporting capability for current and historical data, development of questions database, using of the system for evaluation and other university purposes, and ability to follow up with students to determine importance of class. For administration requirements, some requested features include: Provide adequate training for those who will administer the system, provide central funding to departments, develop university policy to publish limited results, and guarantee ease of use for the system.

Best Practices: From previous studies, five universities in USA that have successfully moved from a paper to an online evaluation process mentioned some recommendations for characteristics of features need to be considered in online evaluation teaching system. These features include: Guaranteed anonymity of respondents, Customization of questions, Data security and availability, Inclusion of incentives to achieve higher response rates, Ease of maintenance and modification, and Reporting capability.

Student Survey: In the five universities Student opinions were solicited via a survey conducted over a period of several days in both online and paper format. Selected anonymity and confidentiality is the issue of greatest concern to students about completing evaluations online.

Faculty Interviews: In the five universities Faculty opinions were collected through Interviews. There desired features are summarized by: ability to customize evaluations at the departmental and course levels in order to obtain more relevant data, availability of a menu of reports with the ability to receive raw data that could be further analyzed, and security of data and student anonymity must be provided by the new system.

Staff Interviews: From previous studies desired features for the staff can be summarized by: the need for stringent security measures to guarantee anonymity and protect the sensitive data that being collected, the need for the system to provide robust reporting and access to collected data, the need for training program to use the system, Integration of the system with other relevant databases and systems, and the development of an official department policy that would clearly state the rules and regulations governing the use of the evaluation data being collected by the new system.

5. DESIGN OF THE ON-LINE EVALUATION SYSTEM

The design is similar to Web-based systems developed by previous projects. However, because of the rapid progress in Web technology, a lot of re-designing and re-coding are required. In this part we discuss the System Level structure, requirements of the system, its architecture and the development process.
5.1 System Level

System is a Web-based system for conducting end-of-semester student evaluation of teaching. The WWW server is linked to a database server, running MYSQL DBMS, which acts as the back-end database engine. HTML programming languages can be used to design the forms needed by the system and a Script Programs written in PHP will run at the WWW server which generate Web forms using information stored in the back-end database. These forms are then displayed on the WWW clients. When the evaluation is completed, the data is transmitted back to the WWW server which then stores them in the back-end database. Communication between the WWW server and the database server is accomplished using PHP scripts.

![System Architecture Diagram]

**Fig 1: System Architecture**

For the purpose of system maintenance, a front-end tool will be created using suitable software. This system is a user-friendly menu-driven system which enables the system administrator to do regular maintenance without the need for programming.

5.2 Administration Level

At the administration level, there were two key issues, namely user authentication and response rate.

5.2.1 User Authentication

Because the Web can be accessed from anywhere at any time, there has to be a way to ensure that the person evaluating a course at the client end is in fact one of the students enrolled in that particular course. It is also important to ensure that no student is able to evaluate a course or teacher more than once.

To do a course evaluation, a student had to go through a log-on procedure. Students will be asked to enter their own student IDs and password. Students would be asked to log-on using their own system usernames and passwords with the assurance that these would be
stripped from the system after initial identification had been made and in no way could they be matched to the response data.

It is important to emphasize that, although students have to log on using information relating to their identities, their anonymity is maintained. The system has to be designed in such a way that is impossible to trace the identity of any student making a particular response.

5.2.2 Response Rate

In a paper-based system, the questionnaire survey was often conducted in class time. This usually guarantees a response rate of roughly 60%. However with an on-line system, students are encouraged to do the evaluation in their own time. It thus becomes hard to predict the rate of response. To encourage a reasonable response rate, we can use email to remind students to do the evaluation, or prevent students from retrieving their grades information before they submit the filled course evaluation form.

5.3 System Requirements

To design an online system that would run in more than one University, consideration need to be given to some factors such as: the purpose of the existing paper-based evaluations, the need for links with other university systems, and the computer support facilities within the university.

In considering these factors, various design constraints became necessary. For example:

- Constraints on Student login to satisfy anonymity and authenticity.
- Constraints on time within which evaluation process to be available to students, may be constrained by end-of-semester evaluation periods.
- The period of availability of the evaluation process for students. It may be constrained by the number of students responding.
- Constraints to secure the evaluation results and protect the system from unauthorized intrusion.
- Suitable system design that could be migrated across different institutions with a minimum effort.

For the first factor, Paper evaluations are usually conducted during the last two teaching weeks of each semester and done in class. This process needs a heavy load of work from the responsible persons as mentioned in section 2 above.

For the second factor: to ensure maximum efficiency of the online evaluation system, it's necessary to link the system with other electronic systems in the university, such as: the course registration system, the central computer system, the evaluation data processing system, the instructor information system (if available), and the semester timetables that determine the timing of evaluations. Figure 2 indicates the types of links desired. Furthermore, the results of the evaluation must be immediately available and in a form suitable for data processing and reporting. Hence, the need for close integration with each university’s computer system has a major impact on the design of the system.
For the third factor, the evaluation system can be designed to consist a set of modules, such as: Questionnaire Input Module, Data Capturing Module, and Data Reporting Module.

The questionnaire input module allows users to design and input questionnaires. In this module users specify the number of questions, the question types (multiple-choice, true/false, short answer, etc.), and other relevant features. The reporting module processes and analyzes evaluation data. The reports are usually printed and sent back to the interested parties. Reports can be made available on-line, but data security needs to be considered. These three modules need suitable Interfaces design.

5.4 Development of the System Architecture

The design and development of the system follow closely the systems development life cycle (requirements study, feasibility study, logical data models development, physical database and software development, programming, testing, operation and maintenance).

Major architecture design issues have be considered such as: need of the system to be widely accessible, available at any time, and user friendly. To consider these issues, Client/Server architecture is a suitable architecture, with the World Wide Web used as the client and a relational database management system such as MYSQL used as the database server.

This simple architecture can met most of the system requirements, since: It adapt the system to different platforms. The relational database systems provide centralized data storage and management. The Internet can be accessed at any time from any place. The Web provides a friendly graphical user interface, where the HTML and PHP programming languages can be used to display the needed GUI web pages on client's screens.

Users can interact with the system components in several roles. Figure 3 illustrates the work flow for the various roles within the system. Execution would begin at the top of the figure and proceed toward the bottom, starting with a login attempt and ending with server processing. System GUI guides the users through their workflow based on their roles. When a student submits an evaluation through the system, it generates an internal evaluation number to be assigned to the evaluation data. After that, no trace is left in the system to identify which evaluator ID is used to generate the evaluation. Students can be assured that their responses on the system evaluation forms are truly anonymous.
5.5 Database Design

In this section we present a proposed E-R Diagram, database schema, and some of the Interfaces screens and Forms of this proposed system:

5.5.1 E-R Diagram

5.5.2. Database Schema

Our Database Schema (teacher_eval) consists a set of relations (Tables) described in the following paragraphs and figures:

- Users Table: consists information of the users who can logon to the system, and privileges allowed to each user.
- Courses Table: consists information about the courses available for the students.
- Students Table: consists information about the students registered in the courses.
- Teachers Table: consists information about the teachers of the courses.
- Questions Table: consists the questions that will be included in the evaluation form.
- St_answer Table: consists the answers information that collected from the student form after the student filled and submit the form.
- Course_eval Table: consists the evaluation marks for the courses after the evaluation process.

You can see the tables' fields in the EER diagram above.

5.6 Interfaces screens of the proposed system

Interfaces screens can be designed and implemented by using HTML language or software programs like Microsoft SharePoint designer forms. These forms can then be connected with the database server by using the PHP script language. The following figures present some of these interfaces:

Figure 5: User logon screen

Figure 6: Administrator main Screen
6. IMPLEMENTATION

The system can take advantage of the latest development technologies in its implementation. MYSQL can be used as a server database and the PHP scripting language with HTML can be used to develop the web application. Windows 7 for example can be used as a platform to develop the system.

Using these software programs in Implementation can help to: Allow users to simply call up and login to the site using any standard web browser, fill in the appropriate questionnaire forms and submit the forms, Results automatically saved in remote database server, and Create dynamic web pages that can be displayed for user with suitable forms and format.

By dynamic web pages, elements of the evaluation questionnaire can be saved in the database and reconstructed dynamically on the Web when accessed. By using this approach, when a student logs on to the system, his or her identification is first checked. If verified, the courses within which that student is registered for the selected semester will be retrieved.
After the student chooses a course to evaluate, the questionnaire of the course is retrieved and displayed. Upon completion of the questionnaire the student would submit it and the system would register it as complete. The entire process is a data driven process and is shown in Figure 9.

Some points need to be considered during implementation such as: System needs to be easy to access and use, System needs to be tied to the student registration database so as to be able to access enrolment information dynamically, and System needs to guarantee data security as required.

In system testing process, some issues need to be considered such as: Run the system with a large number of students to test system stability; Allow students to use the system and test response rates within a specified period of time; and Focusing on testing the validity, reliability, stability, and consistency of the online system.

7. DISCUSSION AND ANALYSIS

In this paper we presented some points that have to be considered in developing and using online web-based teaching evaluation systems.

While students may find it somewhat inconvenient to evaluate faculty online, they should have little difficulty understanding the online procedures, since students today, are quite comfortable with the Internet and web sites.

This study and previous studies demonstrated that gathering teaching evaluations data online is a viable alternative to the traditional, in-class method. In addition, several studies have demonstrated that online surveys may produce a higher quality and greater quantity of response to questions.

The only serious problem posed by the online method is a potentially low response rate. Professors can use reminder messages to enhance the response to an online faculty evaluation, they can easily make reminder announcements in class and/or they can have the web site programmed to automatically Email reminder notices to non-respondents on a regular basis. In addition, system can be programmed to prevent students from retrieving their grades in the course before they do the evaluation for that course.
When students log on to a web site to conduct an online evaluation, they should be required to use an access code. The access code ensures that the response is coming from a student in the class and it prevents students from evaluating the class more than once. In many cases, a student’s access code is the student’s ID number.

When students use their ID number to log on to the survey web site, professors and survey administrators must assure students that their identity will never be tied to their online evaluation. It may be necessary to develop strategies that increase the student’s perceptions that response to the survey is truly anonymous. One strategy that might work is to develop a set of access codes for the web site survey.

Should students be required to verify that they have completed the evaluation, the online system can be programmed to generate a ‘proof of completion’ certificate for the evaluator.

Gathering evaluations of faculty through a web site survey is a relatively new technique and many aspects of this survey method still need to be researched and fine tuned. For example, when should the online faculty evaluation begin and how much time should students be given to complete the evaluation? Most of the online evaluations in the literature started a few weeks before the final exam.

When students respond online, should they be allowed only one attempt at the evaluation or should they be allowed multiple visits to the same questionnaire so that they can either complete the survey or change their previous answers?

Clearly, answers are needed to the above questions so that survey administrators will know the optimal strategy to use when conducting an online evaluation of faculty.

8. CONCLUSION AND FUTURE WORK

The online method of collecting teaching evaluations data offers numerous advantages over the in-class method of evaluation: it is cheaper to administer, requires less class time, permits the processing of data quickly, is less vulnerable to professorial influence, allows students as much time as they wish to evaluate faculty and allows students multiple opportunities to evaluate faculty. Though there are costs associated with managing the online web site, such as downloading the responses and preparing summary reports, these costs are far less than the material and labor costs associated with in-class evaluations.

In this report we presented a comprehensive description for the features and characteristics of planning, designing and implementing good online (Web-based) course evaluation systems using the new and up to date technology.

In this report we presented the planning, designing, and implementation of our Prototype (simple) online course evaluation system. In this system we used the new MYSQL Server database software to create our database on a local server under the windows 7 operating system. We used SharePoint designer 2007 to design the Clint Interfaces forms and screens, and using the PHP scripting language with the HTML codes to connect these forms with the local MYSQL server.

To maximize efficiency our proposed system can be extended in future to be connected with the existing university electronic systems such as course registration, semester timetables, evaluation data processing, and central computer Systems. System can be extended to include more Web-based components such as: questionnaire builder, report generator, and other components.

With questionnaire builder, instructors will be able to create their own questionnaires on the Web. There will be a question bank attached to the questionnaire builder so instructors
can compile questionnaires using questions from the bank. They will also be able to choose to write their own questions or modify existing ones.

When instructors finish designing their questionnaires, the questionnaire will be put on the Web to collect students’ responses. To do that, all they will have to do is to specify a period during which the students will be given access to the questionnaire. When the data collection period finishes, a report will be generated automatically which the instructor can view on the Web.

REFERENCES


