

Learning through Collaboration: Students Partner with Health Care Organization to Apply Baldrige Criteria

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Abstract

Total Quality Management, ISO standards, and the Malcolm Baldrige criteria are among several well known initiatives used to improve organization competitiveness and performance. Students taking the Quality Management course elective for the University of Dayton's Industrial Engineering Technology program explore how the seven leading-edge management practices are used by organizations to measure performance and improve quality, increase productivity and reduce costs. Each semester, an organization from service, manufacturing, or health care sector is invited to participate with students who apply the Baldrige model to identify potential gaps for all parts of the business. Partnered with the key personnel, student teams evaluate organizational performance and show where improvements or innovations are most needed using the Malcolm Baldrige award criteria. This paper describes about the course capstone project to interpret and evaluate a health care organization using the seven Baldrige categories followed by discussion about the experience to introduce and use several Web 2.0 technologies for social media.

Industrial Engineering Technology Quality Management Course

At the University of Dayton, students enrolled in Engineering Technology programs learn how science and engineering is applied in industry to be prepared for a productive career in design, development, and implementation of technical systems in manufacturing, business and service enterprises. A program of specialized technical courses emphasize rational thinking and use engineering and scientific principles to solve technological problems. In addition, courses in applied mathematics and science support the technical, communication, and humanities courses that ensure students communicate intelligently, responsibly and professionally.[1]

The Industrial Engineering Technology curriculum includes four quality assurance technical electives for a Quality minor in this degree program. All engineering and engineering technology students are encourage to take any of the quality assurance courses as technical electives since today's business environment emphasizes use of best practices and methods by all employees for implementing and improving operational performance and customer satisfaction [2]. These electives are Statistical Quality Control, Quality Improvement Methods, Quality Assurance Techniques, and Quality Management.

The Quality Management course addresses how an organization manages a total quality environment to improve quality, increase productivity, and reduce costs. Topics include implementation strategies about ISO standards, six sigma methodologies, and the Malcolm Baldrige performance criteria. Three distinctive phases during the semester address the course requirements. First, introductory topics about organizational effectiveness and the philosophies of seven quality gurus provide a framework to explore an overview about quality systems. Next, students learn about quality management and effective organization concepts specific to customer focus, strategic planning and leadership, process management, measurement and analysis, workforce focus, and results. In this phase, students also form multi-disciplinary project teams and are partnered with a local business' key personnel for the class project applying the Malcolm Baldrige National Quality Award criteria. The final phase introduces organizational practices about benchmarking, supply chain management, and auditing used by organizations. During this phase, student teams continue to work closely with their key business mentors to understand, interpret and analyze the individual elements for each of the seven Baldrige categories. The students present their organizational improvement recommendations to the business' management during the last week of the course.

The accompanying text, "*Quality Management: Creating and Sustaining Organizational Effectiveness, 2/E*" [3] is used during the semester to introduce and explain each topic. Real-world examples and case studies were used for class investigation and discussion. Content available from external resources via the internet was also regularly used in the class to demonstrate how organizations apply quality management concepts.



Figure 1. Website homepage view of the Baldrige organization blog

Because the semester's project business was from the health care industry, we used Baldrige award winners from the Health Care sector as a foundation for class discussion and exercises.

Web 2.0 technology applications were employed throughout the course. The text provided the structure to explore concepts about improvement methodologies. Social media provided the environment to explore continuously growing, expansive data to link classroom concepts to the organization's actual implementation. Widely available tools like Facebook, Google Blogspot, You Tube videos, plus a newly developed educational networking tool called mycareerme.org were employed during all phases of the course to varying levels of success. One website in particular was very useful during the course. The National Institute of Standards and Technology (NIST) Baldrige Performance Excellence Program manages a blog featuring commentary and observations "because so many people share our passion for excellence and a desire to improve organizations." [4] The blog's homepage in figure 1 displays the most recent postings in the main view with older versions archived by category. Hyperlinks are effectively placed in each blog to direct the user to other important Baldrige sites for continued learning on the topic discussed.

The Baldrige Performance Excellence Program

While investigating what business should participate as the project company, I had many opportunities to talk to local business professionals about their awareness about the Baldrige criteria and excellence program. When asked, "Do you know what the Baldrige National Quality Award is?" nine times out of ten, the answer was "No".

The Baldrige organization is a nationally recognized program to promote organizational excellence in healthcare, manufacturing, service, education and government sectors. Organizations apply to the program, submit their assessment to program examiners and then are appraised by a panel of experienced judges to measure their performance against the seven effectiveness categories. As a part of NIST, the Malcolm Baldrige National Quality Improvement Act of 1987 was established to enhance the competitiveness of U.S. Businesses. The U.S. Department of Commerce develops and disseminates evaluation criteria and manages the Malcolm Baldrige Quality Award in close cooperation with the private sector. It also applies global leadership in promoting performance excellence and in the learning and sharing of successful performance practices, principles, and strategies. [5, 6]

The Baldrige performance excellence criteria provide a framework that any organization can use to improve overall organizational performance. The criteria are organized into seven categories covering leadership, strategic planning, customer focus, measurement and analysis, workforce focus, process management, and business results. [5] Elements within each of the seven performance categories correspond to the quality management course concepts covered in the Quality Management course.

Selecting an organization from the health care sector provided an excellent opportunity to expand student awareness beyond a manufacturing orientation. Engineering technology student co-op and internship experiences have generally been with manufacturing organizations. Health care organizations have been quick to adopt quality management principles and improvement methodologies including six sigma, lean manufacturing, and ISO since the early 1990's. [9] In the past ten years, area health care facilities have been steadily expanding both their physical facilities and the services offered. Technological advances in

health care have been readily adopted in Dayton area hospitals, making this economic sector one of the most promising for the region.[22]

The success of the Baldrige Program has sparked a grassroots performance excellence effort. Baldrige-based state and local programs are a tremendous resource for organizations in more than 35 states across the country. Many organizations first participate in a state program and then apply to the national Baldrige Program. The Alliance for Performance Excellence[7] is a consortium of state and local programs. Many Malcolm Baldrige National Quality Award recipients have started their performance excellence journey with their state's program before tackling the national program. These quality award programs[8] use the Baldrige criteria to advance organizational excellence and competitiveness in their state and regions.

Class Capstone Project Collaboration with Business Key Personnel

The purpose of the class capstone project is to learn how organizations apply effective quality management techniques in a business setting. The students partner with key personnel from a local business to research, evaluate and analyze, then report how the elements are addressed by the organization. Students apply teaming and communication skills through writing questions and interviewing the industry mentors, interpreting the interviewees response, writing an analysis assessment report, and finally presenting their team's findings to the organization's leadership team. The organization chosen for the student project should not have previously applied to be assessed by the state-level program, Ohio Partnership for Excellence[20] (OPE), or the national Baldrige Excellence Program. The organization's mentors assigned to a student team would generally apply between 5 and 10 hours with the students during the semester.

The organization selected for the class project was CompuNet Clinical Laboratories, LLC, a leading clinical diagnostic laboratory that serves physicians, patients, hospitals, industry, and managed care partners. Students would interpret the essence of elements that make up a Baldrige category and assess their business to determine how requirements relate to actual practices being applied in the organization. The class size allowed for teams of two students each to address six of the seven Baldrige categories. Alternatively, CompuNet Labs management team members were assigned as key business liaisons on one or two of the student teams.

CompuNet Clinical Laboratories had not yet started their journey to apply for the Ohio program or the national excellence program. The company website mission and values "*To improve the health of our community through excellence in medical laboratory services.*" and "*Quality, Integrity, Partners, Customers, Innovation, Performance*",[10] was an excellent indication that the students would learn about how health care organizations can apply effective organizational practices working with the company's key personnel. CompuNet Labs has a demonstrated history of organizational excellence and a commitment to the community as expressed by their mission to quality. They also demonstrate ongoing relationships with secondary and post-secondary institutions across the area through direct involvement supporting education programs and hiring graduates from these programs. CompuNet utilizes

Six Sigma and Lean process improvement methodologies throughout all areas of their business to work toward virtual perfection...an error-free environment.[11]

Project Process and Deliverables

Interim milestones were established to evaluate student project deliverables for the quality, appropriateness, and correctness of (1) category questions to use to interview the CompuNet Labs expert, a (2) draft outline interview response summary, a (3) draft report aligned to their team's category element analysis, a (4) final written report for positive observations, gaps and the overall assessment, and (5) team preparation to present to the CompuNet Lab's leadership team. Classroom discussion and exercises utilized readily available web resources to further develop concepts about organizational effectiveness addressed in the text.

CompuNet Labs hosted a class facility tour at the beginning of the semester to kick off the project. The students then chose the Baldrige category they had the most interest, formed teams, and initiated contact with their category's mentor using E-mail communication. Students used October to schedule and conduct interviews and interpret their mentor's responses against the category elements to write the draft assessment report. Students were encouraged to work with their CompuNet mentor using social media as needed to the conclusion of the project. Several interim progress checkpoint dates through October and November were levied on the students to make sure their work was on-track and met project evaluation criteria. Students would follow up with the mentor as information against the criteria surfaced gaps missed in the initial interviews. The final report and presentation work was completed mid November into December, to be delivered to the CompuNet Labs management team the last week of the semester.

Communication and Collaboration

To complete the project, students had to utilize interpersonal skills within their team, between the other teams, and with their CompuNet professionals. Some class time was set aside to introduce or review best practices for E-mail and interviewing techniques. Students took ownership for how they communicated with their mentor and were expected to conduct themselves with the same level of professionalism expected if they were working at the organization. Students quickly found out that working professionals have other pressing job responsibilities, and that they were responsible to "drive" progress to complete the information gathering portion of the project, not the team's mentor.

Social media and networking applications used during the semester also added an interesting dimension to the class for both the students and CompuNets' mentors. A class blog was created called "*Perspectives on Quality Management U.D. IET321*" to encourage students to write about what they were learning, whether it was Baldrige criteria or about another topic covered over in the course. The class also used the national Baldrige Performance Excellence Program website[4] to supplement text concepts for details about each category ranging from organizations participation in the program to how organizations are evaluated. The site offered excellence educational materials and videos that are designed to help organizations

through the process, which also provided many opportunities for class time evaluation and discussion.

Making Web 2.0 Technologies Work for the Course

The internet brings the world into the classroom. Every day, an expansive set of material is made available for public consumption. Educators no longer need to be software development savvy to apply an application to deliver class content and support student assignments. Looking different ways to allow students to be creative, communicate, and meet technical requirements of a course project? Chances are, a free tool has already been created with functionality that will support all kinds of teaching methods. For example, opening a free Google G-mail account allows you to create a Google Blogspot blog for students to hone writing and editing skills.

From nearly 1,000 participating faculty across the nation responding to a 2008 survey “Social Media in Higher Education”[12], 80 percent of college faculty use social media. Out of these responses, 52% report using video and audio podcasts, blogs and wikis as a part of their class. More than 30 percent use social networks to communicate with students and nearly 1/3 use social networks to communicate with peers. Web 2.0 technology provides a platform to not only view, read and listen to the materials, but also to participate in the discussion. Educators are challenged to select, learn how to use, then figure out how to apply a variety of applications and technologies to enhance student learning. Professional societies and trade organizations, plus companies and industry expert use the internet as a platform to disseminate content that can also benefit the education community.[13]

To understand the Quality Management student’s expertise and level of comfort using social media, a very simple “Social Media User Survey” was administered the first week in the semester. The survey results helped level-set my expectation about college students usage and acceptance of social media. Out of twelve students, two did not have a Facebook account. For the ten that did, most only spent from one half to one hour per day, which was lower usage than anticipated. Other media like Twitter and Linked In, webinars and podcasts, or reading and commenting blogs, were infrequent or not used by the students. For the semester, students who were not already Facebook users were not required to create an account. Also, any student who did not already use G-mail was encouraged but not required to create an account to be able to post to the class created blog. Other access alternatives were provided. We also watched a You Tube hosted video produced in 2007 by a media class at Kansas State University called “A Vision of Students Today”. [14] The first writing assignment asked the question, “How does your electronic media behavior compare with at least two behaviors presented in the video”. Responses to the writing assignment provided other perspectives about the student’s attitude toward social media and networking.

The types of Web 2.0 applications and how they were used in the Quality Management class are explained next.

Class Created and Industry Expert Blogs: Industry professionals express how important it is for newly hired graduates to effectively communicate, in person and through writing. The

Industrial Engineering Technology curriculum integrates all forms of communication across the coursework to prepare students to communicate intelligently, responsibly and professionally[1].

Blog publishing tools make it easy for non-programmers to create, organize, and maintain content. The fall 2010 class' blog "*Perspectives on Quality Management U.D. IET 321*" [16] was created using the Google owned Blogger.com [15] application. Less than five hours effort by the instructor was spent learning to add and arrange the home page element "gadgets" to personalize the blog with resource links, images, and videos. Students that already used G-mail[17] could post to the blog from their own account, or if they were not a G-mail user, could post using the class G-mail account.



Figure 2. IET 321 class blog homepage

The students were required to write at least two blogs over the semester about a course concept, an experience with quality related to a previous co-op or internship, an effective organization applying Baldrige, or a recent life-experience they had keeping "quality management" concepts in mind (figure 2).

Blogging is an excellent opportunity for students to practice writing. The two blogs per student assignment was given with the intention that the knowledge that readership beyond the instructor would lead to self/peer-edited, higher quality published content. The expectation about student behavior was that:

- a) the real-world, as a global audience would be the judge about the composition content and writing quality. Students would take greater care before posting their blog. The grade would less importance than pride for their composition and feedback from peers external to the class.

- b) if the student did not spend time editing and polishing their blog, they would know that the lack of quality would reflect poorly on themselves, their class, and the even perceptions about the university.
- c) the student could use the blog to demonstrate to potential employers their ability to formulate thoughts and express themselves in a professional manner. The blog assignment could be part of their educational portfolio provided to the interviewing manager.

One aspect of blogging is to attract followers. At the beginning of the semester, the students were encouraged (not required) to ask friends, family, and other students to read and become blog followers. This was not something students thought very important or useful, thus was always an option but not pushed. Over the semester, the instructor invited multiple industry professionals, other educators, university staff, and professional society members to follow the blog and if willing, to contribute to the class blog. Lessons learned are presented for the “Experiences to Apply Web 2.0” section.

Written comments in response to an external blog could be just as important as writing an original blog on the class’ site. The Baldrige organization’s blog called “Blogrige” was integrated into class discussion and assignments wherever it made sense. A small writing assignment required student to comment on a recent Blogrige posting related to their project team’s category. This writing exercise still required a well thought out response and be grammatically correct as if writing a new “Perspectives” class blog.

Social Networking: A new educational social networking application called mycareerme.org became available spring 2010 for educators, students and industry professionals to share resources and collaborate on team projects.[18]

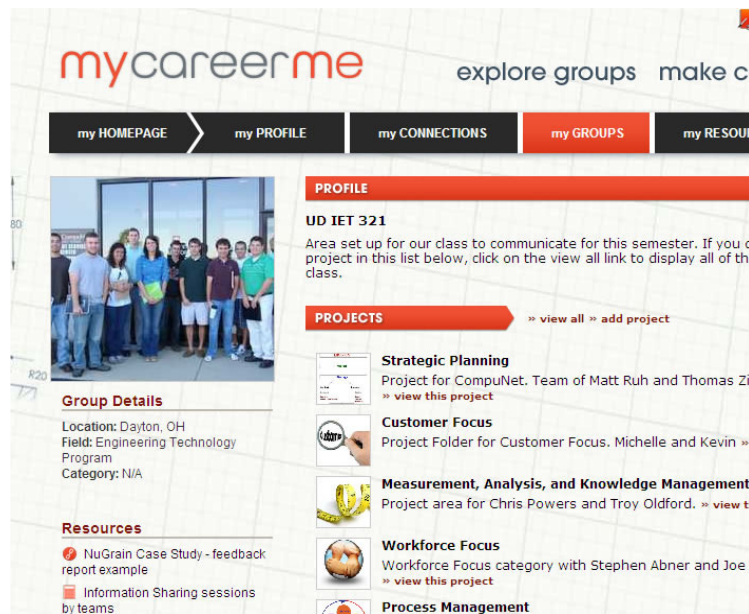


Figure 3. Homepage view for the “UD IET 321” class’ projects

The site was developed in response to high school engineering technology students requesting an area to “show off” their project work, like an on-line resume portfolio, to companies looking for interns and co-ops. Multiple project folders were created for the class “UD IET 321” group to correspond to the text chapters and major concepts. Course assignments, links to resources, power points, events, and news were posted under these Projects or on the Group’s main page to communicate and share information and progress. Each team encouraged their CompuNet key team mentor to become a member of the careerme.org class group and to access their category’s project area. Students uploaded work-in-progress deliverables so mentors could view and comment whenever their schedules permitted, from wherever they were located. The mentors did not need login privileges to view team deliverables like the school’s management system required. Using an internet application that stored files eliminated any need to send E-mail attachments, worry about who to “cc” on the note, or about large file sizes that affected the mentor’s in-box storage. The goal was for mentors and students to be able to open project files, make modifications on their own PC’s, upload the modified document, and continue to share with other team members.

Alternatively, expecting that this class’ students would be Facebook users, a “UD IET 321 Fall 2010” private group was created at the beginning of the semester to encourage communication Q&A exchange about the course and materials. Eight of the ten students that did have a Facebook account became a member of the group, but none of the students opted to post or comment on the group page as the semester progressed. All links, photos, references or comments posted on the class Facebook group was also added to the mycareerme.org website and U.D. learning management system for the students who did not have an account or were not frequent Facebook users.

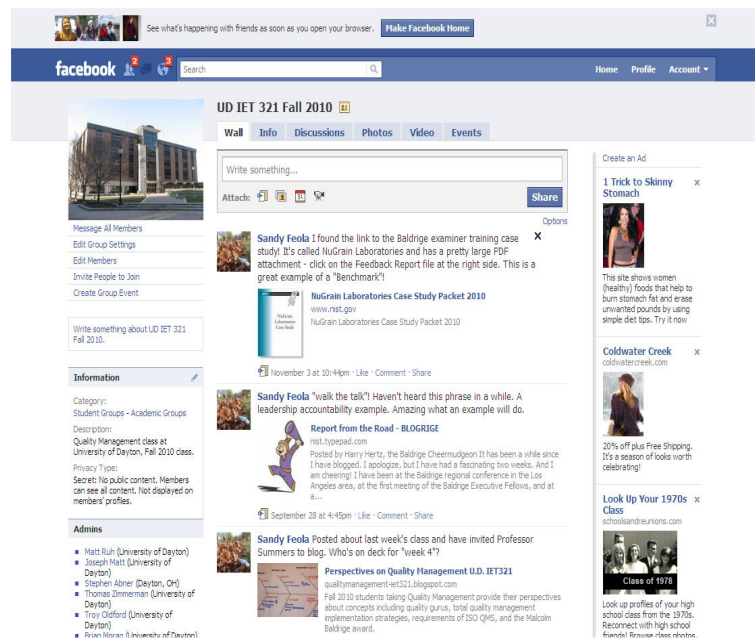


Figure 4. IET 321 Class Facebook group page

As the semester progressed, encouragement to use Facebook as an alternative networking tool was not very enthusiastically received. The students who were more active on Facebook did not want to use this application for class conversations. Facebook also did not have a way to store and share project files between group team members like mycareeme.org offered. Out of the five project mentors, only one was an active Facebook user. Since it was not reasonable to expect the mentors to create an account just for the class project, the Facebook IET 321 group was short-lived.

Subject Matter Websites: A variety of external websites originating from companies, industry and trade organizations, individual providers, and government agencies were visited during the course. These sites helped supplement course materials and class exercises to draw attention to how businesses apply a particular concept. Many subject matter websites present difficult concepts in a straight forward, interesting format. Sometimes it was easy to find good websites to support a class topic, but in most cases, it took investigative internet searching to uncover an excellent website example. How websites was used during the class period also required thought and planning.

Learning Management Systems: Students, staff and faculty use the Isidore learning management system[19] (LMS) to download files, share ideas, monitor progress (e.g. grades), plus many other features unique to this system. Since the students were already very familiar with the school LMS, the course materials, assignments, links and other resources used during the class were stored on our course folder to mirror the files uploaded onto mycareeme.org. This site was accessible to the students but not the CompuNet mentors or anyone not affiliated with the university. Because of access restrictions, the site could not be used as a primary social media tool although several features offered by this e-learning management system were similar to external 3rd party developed applications for blogs and discussion boards.

Audio and Video Podcasts: The variety and availability of podcast content is growing faster than can be imagined. Given enough time and search savvy persistence, educators are almost certain to find quality “shorts” or longer explanatory videos to help visually explain a concept. Whether produced professionally by a corporation, a respected industry expert, or a young practitioner, publishing videos no longer requires special equipment, training, or system access. For example, Baldrige award winning organizations are encouraged to communicate about the award and their organization’s process journey. Some of these organizations produce videos that offer excellent education value. A video produced by NIST features Baldrige judges and examiners who share their personal, organization, and national thoughts about the examination process.[22] Using this video in class captured these individual’s passion, commitment, and effort to be a Baldrige examiner that could not be explained as well through static images and documents.

Experiences Using Web 2.0 in the Class and for the Project

Exposure to business professionals applying effective organization practices provides an excellent learning environment. Students had an opportunity to try out the classroom theory through the investigation and analysis process with their team’s CompuNet mentor.

Applying different social media applications did offer challenges to both students and the CompuNet professionals. Similar to the class' survey results, not all mentors had used social media and networking tools. A few of the mentors considered themselves social media savvy, whereas the others had not or rarely used Facebook. All were very experienced using business applications and regularly accessed industry related websites.

The students were responsible for introducing the mentors to the mycareerme.org tool as a networking resource so they could upload and review project deliverables or to ask and answer questions. Although the mentors were willing to learn how to use mycareerme.org, their busy workload following the one-on-one interviews did not offer enough time to get through the initial learning curve typically required to adopt a new tool. Even though the students were tasked to help their CompuNet team member learn how to use mycareerme.org, they too did not have the time to be a mentor to their team's professional.

Perspectives about using social media over the course, from the instructor and the students follow:

The Instructors Perspective:

Exposing students to new technology, too fast: At the beginning of the semester, I introduced many types of social media tools to deliver class content and encouraged student-to-student networking. I expected that the students would be willing to try new Web 2.0 technology tools. What I found was that students were comfortable using more traditional learning method; viewing Power Point slides for course lectures. As the semester progressed, I used a handful of the Power Point slides for discussion, but never the complete slide deck to control the lecture sequence. In hindsight, having not taught this class before, I found out how important it is to appropriately set expectations about tools that would be used, and how I would integrate unfamiliar tools into content delivery.

Expecting students to embrace blogging: The student's did not consider blogging as a media type they would be likely used based on their survey results at the beginning of the semester. They had not considered the communication power that a blog can provide to express an opinion and reach either a specific or a very broad audience. They also did not expect a blog to be technically relevant or think about visiting blogs written by subject matter experts. Early in the semester, the first student authored blogs were very short, but as the course progressed, student posts became more informative, relevant, and demonstrated their ability to intelligently convey thoughts in a professional manner.[18] With this new blogging experience, it is not known whether the students would be more likely to post or follow blogs in the future.

Expecting the industry mentors to use social media: The team industry mentors were very busy and did not have much time to learn about and adopt unfamiliar Web 2.0 tools. Students also were not able to dedicate time to bring their mentor up to speed with the new mycareerme.org application. At the beginning of the project, more emphasis should have been placed on how social media tools would be used and how to help the industry professionals adopt the tools. The same held true when non-project industry professionals

were approached during the course such as industrial engineers, quality engineers, other educators, and trade and professional organization subject matter experts. To encourage these professionals to participate with the class blog as an independent contributor, or to use the mycareerme.org application required communication, and effort, all of which take time.

Trying to make something fun: In industry, use of “visual indicators” is an effective way to monitor processes, show production status, send alerts to material handlers or inspectors, etc. Students were given two colored table tennis balls and randomly assigned two weeks out of the semester to submit their required blog posting. The idea was for students to place their colored ball into the container to indicate when they completed their week’s assigned blog. As the semester progressed, the container would fill up to show the number of blogs written. Although the idea seemed good in the beginning, the down-side discovered about this idea was: 1) a small class did not show much progress filling the container, 2) even with a parallel discussion about “visual indicators” used in industry, college students thought it was silly, and 2) students forgot to bring their table tennis-balls to class and add to the container after they posted their blog. Regardless, the container was always “set out” on the front table at the start of class as a reminder!



Figure 5: Visual indicator to show student blog progress

College students aren’t all Facebook Users: The student survey uncovered that all students are not Facebook users. It was also not reasonable to ask those students to register and become a user in order to communicate. Information was periodically added to the class Facebook group for images, links to websites, or references to other good resources, but only eight of the ten students with Facebook accounts opted to join. No student opted to comment on any of the instructor postings or chose to post. Using Facebook as a communication dissemination method between students can be effective given all class members opt to participate and a specific purpose for use is defined and encouraged.

Student Perspective:

Use more industry expert originated websites: Using internet websites hosted by organization experts was beneficial because “state of technology” information was more current than the latest edition of the published textbook. Students would have preferred using more of the expert sites than the handful applied during the semester. The Baldrige organization and Blogrige site was more frequently used, but did not offer enough diversity about course topics such as ISO, Six Sigma, or benchmarking for example.

So many other options to share files! The mycareerme.org tool was more difficult to use for document sharing than other applications like Dropbox[23] and even E-mail. Even though the idea was to get away from emailing attachments since they impact recipient’s in-box, mycareerme was not convenient enough or that the mentors weren’t using to make this an effective tool to share files. Email’s also show message threads if necessary. As a social networking application, the mentor’s facility was close enough for students to visit in person, or they could talk via phone, so using mycareerme so this tool’s feature was not emphasized or used.

Conclusion

An excellent method to re-enforce concepts presented in class is through student-industry collaborative projects to demonstrate real-world application. The Quality Management course offered by the Engineering Technology Department at the University of Dayton applies a Baldrige category assessment for students to learn first-hand about organization effectiveness and partner with the businesses key personnel to evaluate performance to show where improvements or innovations are most needed. In addition to traditional communication methods used by the students, instructor and industry mentors, social media and networking tools were applied. The outcomes of the media use by the students and their project mentors provided a unique perspective to complete class and the project deliverables.

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Biography

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