Experiences in Developing a Web-based Assessment System

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Abstract
Like many departments around the country, the Engineering Technology Department at Kansas State University – Salina is trying to find ways to effectively manage assessment of its programs. Students in the Web Development Project course were assigned the task of developing a prototype assessment system to manage and track student learning outcomes. In addition, the specifications called for a way to track suggestions for program and course improvement. This paper describes the project and its challenges.

Introduction
The Engineering Technology Department at Kansas State University is moving to more of an outcome-based model for its degree programs. The biggest motivation behind this move comes from two accreditation agencies. The North Central Association provides accreditation for K-State University as a whole. In addition, most of the programs in our Engineering Technology Department are accredited by Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET).[1] Both of these agencies emphasis the need for a student learning assessment plan that specifies the desired outcomes that graduates should achieve. Furthermore, there should be a trail of documentation to demonstrate what was done to meet these outcomes and how well the outcomes were met. The documentation should show a commitment to a continuous improvement process.[2]

Within our department's student learning assessment plan, degree program student learning outcomes (SLOs) are connected to department SLOs, which are ultimately connected to university SLOs.[3] The university SLOs are the most broad type and program SLOs are the most specific type. A graduate fulfilling a set of program SLOs will, by default, also fulfill the department and university SLOs. In addition, TAC/ABET requires all graduates in accredited programs to meet specific program criteria.3 This makes it important that we are able to demonstrate how our program SLOs map to TAC/ABET's criteria.

In addition to the different types of SLOs and criteria, we also have course outcomes to add to the mix. The course outcomes will map to the program SLOs. Tracking course outcomes allows us to see where in our curriculum we are meeting a specific program SLO. From this program SLO we should then be able to see where in our curriculum we are covering a particular university SLO and/or TAC/ABET requirement.

Of course there is much more to assessment than just the pieces that are described above. As we continue to build our department assessment plan, we will need to track more pieces of information. For example, there will be such things as the suggestions, measures, criteria, and improvements that are part of a continuous improvement process.

A department assessment committee was formed with representatives from each of the different program areas. As the committee grappled with how to document the assessment process, it was suggested that we might try building a database application to store the information. The eventually led to the idea of making this prototype assessment system a student project. In the Spring 2004 semester the best fit for this type of project was my Web Development Project course. This a capstone course in the Web Development Technology Associate Degree. One of the big challenges for the committee was to come up with system specifications for an assessment plan that was still in its early stages of development.

System Specifications
The department assessment committee specified that the system should include the following input forms:
- Student Learning Outcomes (SLOs) for University
- SLOs for College
- SLOs for Engineering Technology (ET) Department
- SLOs for each academic program option (ET-CET, ET-MET, ETB-MET, ET-ECET, ETB-ECET, ET-CMST, ETB-CMST, ET-CWDT)
- SLOs for each course or activity
- Measurement methods for each course or activity SLO
- *Suggested* program and process improvements prompted by advisory committee, faculty, etc.
- *Implemented* improvements prompted by advisory committee, faculty, etc.

The following output reports were specified:
- SLOs for University
- SLOs for College
- SLOs for ET Department
- SLOs for each academic program option (ET-CET, ET-MET, ETB-MET, ET-ECET, ETB-ECET, ET-CMST, ETB-CMST, ET-CWDT)
- Chart summarizing the University, College, Department and program SLOs (one for each program option).
- Chart matching program SLOs to TAC/ABET criteria
- SLOs for each course
- Tabular list and matrix of program SLOs vs. courses
- Chart showing measurement methods, improvements, etc. for a selected academic program option (ET-CET, ET-MET, etc.)
- Course cover sheet for each course showing which Program SLOs are addressed in the course
- List of *implemented* program and process improvements. Query must include date ranges, program option(s).
- List of *suggested* program and process improvements. Query must include date ranges, program option(s).

In addition the committee added the following access and security notes:
- Authorized users will be able to access the system from any location with web access.
- The Department Head will have read and write access to all database areas.

- Program coordinators will submit program option SLO revisions to the Department Head, who will review them and enter them into the database.
- Faculty will have read access to all areas and write access to their respective course areas.
- Other authorized individuals (administrators, accrediting agency personnel, etc.) will be given read access only.
- The Department Head will screen suggestions for program or process improvement before posting them for viewing by faculty or other authorized individuals.

The students met with the department head and each of the assessment committee members to better understand the requirements and expectations.

Project Description
The prototype system is built on a Microsoft Windows server platform running Internet Information Services. The programming is done in Active Server Pages (ASP) and uses Microsoft Access for the database. On t he client side, most current web browsers should work as long as cookies are accepted. The system was tested with current versions of Microsoft Internet Explorer, Netscape, and Mozilla.

The interface has a banner along with buttons across the top of the window. The buttons provide access to different areas of the system (see figure 1.) Once a particular area is accessed a menu is displayed on the left side of the window. A login form and/or login information is also provided on the left panel.

Figure 1

A challenged based user and access security authentication system is used. In this type of system each web page that is requested will check to make sure the user is logged in and has proper permission to access the page. The user database for controlling access to the system is encrypted and separate from the rest of the assessment data. There are two levels of users supported by the security system. Level 1 users are the faculty users. These type of users have the ability to add SLOs at the program and course level. In addition, they can also run all the assessment reports. Level 3 users have administrator privileges. These users have all the level 1 capabilities plus the ability to add other users and modify user information.

A forum area is provided to track suggestions and comments for program and process improvement (see figure 2). The students modified an open source bulletin board system, Philboard[4], and integrated it into the assessment system. This allows users to post suggestions and make comments on previously posted comments. Before the post will be public viewable it must be approved by a level 3 administrator. Anytime a new post is made to the forum an email message is sent to a designated moderator notifying them of the entry. The moderator can login with their administrator account then edit and approve the post. Users can add comments and suggestions to current posts by replying in that same thread. In addition, users can start new threads when desired. Administrative users also have the ability to create whole new forums within the bulletin board system.
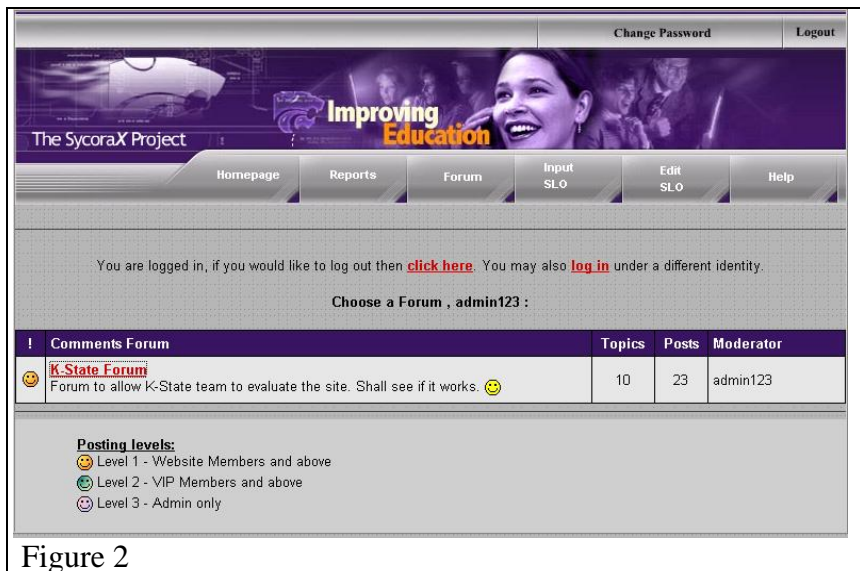

Figure 2

The system also provides menus for inputting, editing, and reporting SLOs (see figure 3.) Most of the options on the menus provide a description of the necessary input fields. In addition, there is a separate help area that provides information about the different areas and the system in general.

Challenges
Students ran into several major challenges during the development of the system. Initially the students had to spend a significant amount of time just learning what this system was supposed to do and all the terminology associated with assessment. The fact that our department is still in the early stages of developing an assessment plan added to the challenge. Many times students

would ask a question about something that had yet to be hashed out by the assessment committee. This sometimes led to conflicting information and consequently confusion amongst the students. Though the specifications listed above didn't change throughout the semester, the students understanding and approach changed a lot between first few weeks of the semester to the second half of the semester. The biggest impact of this was on the database design. The students spent a great deal of time designing and redesigning the database in the first half of the semester. This greatly affected the amount of time they had left to do the programming for the rest of the system. With the constraints of working within a semester time frame they had to scale back somewhat on the scope of what the had hoped to do.

Another factor that was a significant problem for the students was communication. There were 12 students in the class. These students divided into three teams to work on different aspects of the system. The students had to learn to work together and coordinate their activities. Again, different levels and understanding coupled with different approaches and lack of effective communication between team members and teams led to a lot of inefficiencies the first half of the semester. However, by the second half of the semester the students did a very good job of coordinating their activities.
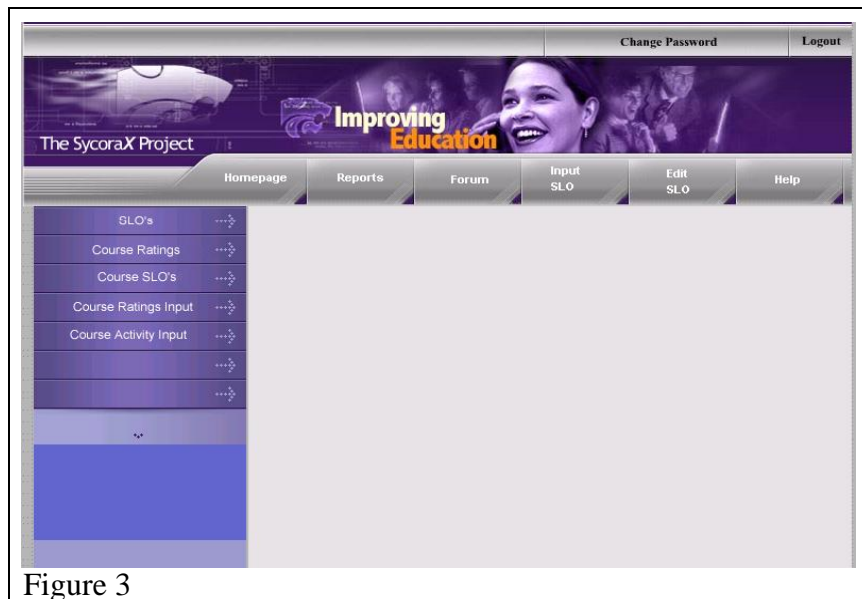

Figure 3

Conclusion
The prototype system developed by the students still has a lot of rough edges and needs some refining. However, it provides a good base to build on. It shows a lot of promise as a tool to help faculty track and document the assessment process, which will hopefully become part of a continuous improvement process.

References

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