# AC 2009-22: SUSTAINABLE ASSESSMENT AND BEYOND

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# Sustainable Assessment and Beyond

Abstract

This paper provides an overview of two web-based tools for program-level and course-level assessment of student learning outcomes at the Georgia Institute of Technology. An institutional level perspective for annual program assessment is discussed using a tool called the "Online Assessment Tracking System (OATS)." A second perspective, at the academic unit or department level, is provided using a web-based tool entitled "Course Level Assessment System (CLASS)" for conducting ongoing direct course assessment of student learning outcomes. Five integrative courses in the mechanical engineering curriculum are selected to assess twelve learning outcomes. These web-based outcomes assessment programs are sustainable and provide measures of change over time. Results are fed back to provide a mechanism for continuous improvement of the educational process. The tools also integrate online technology to develop and maintain the systems. At both the institute and academic unit/department level, the assessment process is subject to review and approval. Administrators and faculty instructors are able to use the information to fine tune their assessments in the future. In addition, the annual reviews ensure that the programs will be ready at any time for accreditation visits, such as ABET or Regional Accreditation Boards, for example. The topics presented regarding web-based assessment tools are particularly pertinent to others who work in higher education. This paper offers creative web-based solutions to a problem that is common to colleges and universities.

## Background and Motivation

Educational institutions are expected to have a program of continuous improvement to demonstrate how well they are accomplishing their teaching, learning, and research missions. Assessment methods and tools allow schools to accomplish this goal and to continually renew their commitment toward building better learning environments.

Instructors constantly assess student learning through comparison to standards required for a competent understanding of the course material. Assessment is more than assigning individual grades in a course. Assessment is more holistic. The goal is to assess the learning that is being achieved by our students as a whole, rather than a single student. The question addressed is whether learning is effective through a curriculum that produces graduates who are able to achieve learning outcomes and objectives desired by the educational institution. Strengths are identified to build on and improve the overall program. Weaknesses are also identified so that they may be corrected and also improved upon. If the learning community, to include students, faculty, and constituents, are able to continuously improve the teaching and learning experience for their students, the assessment process should be considered a success.

In addition, there are requirements for educational institutions to be in compliance with a number of accreditation bodies.[1] This will include a regional accreditation board, such as the Southern Association of Colleges and Schools (SACS) for schools in the southeast. For engineering and

engineering technology programs, periodic accreditation visits are conducted by the Accreditation Board for Engineering and Engineering Technology (ABET). Public universities, such as Georgia Tech, may have additional periodic Board of Regents Academic Program reviews. And finally, most universities require some sort of a mandated university assessment process, usually on an annual basis. Each of these accreditation bodies are examining the school's educational outcomes and objectives and determining whether a satisfactory assessment plan is in place to monitor their achievement.

Overview of Web-Based Tools to complement an Outcomes-Based Assessment Program

This paper will provide an overview of two web-based tools for program-level and course-level assessment of student learning outcomes at the Georgia Institute of Technology. These tools are an attempt to improve and provide a more efficient means for the design, development, and implementation of an outcomes-based assessment program for engineering education.[2] There are already some web-based methods described in the literature. Reference [3] describes tools to enhance assessment automation. Web-based portfolios are also being used in the assessment of learning outcomes for on-campus and distance learning programs.[4]

Two perspectives for the implementation of web-based tools for assessment will be described in this paper. From an institutional-level perspective, web-based program assessment at the Georgia Institute of Technology is performed using a tool called the "Online Assessment Tracking System (OATS)." The "Online Assessment Tracking System" is used for annual program assessment. Individuals at the academic unit, or department level, provide input. The system also serves as a repository for previous annual assessments.

As a second perspective, at the academic unit-level, or department level, is provided using a web-based tool entitled "Course Level Assessment System (CLASS)." This system is currently used in the Woodruff School of Mechanical Engineering at the Georgia Institute of Technology. The "Course Level Assessment System" is used for annual direct course assessment of student learning outcomes. Faculty members of selected courses provide input. The system also serves as a repository for previous annual assessments.

Online Assessment Tracking System (OATS)

At Georgia Tech, program assessment information is collected by the Institute annually using a web-based tool. Figure 1 shows the design of the main menu for this program. Note that current annual assessment may be viewed or edited. A record of previous annual assessments is also maintained.

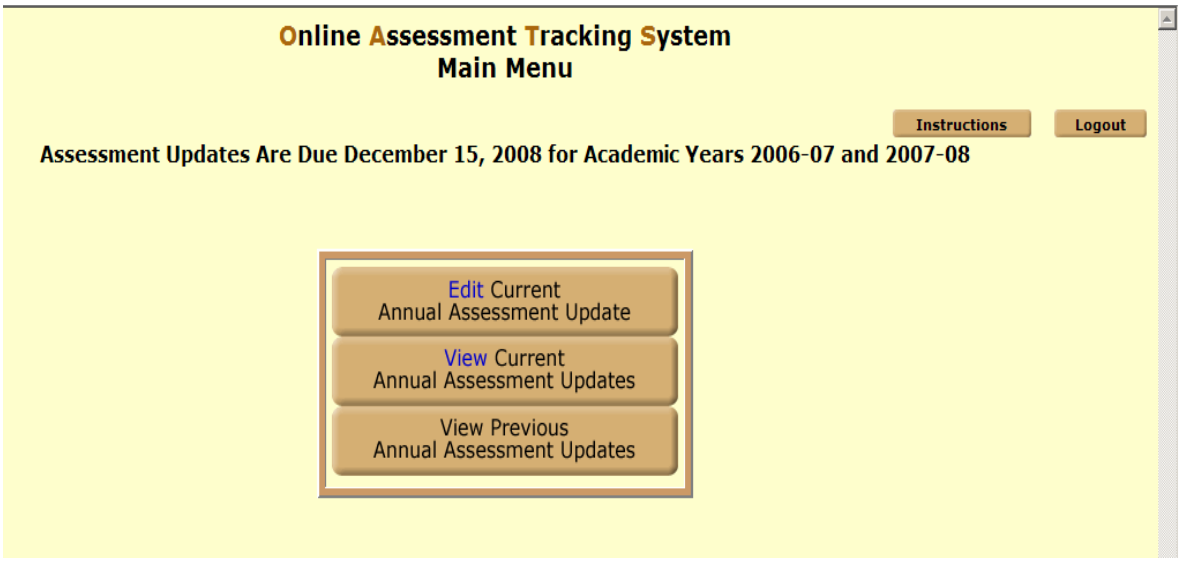


Figure 1. Online Assessment Tracking System (OATS) Main Menu

For each degree program, the OATS system allows learning objectives and outcomes to be documented. The methods for assessing these objectives and outcomes are defined. Results from the assessment are collected. Impacts on the program are recorded and actions to take based on this assessment feedback are formulated. Figures 2 is an example of how the status of this assessment data is kept. Figure 3 is a screen capture of a typical entry for the assessment of a learning outcome. The annual online assessments are sent through the Deans of the various Colleges at Georgia Tech for review and then go to the Provost's Office and the Georgia Tech Office of Assessment for final review and approval.

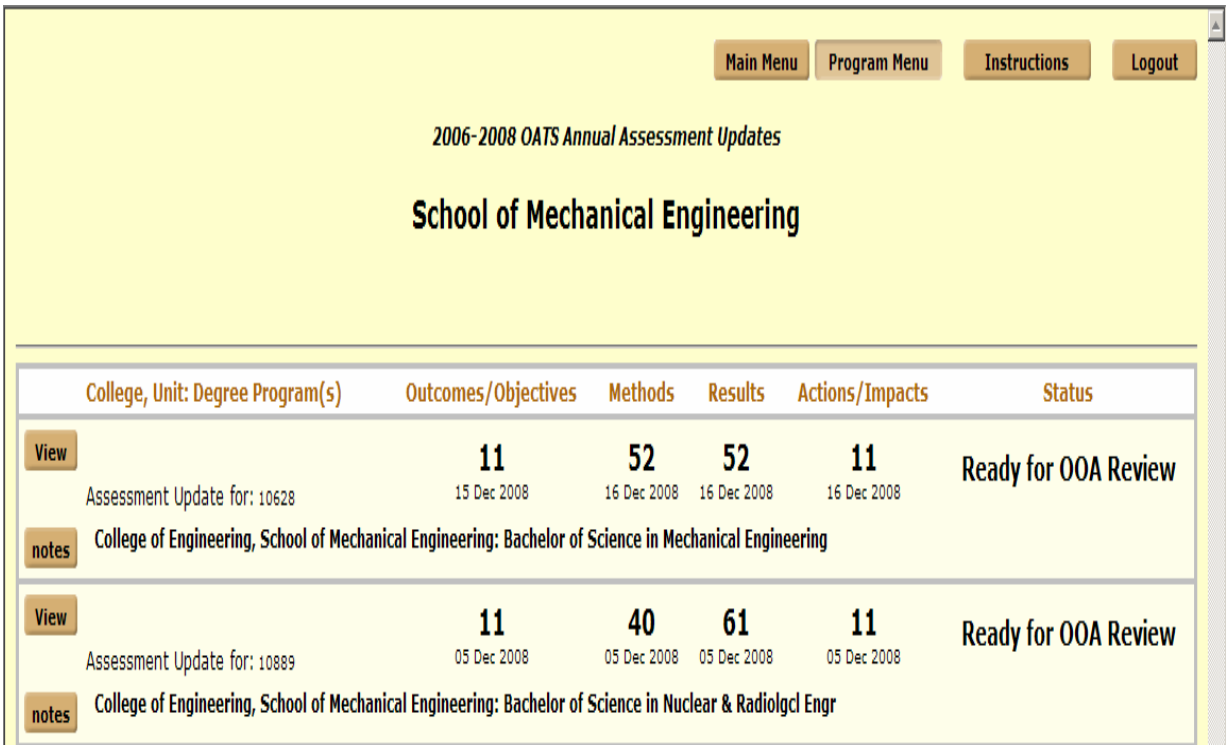


Figure 2. Status of Degree Program Assessment

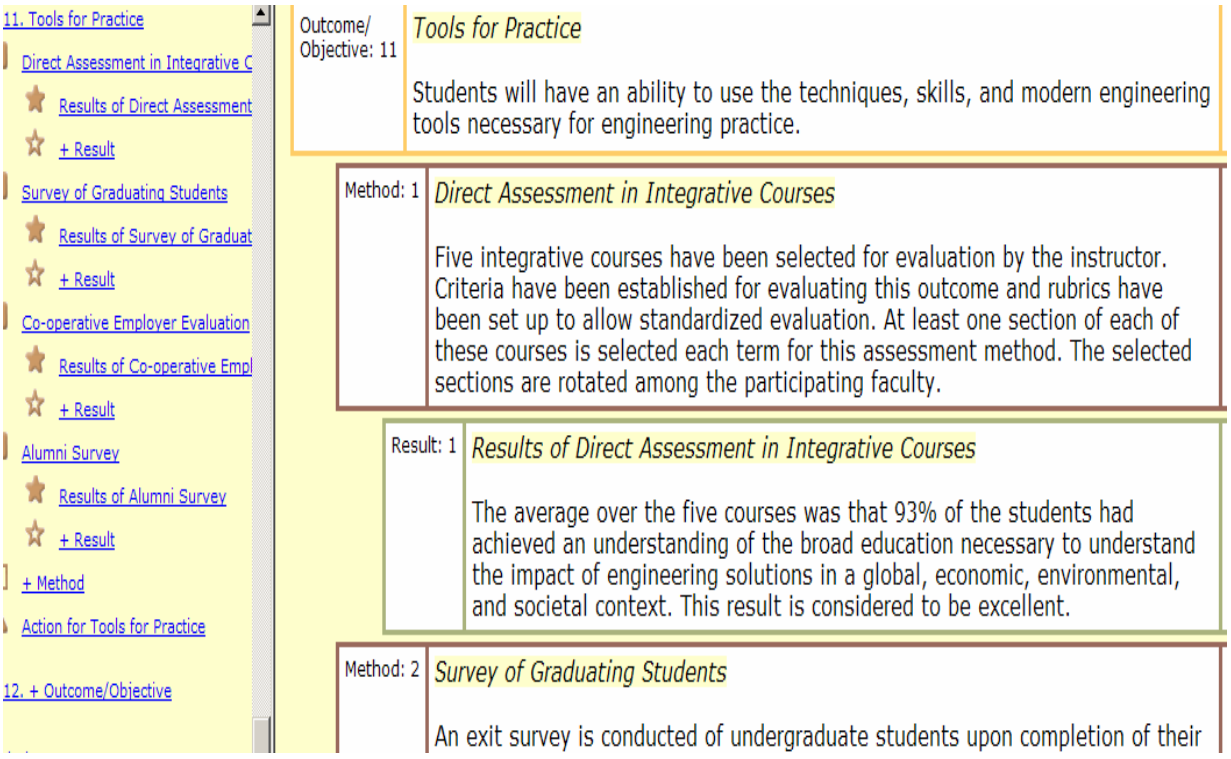


Figure 3. Typical OATS entry for the assessment of a learning outcome

Course-Level Assessment System (CLASS)

In the School of Mechanical Engineering at Georgia Tech, direct assessment of student learning outcomes is accomplished using a Course-Level Assessment System (CLASS) web-based tool. Five integrative courses in the mechanical engineering curriculum are selected to assess twelve outcomes. Figure 4 shows the entry screen for this web-based program. Figure 5 shows the integrative courses that are currently selected for assessment. Note that administrators of this web-based system are able to add or edit learning outcomes, methods of assessment, and narrative assessment questions. The assignment of faculty instructors for conducting assessments may also be updated as necessary.

The faculty input screens for assessment information are shown in Figures 6, 7, 8 and 9. The achievement of learning outcomes is assessed using a performance criteria rubric. A typical rubric defined for a specific course is given in Figure 6. Figure 7 shows the selection of methods of assessment for a designated outcome in a particular course. Faculty members teaching the selected courses input ways they are assessing student learning outcomes. Narrative assessment input is shown in Figure 8. Figure 9 shows how faculty instructors are able to record the achievement of specific outcomes for students in the course. This part of the assessment is based on performance expectations for the various learning outcomes.

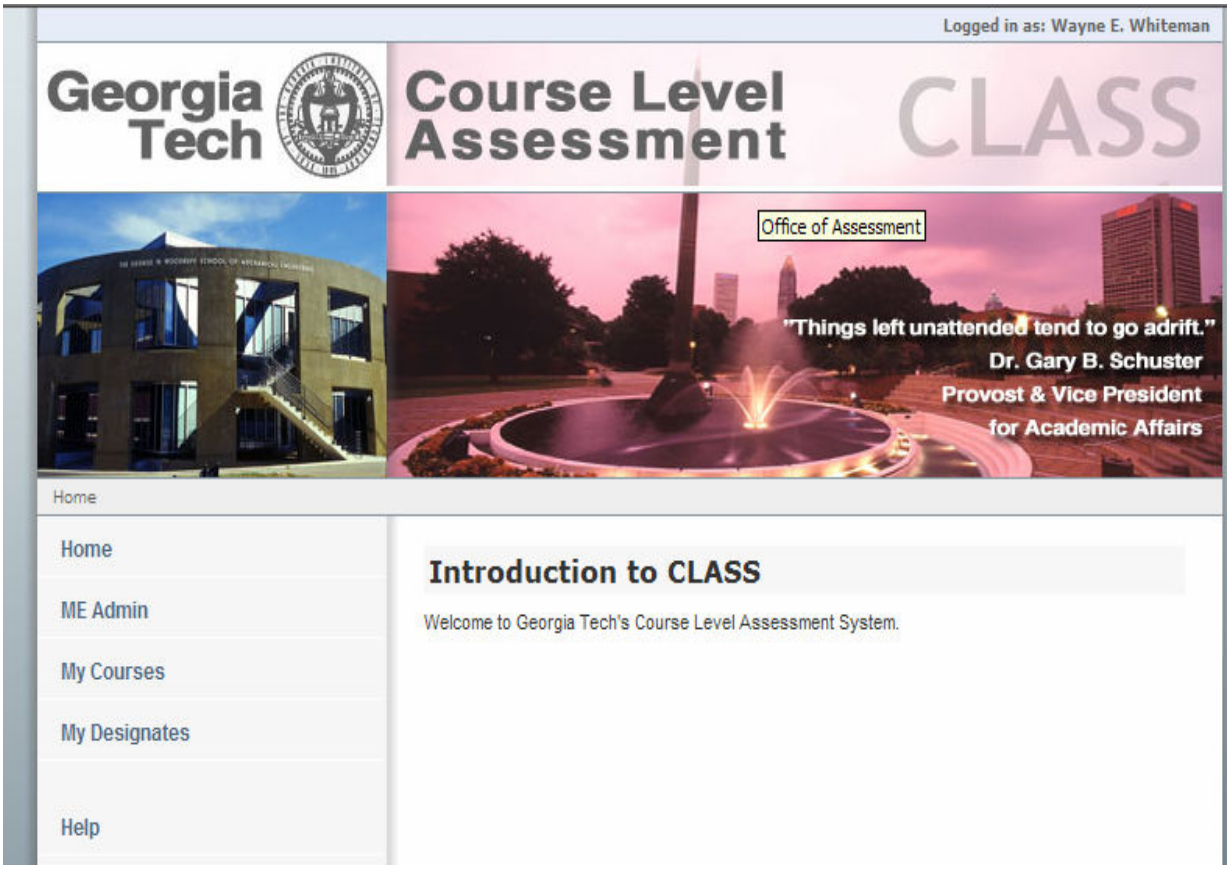


Figure 4. Course-Level Assessment System (CLASS)

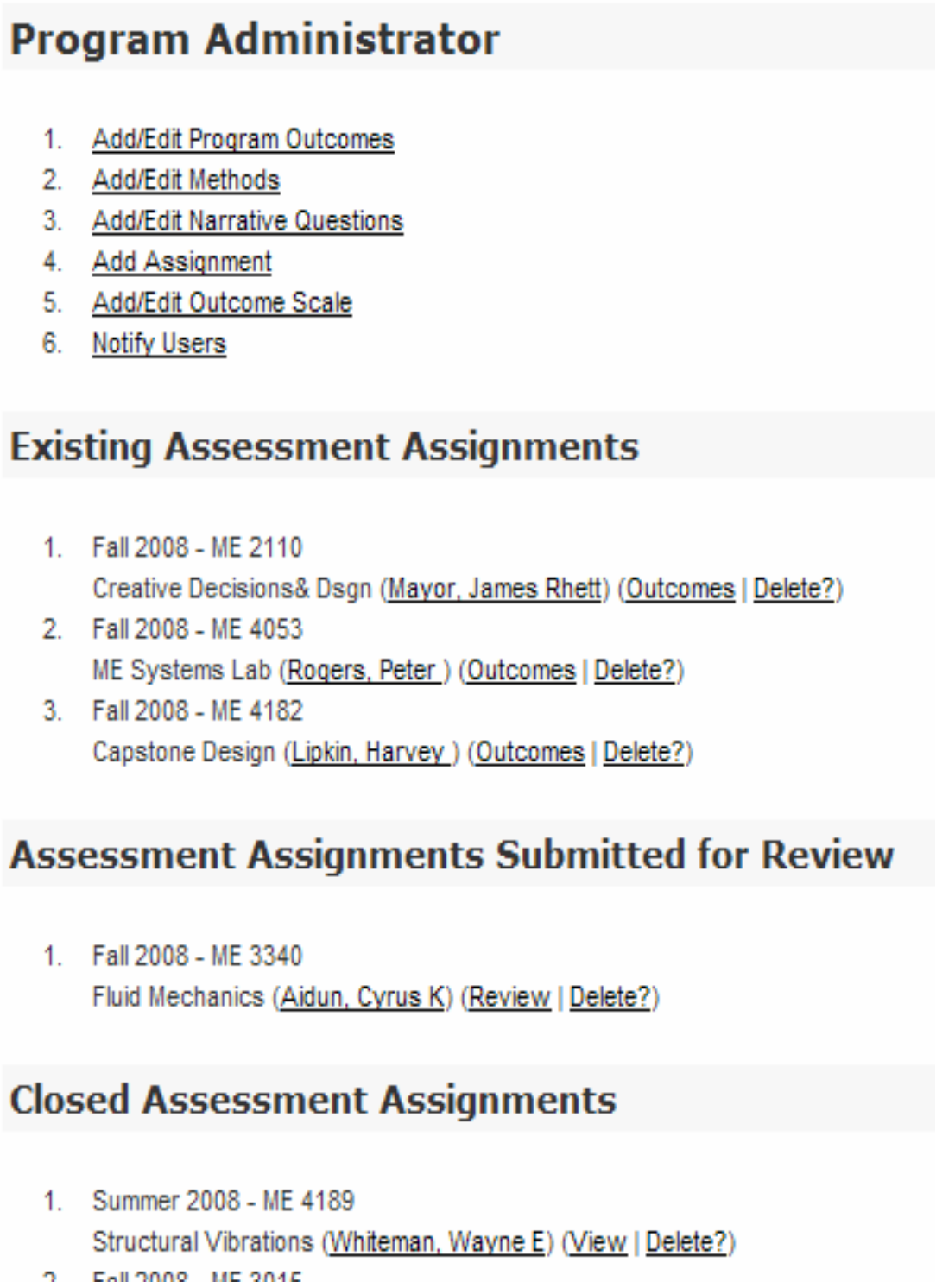


Figure 5. Course-Level Assessment System (CLASS) administrative functions

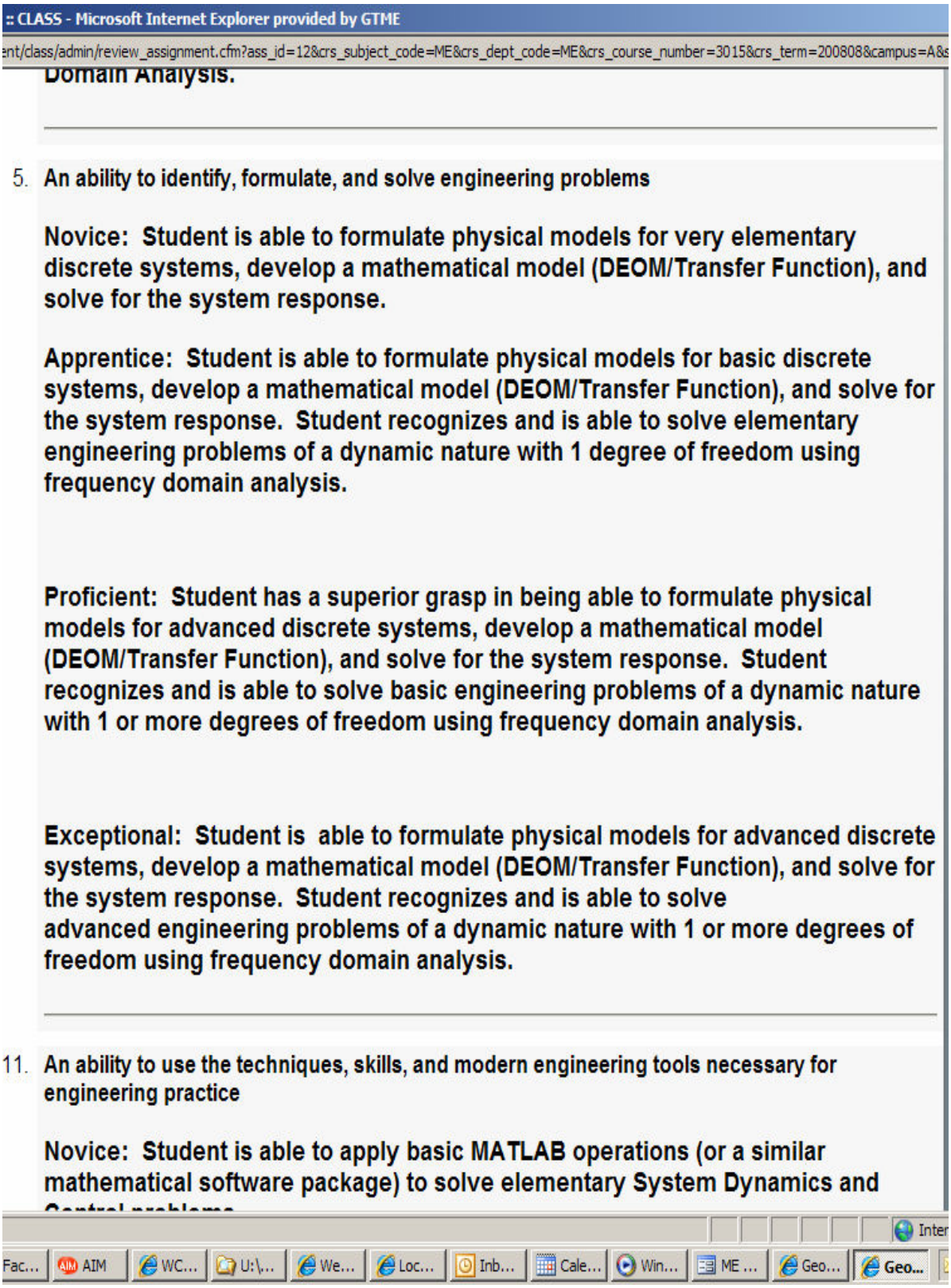


Figure 6. Typical Performance Criteria Rubric

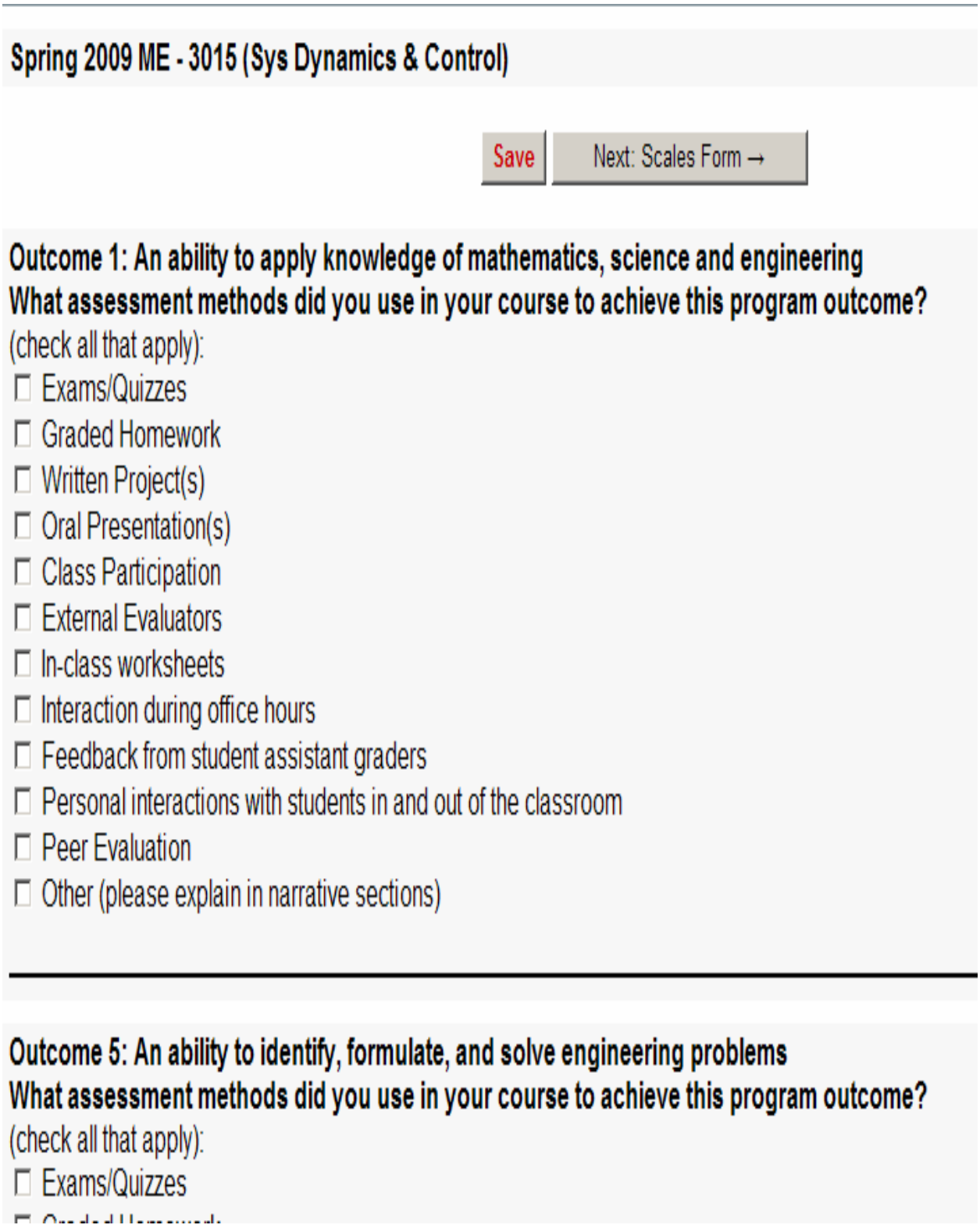


Figure 7. Methods for course outcome assessment

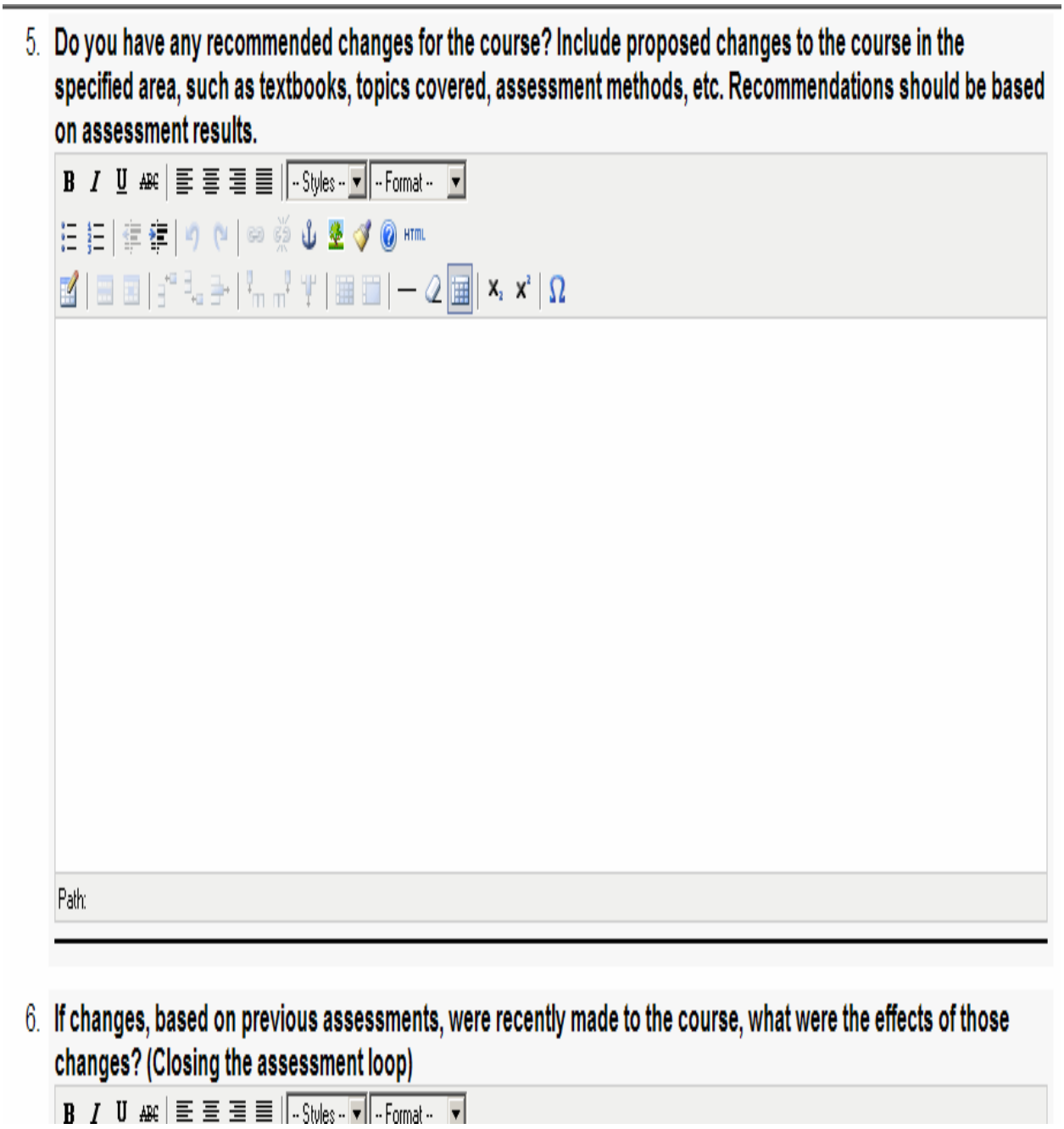


Figure 8. Narrative input for course outcome assessment

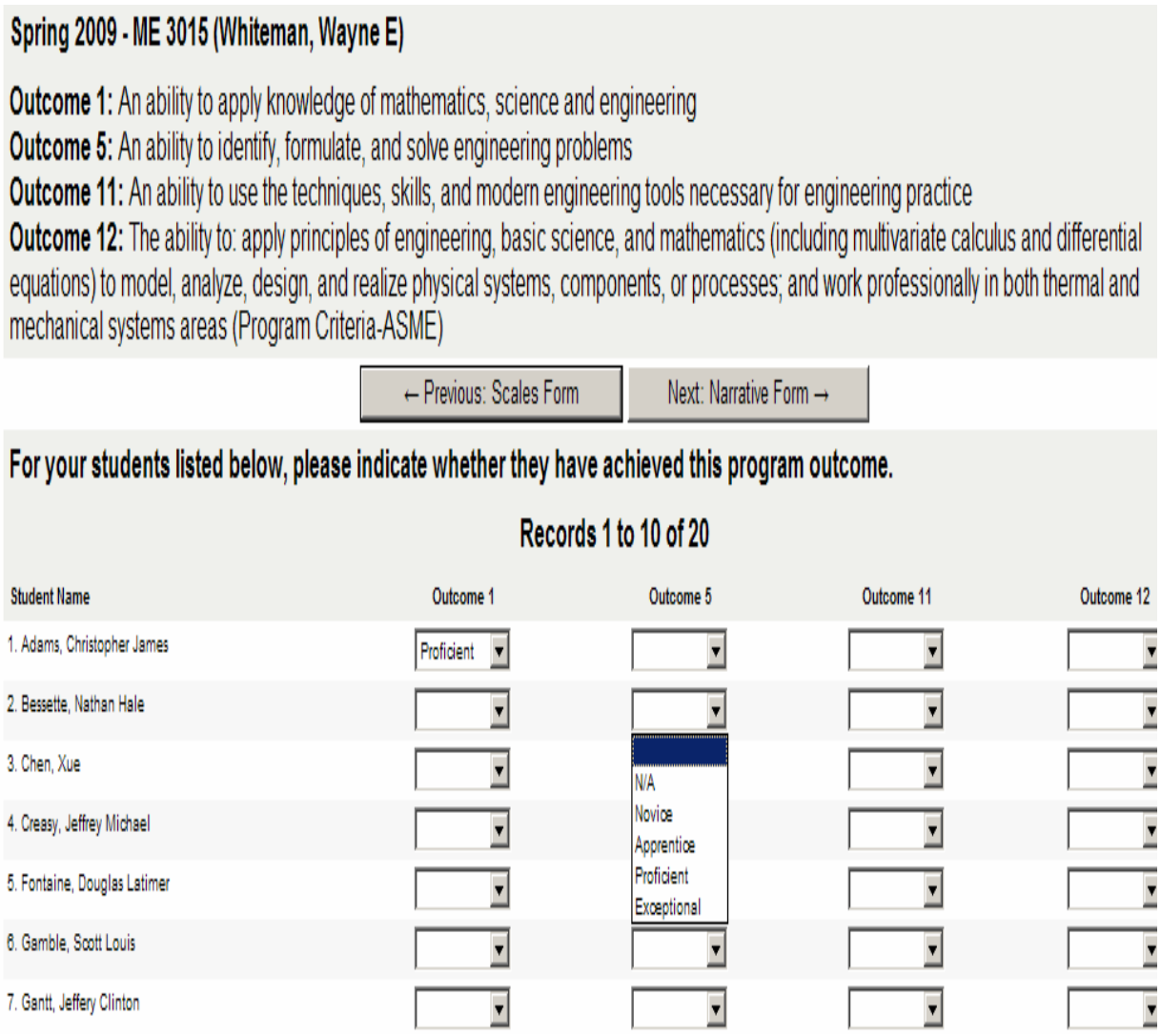


Figure 9. Learning outcome assessment for a specific course.

## Sustainability

An outcomes-based assessment program must be sustainable and provide measures of change over time. Results must be fed back to provide a mechanism for continuous improvement of the educational process.[5,6] The web-based tools described in the previous section are an effective means for capturing and implementing this continuous improvement process. The tools also integrate online technology to develop and maintain the systems.

As previously described, student learning outcomes are reviewed on an annual basis. Methods are recorded for assessing these outcomes along with the assessment results. These methods and results include direct course assessment of student learning, design projects, coop and internship employer feedback, undergraduate research papers, student portfolios, student exit surveys, alumni surveys, advisory board feedback, and national rankings, as examples.

Sustainability of the process allows assessment to be ongoing and not episodic. Assessment is most effective when it looks at performance over time. As depicted in the OATS and CLASS web-based tools, both quantitative and qualitative information is recorded. The web interface is designed to be user-friendly. The web-based system allows the data to be more efficiently managed. The web-based tools can be easily modified to accommodate future changes.

At both the institute and academic unit/department level, the assessment process is subject to review and approval. Administrators and faculty instructors are able to use the information to fine tune their assessments in the future on a sustainable basis. In addition, the annual reviews ensure that the programs will be ready at any time for accreditation visits.

## Applicability to other Educational Institutions

The topics presented in this paper regarding web-based assessment tools are particularly pertinent to others who work in higher education and who are struggling with these same issues. This paper offers creative web-based solutions to a problem that is common to colleges and universities. Leveraging information technology solutions, such as these types of online assessment tools, is an innovation that needs more exploration.

Interested readers should identify other program-level and course-level assessment tools they are currently using, or have seen used at other educational institutions. They may want to consider a web-based system, like OATS or CLASS discussed in this paper, to be possibly adopted at their home institution.

## Conclusions

Web-based assessment tools are an efficient means for the design, development, and implementation of an outcomes-based assessment program. This paper describes two of these tools used at the Georgia Institute of Technology. These web-based programs are a sustainable means of providing measures of change over time. This allows a systematic mechanism for continuous improvement of the educational process. These web-based tools are also fully applicable and may be adopted by other educational institutions that are interested in leveraging information technology solutions to assessment processes.

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