

Implementing Electronic Portfolios for Learning and Assessment

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In higher education programs, electronic portfolios provide powerful tools to enhance learning. Their functions vary from learning through reflection, to assessing performance of prescribed outcomes. The implementation of electronic portfolios presents a challenge to the faculty. It requires clear objectives, faculty commitment and a carefully selected portfolio platform. Meanwhile the use of e-portfolios requires a gradual change of culture in knowledge delivery and assessment. It is a shift from traditional delivery to additional learning through research, documentation and reflection. Through this shift, students develop their personal portfolios to summarize and reflect on their college and personal experiences. They also develop portfolios for selected courses to document their learning and archive materials they receive in various classes. This paper briefly discusses the value of e-portfolios in learning and elaborates on their implementation in the Construction Management Program at University of Cincinnati.

Key Words: Electronic Portfolio, outcomes, assessment, performance, accreditation.

Introduction

Electronic portfolios, or e-portfolios for short, are powerful tools that can be used to fulfill many objectives of higher education (Thompson & Suckarieh, 2007). From learning, to outcome assessment, e-portfolios are making strong marks in the development and delivery of higher education. E-portfolios present digital stories of deep learning (Barrett, 2004). Barrett describes three purposes for the electronic portfolio: *formative*, *summative*, and *marketing* (Barrett, 2001). The formative purpose of e-portfolio is at the center of learning; when students compile educational materials and reflect on their learning, they have better opportunity to learn the materials, get more interested in furthering their education, and improve their communication skills. The summative purpose of e-portfolio reflects on the development of personal assessment skills. Self assessment allows the students to develop skills that maximize their career potential and drives further learning (Lloyd, 2009). Finally, the marketing purpose of e-portfolio allows the students to selectively present their skills as they target specific job opportunities (Barrett & Wilkerson 2004).

There are several methods to launch e-portfolios; they vary from a non-structured approach where the students design the content and structure of their portfolios, to highly organized delivery by using templates. Portfolios can be self centered to reflect on the personal experiences of the students, or educational centered to reflect on their educational experience. Electronic portfolios can also be used for courses delivery. They provide a collaboration tool between faculty and students. Through e-portfolio templates, the faculty delivers class materials that provide a starting point for the students. A template provides a placeholder and a structure for organization of materials that stay well after content management systems like Blackboard Learning System™ is no longer available to the students. In this placeholder, the students can add their own notes, assignments, reflections, and artifacts like video clips and illustrations. At the end of the portfolio, the students reflect on their overall learning experience in the class and assess how the class relates to other classes to form their academic experience and shape their future career.

E-portfolio allow academic advisors, and counselors to take the initiative to reach out to students to offer advice, support and assistance, rather than waiting for students to seek help. In reality, depending on their contents, e-portfolios provide both dynamic and static views of student learning. They allow advisors to pinpoint deficiencies before they hamper the success of the students. They allow faculty to readily access information on the progress of the students to improve their learning and provide a feedback loop to improve their experience. From advising perspective, e-portfolios allow for intrusive academic advising to take place. Intrusive or proactive advising has been found to have positive impact on student success (Thomas & Minton 2004).

The following paragraphs present an overview of the implementation of e-portfolios in one CM program. First, students create their personal portfolios by using a template. Then, several courses are identified to provide benchmarks for their progress in the program. The portfolios for these courses are linked through personal portfolios that the students create in the freshman year. Personal and courses portfolios present the students with opportunities to enhance their learning, archive coursework and knowledge and showcase their skills. The portfolios also exhibit the maturity and growth of the students through their years in college.

Background

Several faculty members of the CM program at University of Cincinnati worked collaboratively on implementing e-portfolio for learning. They identified three objectives for using e-portfolios: a) To foster students' learning through reflection, b) To use the reflection as feedback loop for self assessment and program improvement, and c) To allow the students to deliver professional presentation for employment. The faculty identified the platform for creating the portfolios. The group designed a template with a commercial website editor. The students were required to use word processor to edit the template, create their portfolios, and upload them to a university server. The process proved difficult to follow. It required several hours of training, and the created portfolios had no mechanism for electronic assessment. After the first year of piloting the system in Freshman Construction Seminar it was decided to switch to another commercially available platform for e-portfolio. The system is developed and hosted by LiveText (Copyright © 1997-2010 LiveText Inc.) The new system is on-line and since it is hosted by a service provider external to the university, it requires neither maintenance nor storage space within the university. The students pay one-time fee for the use of the system and for storage of the data for the duration of five years. They can export their portfolios at any time. Every faculty member using the system receives a free account with unlimited storage to build templates, share them with the students, and assess their work.

Platform Selection and Personal Portfolios

Five criteria influenced the selection of the new platform for the system: ease of use, structured approach, affordable to the student, adaptable for collaborative teamwork, and facilitate assessment. Although there is a considerable amount of free technology, most lack important requirements identified by the faculty. Meanwhile, the selected platform easily integrates with free technologies like blogs and wikis. The cost of the system is equivalent to the cost of one book and the system can be used by the students for five years for the initial payment. After five years the student has the option to subscribe to continue using the system for a yearly fee, or stop. The portfolios created with the systems can be exported at anytime to become part of the electronic records of the students, it can be modified and uploaded to a different host. The exportability feature is extremely important. The students need to keep the content of their e-portfolio accessible if they change the platform; their archive of coursework and their documents are too valuable to loose after they graduate. Meanwhile, LiveText platform allows the students to edit the template to create their portfolios with great ease. It also allows them to link their personal portfolios with other portfolios dedicated for various courses.

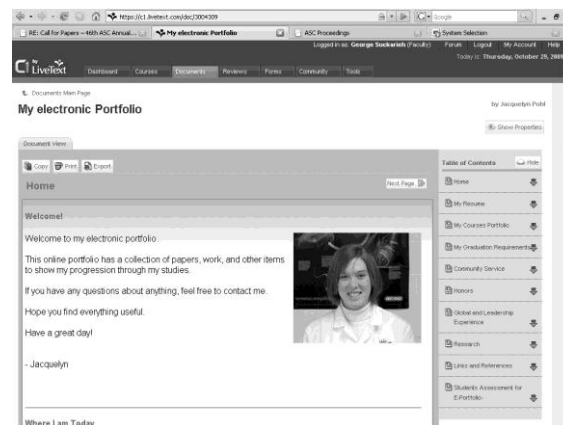


Figure 1: Personal e-portfolio generated with a template designed by CM faculty

The main goal of the personal portfolio template is to provide a structured input of data to the students. The students edit the template to create their personal portfolios. The template provides an introductory page for the student to write a short biography and goals, a second page for a resume, a third page serves to document the progress of the students in the program: a degree plan and a list of courses in the curriculum that could be linked to portfolios of selected courses. Two more pages provide a place to archive community service and global experiences and finally one last page for the students to provide reflections and self assessment. If they desire, the students can add more pages to the template, figure 1.

Every term of the freshman year, the students share their personal portfolios with their faculty advisors while updating their progress toward achieving their degree plan. They also link their personal portfolio to portfolios of courses they are taking. The faculty in return, provides feedback to the students to help them with their progress toward achieving their goals.

Courses Portfolios

The design of portfolios for different courses is left to the instructors. However, a generic template for a course portfolio is provided to the students in case no specific course portfolio template is available. The one-page generic template contains three sections: One section for course identification and objectives, another section for assignments where students post artifacts (text, pictures or combinations) for three assignments and reflect on them. Several prompts helps the students making reflections about the assignments. The third and final section is dedicated for course reflection. The course reflection section lists eleven carefully crafted prompts that the students can use to reflect on the class. By addressing the prompts shown in figure 2, the students are in fact addressing accreditation outcomes criteria for the course.

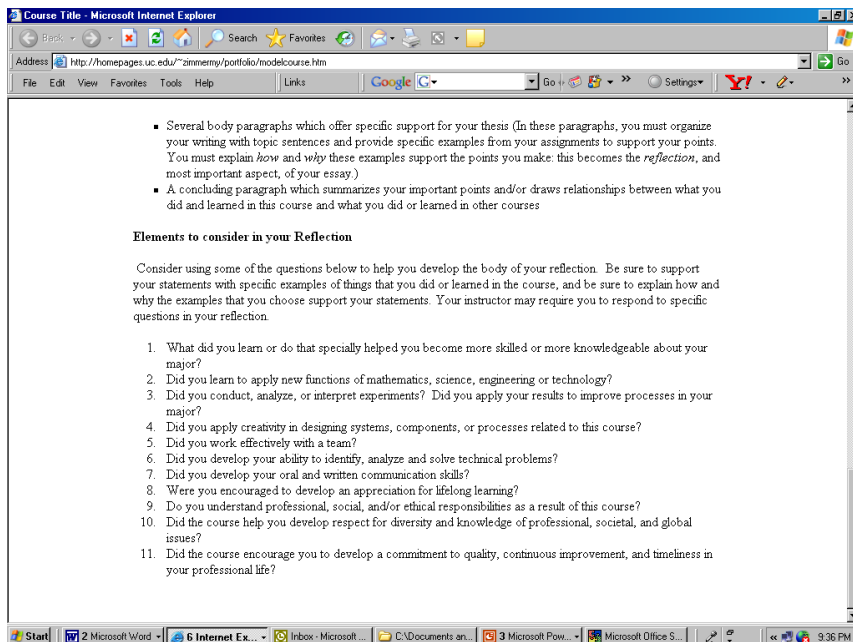


Figure 2: Elements to consider in a course reflections

Templates for portfolios for many courses in the CM programs are more specifically designed for the courses taught. The first year course “Mechanics of Rigid Bodies- (Statics)” template is shown in figure 3. It displays the course overview on the first page, then exhibits summary of course materials by subjects in different pages. The students post their notes in each page. They do that by editing each section and adding the required materials.

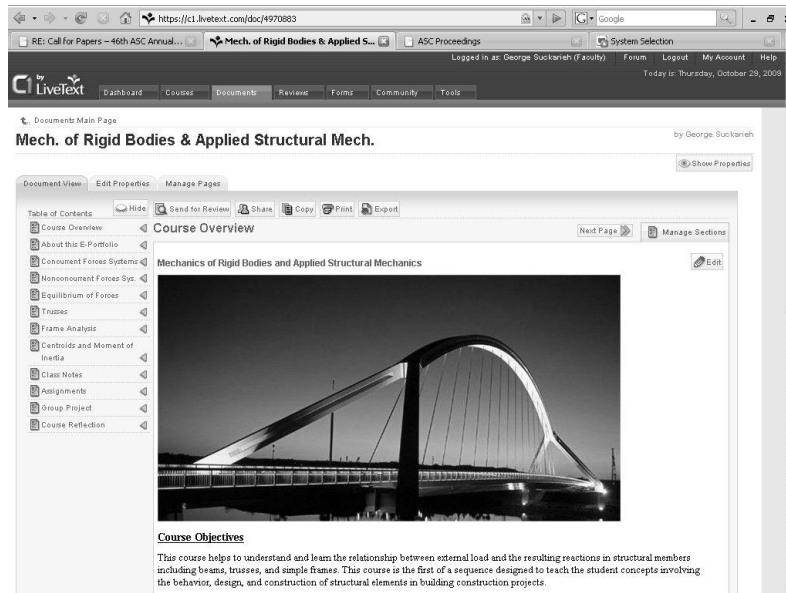


Figure 3: Mechanics of Rigid Bodies (Statics) Course Template

The template for the course Construction Safety shown in figure 4 follows a different format. The first page has the course overview as posted by the instructor. The other pages are exclusively used by the students to publish their notes, their reflections on safety videos and post their papers and PowerPoint presentations. Finally they reflect on the course in the last page and assess their own performance.

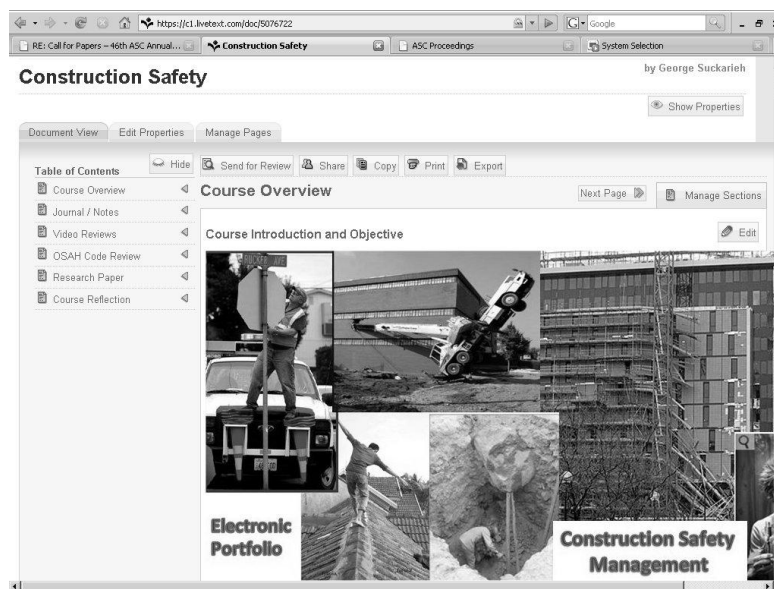


Figure 4: Construction Safety Course Template

Benchmark Courses for E-Portfolio in the CM Program

The CM Faculty selected strategically located courses in the CM program for the students to develop their e-portfolios. The process starts in the freshman class “Construction Seminar” taught in the Fall Quarter where each faculty advises twelve to fifteen students. The students are required to purchase an account to access LiveText platform and start their portfolios. Their assignment for the class is to create a personal e-portfolio and develop short portfolios for at least three courses by using the generic one-page template. Construction Seminar class establishes a culture of documentation and reflection. All portfolios are submitted electronically to the faculty on a regular schedule throughout the term. Each faculty reviews the portfolios of the students that the faculty is advising, makes comments, and returns the portfolios with comments electronically to the students. The comments are posted directly on the portfolios. The time required by the faculty for reading the portfolios and posting comments is not much different from reading journals or assignments and giving the student feedback on these assignments.

Each year after their freshman year, the students are required to prepare portfolios for predetermined courses using specific templates. These courses present benchmarks in the CM program and demonstrate the progress of the students in the program. The courses reflections show a gradual improvement in writing skills and ability to build on the knowledge from one course to another. All portfolios created by the students for specific courses are linked to their personal portfolio in the page “My Course Portfolio” as shown in figure 5.

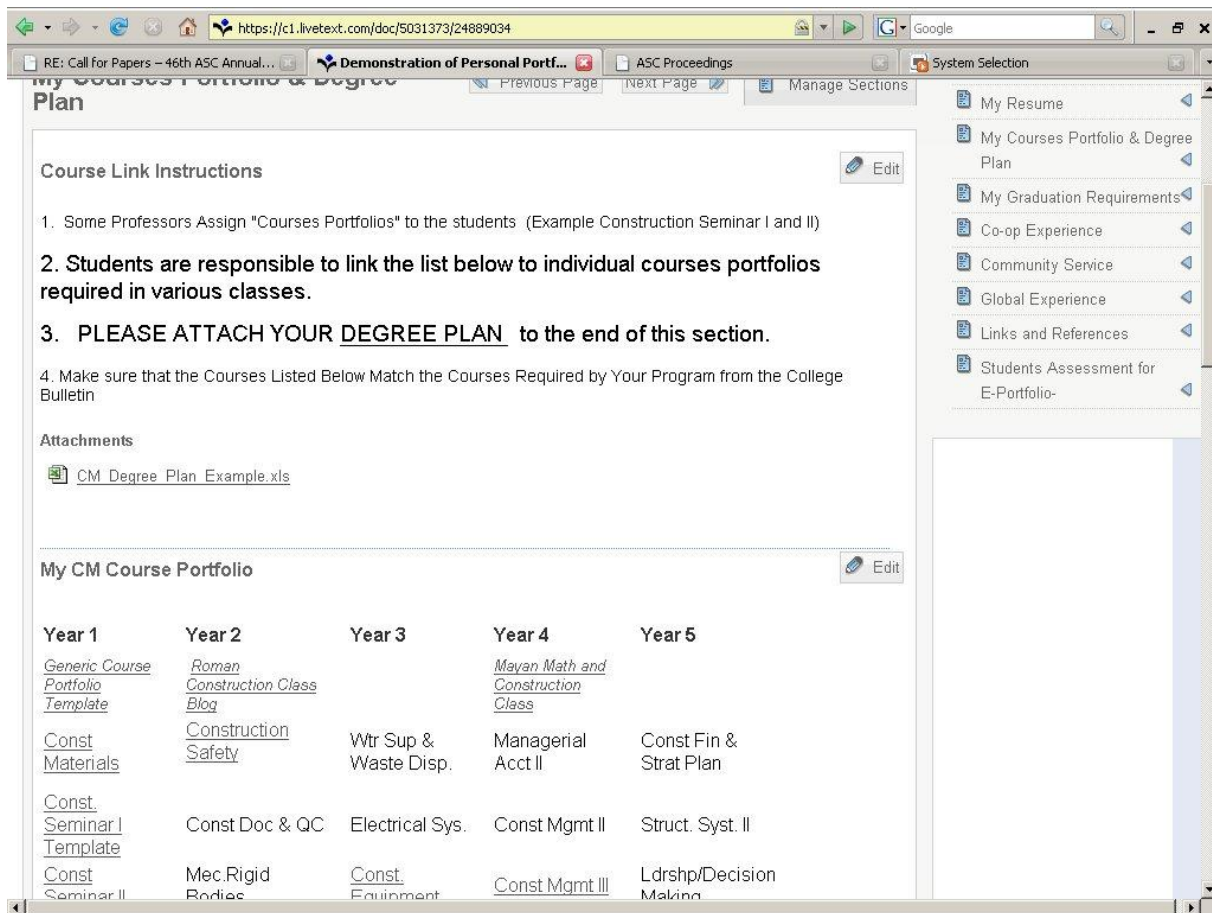


Figure 5: Courses are Linked to the Personal Portfolio through the page “My Course Portfolio”

Assessment with E-Portfolio

One of the goals of electronic portfolios is to provide an assessment mechanism to evaluate the performance of the students. Toward this goal, the faculty developed rubrics that include criteria to measure performance in individual course as well as the progress in the program. Objectives related to an individual course include knowledge objectives or skills objectives related to the course. Meanwhile, program objectives include communication skills (oral and written), interpersonal skills, teamwork, etc. Program objectives are common for many courses in the program and can be tracked with e-portfolios. The portfolios assessment mechanism measures the students' performance as they advance in the CM Program. Courses objectives and goals can be directly associated with accreditation criteria and are measured according to students' accomplishment as in figure 6 where rubrics from CMIII class on Value Engineering are displayed.

	Level 1-Weak Performance (1 pt)	Level 2-Fair Performance (2 pts)	Level 3-Good Performance (3 pts)	Level 4-Very Good Performance (4 pts)
Class Participation- Ability to function effectively on teams- Ability to communicate effectively (15, 30%) ABET-TAC.2.E ABET-TAC.2.G	- Students Missed four or more classes/Team meetings or Combination - Students Failed to engage in sharing ideas with their teams as assessed by teammates	- Student missed less than four Classes/Team Meetings or Combination - Student Demonstrated Effective Participation in Case Study Report (Executive Summary) - Student Participated in Class Exercises.	- Student missed less than three Classes/Team Meetings or Combination - Student Demonstrated Participation in Case Study Presentation - Student Students Participated in Class Discussion	- Student missed less than two Class/Team Meetings or Combination - Student Demonstrated Effective Team Work as evidenced in BB - Student received positive feedback from all other team members
Group Participation in BB- Ability to function effectively on teams, Ability to communicate effectively (10, 20%) ABET-TAC.2.E ABET-TAC.2.G	Group Contract is not Posted on Message Board - Group did not post Group Meetings Minutes on BB group Message Board - Group has only a few group files in the file exchange	- Group Message Board is used effectively for communication - Group Minutes Posted Including members roles and what has transpired in meetings - Group Meeting Minutes Include Satisfactory Details of Meetings	- Group Demonstrated use of Problem Solving Techniques - Group Demonstrated application of methods for Brainstorming- like c-map - Group Meetings Minutes Demonstrated Depth of Meetings	- Group Demonstrated effective sharing of resources - Group Demonstrated effective Sharing Innovative Ideas in blog format on Group Message Board - Group Demonstrated effective assembly of written report from entire team on File Exchange
Written Report- Appropriate mastery of knowledge- Application of current knowledge- Creativity in design of systems- Ability to function effectively on teams (16, 32%) ABET-TAC.2.A ABET-TAC.2.B ABET-TAC.2.D ABET-TAC.2.F	- Report Was Poorly Organized - Report with Poor Structure - Report with Spelling and Grammar Problems	- Report Was Clear and Concise - Report was Organized - Report Showed Fair Applications of VE Concepts - Report was Well Referenced	- Report Presented a Strong Thesis for the Technical Problem Report Presented Persuasive Arguments and Recognize Opposing Views Report Demonstrated Good Knowledge of VE Applications - Report Demonstrated Solid Research Base	- Report Demonstrated Strong Community Service - Report Demonstrated Strong Technology base - Report Demonstrated Strong Applications of VE Concepts - Report Demonstrated Relation between Technology/Community Service and Entrepreneurship
Oral Report- Ability to	Oral Report 9% - Poorly Organized Presentation	- Clear and Concise Presentation - Smooth Transition of Speaking	Presentation of Good Solution to Technical Problems	Presentation of Comprehensive VE Plan

Figure 6: Rubrics to assess objectives in CMIII Value Engineering course portfolio

It should be noted that the evaluated criteria in the left column apply to both class assessment and program assessment. They also relate closely to ABET accreditation and similar ACCE accreditation criteria. During portfolio evaluation, the faculty can assess the student performance with a dropdown menu to indicate the level of performance.

At the end of the class, when every student is assessed, the faculty can generate a complete report assessing the entire class as in figure 7. The report shows the performance level of the students: Level 1- weak, Level 2- fair, Level 3- Good, Level 4- Very Good. The underlined numbers under each level designate the number of students who performed

at this level. With a click on the number, all the names of students whose portfolios were assessed and awarded that level of achievement are displayed; another click on a displayed name will take the observer to the portfolio of that student with the rubrics evaluation. This feature in LiveText proves very helpful in tracking the performance of the students in various classes. It also helps in evaluating the performance of the students in meeting accreditation criteria and provides the necessary feedback loop for improvement of the CM program. It is expected that accreditation teams will be able to examine the performance of the students and validate that the students in the program are meeting the designated outcomes.

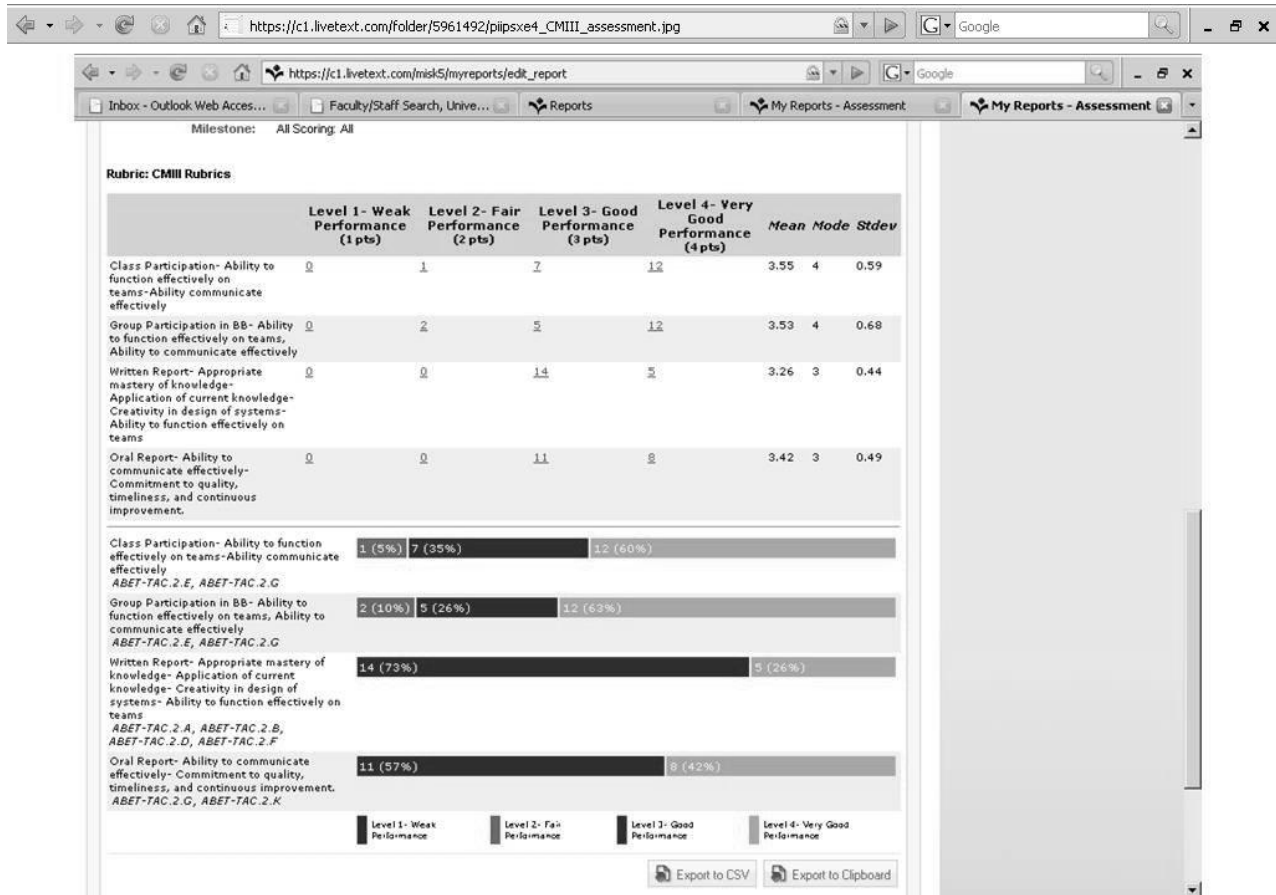


Figure 7: Assessment report for CMIII- Value Engineering course portfolio

Portfolio Experience Assessment of the CM Program

Every course where e-portfolios are used, the students are required to reflect on their experience. The results vary from year to year and from level to level with major improvement at the advanced levels. Generally speaking, at the freshman level, the students feel that the experience is not useful but rather excessively demanding. In 2006 during the first year of implementation, the freshmen were rather vocal about using e-portfolios. They felt that the department is applying unproven educational methodology. After the first year, the reaction and response of the students changed. In the construction equipment class for example, the students commented how they will be able to use the e-portfolio content in the future to evaluate productivity of construction equipment. Many students embedded U-Tube video clips in their e-portfolio showing the cycle time of scrapers, graders, loaders and trucks in excavation operations. Their comments on the use of e-portfolio were for the most part very positive. In the class CMIII on Value Engineering, the

students understood the value of e-portfolio in documenting their projects. However, they felt that they spent too much time formatting the project to display it neatly in the e-portfolio. These fourth year students had little training on using the text editor in the e-portfolio since they did not use the system in their freshman year. Overall, the-portfolio experience is proving to be an important experience for the education of the students. As the CM program prepares for accreditation, electronic portfolios present to the accreditation teams valuable documentations of the performance of the students in meeting the outcomes of the program.

In summary, implementing e-portfolio requires a change in culture that takes time. For the experience to be successful, e-portfolio implementation must be faculty-driven, needs a critical mass of faculty. The benefits of e-portfolio must be explained repeatedly to all involved, must have full administrative support and the selected platform must be easy to use by both faculty and students.

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