



Quality Matters: Development of an Online Course Shell for Quality-Control Courses

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Abstract

Educators face several challenges while teaching online courses. Some of the challenges are design of course contents, delivery method, and effective communication. The objective of this paper is to explain transformation process of an industrial engineering technology course which has traditionally been taught in the classroom environment to online course. This paper also discusses how to engage online students in active learning by making them participate in forums and case studies. The methodology used for this transformation is the guidelines and standards outlined in Quality Matters™ (QM) Rubric which is a national benchmark for online course design. The Quality Matters Higher Education Rubric has a set of 8 general standards and 43 specific review standards. Out of these 43 specific review standards, 21 are considered essential and each standard is worth 3 points, 14 are considered very important and each standard is worth 2 points and remaining 8 are considered important and each is worth 1 point. Any an online course to be effective course should have minimum overall evaluation score of 84 when evaluated by QM Peer Reviewers. In this paper, taking quality control course as an example, how technical engineering course can be developed as an effective online course has been explained. Quality control course is a mandatory course in all undergraduate degree in industrial engineering and industrial engineering technology programs.

Introduction and Background

It is very easy for an online student to feel frustration and drop out of the course because of ineffective course design and lack of timely and quality communication. The National Academy of Engineering emphasizes the importance of making the learning experience more meaningful to the engineering students¹. With the development of communication technology, specifically high speed internet and smart gadgets (smart phones, several kinds of tablets, portable computers etc.), demand for online education continues to increase. “In order to meet the growing demand for quality online education, a course development model that provides a common framework for consistency, design, pedagogy and content can be very effective”². However, transitioning engineering courses from conventional face to face learning in classroom and lab setting to completely online setting can be challenging since for most of the instructors and professors may not be capable developing effective online courses². The Seven Principles of Good Practice, outlines principles of quality in education³. They are:

1. Good Practice Encourages Contact between Students and Faculty
2. Good Practice Develops Reciprocity and Cooperation Among Students
3. Good Practice Uses Active Learning Techniques
4. Good Practice Gives Prompt Feedback
5. Good Practice Emphasizes Time on Task
6. Good Practice Communicates High Expectations
7. Good Practice Respects Diverse Talents and Ways of Learning

“Virtually all educators agree that the Seven Principles of Good Practice represent an excellent starting framework for developing a vision of quality”². The principles mentioned above are broader in sense and team assigned to develop online course may not breakdown each of these principles to measurable, attainable, and implementable course components which are understandable to both faculty and students for effective learning experience.

Author’s university subscribes The Quality Matters Higher Education Rubric⁴ and the university has been using this rubric as a benchmark for online course development. University has been providing training on all the necessary tools and expertise to develop online course satisfying requirements of this rubric. The Quality Matters Higher Education Rubric has clearly stated 8 general standards and each standard has some specific review standards used to evaluate the design of online courses. Out of total of 43 specific review standards, 21 are considered essential and each standard is worth 3 points, 14 are considered very important and each standard is worth 2 points and remaining 8 are considered important and each is worth 1 point. Any an online course to be effective course should have minimum overall score of 84 when evaluated by QM Peer Reviewers. With clearly stated specific standards, it is easier to add course components in the course shell.

The objective of this paper is to explain describe the transition of a face-to-face course to an online distributed learning environment with the example of ‘Quality Control’ (QC) course. The paper proceeds by describing QC course development methodology, strategies for online instruction, and concludes with a summary of lesson learned.

QC Course Development Methodology

Quality Control is commonly taught in Bachelors of Science degrees in industrial engineering and industrial engineering technology programs. Generally the concepts and topics covered are, but not limited to, roles, functions, challenges, skills, and importance of Quality Management, basic statistics and tools for variable data, basic statistics and attribute data, probability, reliability, data collection, and quality improvement techniques, ISO 9000, Malcolm Baldrige Award, and six sigma.

The first course component added in the shell was a banner with the theme in quality as shown in Figure 1. The size of the banner is 650 x 130 pixels and file format is ‘.png’ for better quality while viewing in the web browser.



Figure 1. Banner used for Quality Control course

In order to comply with 43 specific standards of Quality Matters Higher Education Rubric⁴ a ‘Start Here’ label was added at the beginning of the course shell right underneath the label shown above, and a copy of syllabus and a brief video introduction of an instructor was added under ‘Start Here’ label, see Figure 2. Video can be recorded using WebEX Recorder/Editor⁵ and can

be edited as required. This WebEX Recorder/Editor⁵ can also be used to upload lecture videos or other illustration and demonstration videos.

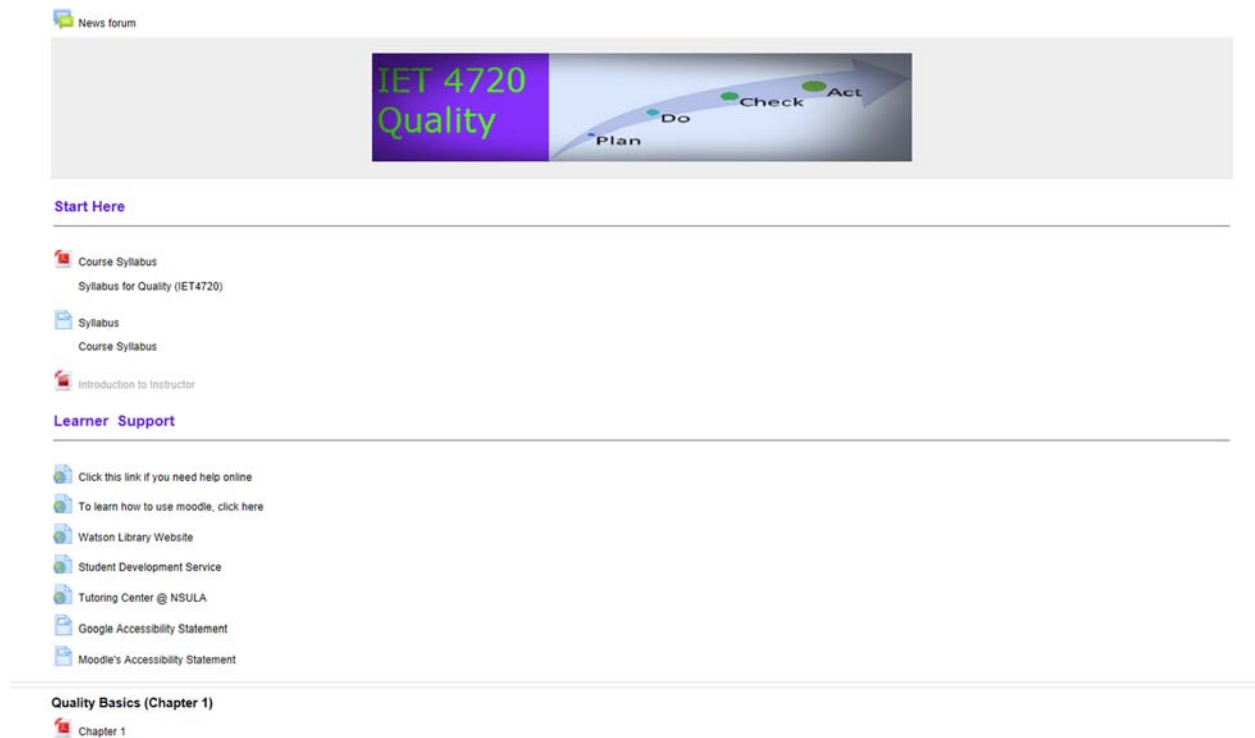


Figure 2. Online shell for Quality Control course

There are some additional syllabus requirement for online course as per Quality Matters Higher Education Rubric⁴. These requirements once properly addressed in the syllabus, they satisfy several of the specific standards required by the rubric. For example, for QC course, under ‘Learner Support’ label, computer with mic and headphone, internet access, calculator, internet browser, and word processing program are listed as minimum technical requirement. Similarly, ability to use internet browser, download, save, open, and upload files, find, copy, move, rename, and delete files, send and receive e-mail messages with attachments, use a word processing program, and use spell check in word processor were listed as minimum technical skill expected. Furthermore, what course material are required and what material are optional has to clearly state in the syllabus.

General syllabus for face to face learning setting typically contains course description, prerequisite, objectives, and topics, textbook information, classroom locations and meeting times, instructor’s office location, phone number, email address and office hours, grading policy and some regular university policies for students (honor code, Title IX of the Education Amendments of 1972, Policy regarding students’ rights and responsibility). There are two additional policies which should be stated in the syllabus for online course.

First one is communication and feedback policy that explains author’s policy regarding communication with students and feedback on their work. This author for QC course wrote

communication and feedback policy as, “Students are highly encouraged to use email feature in the Moodle. They may also send email to instructor’s email account. If they opt to do so, they are recommended to add IET4720_student’s_lastname and a brief subject in subject line of their emails. Emails received during the work days will be answered promptly as far as possible, however, it may take up to 24 hours depending upon the volume of emails. Emails received during the weekends will be answered at the latest by the following Monday. Materials (quizzes, assignments, forums, etc.) are normally graded within a week and feedback will be provided”.

Second policy that should be stated in the syllabus is netiquette. Students are expected to follow net etiquette expectations (sometimes called “netiquette”) for online discussions, email, and other forms of communication. Information on netiquette can be found by visiting the several sites.^{6,7,8}. The crux of netiquette is to remind online students to be respectful of other students and faculty, not to abuse power, be presentable when attending online video meetings, discussions, forums, and be polite and professional in both oral and written communication. With these updates in the syllabus, it is ready for posting in the course shell.

Under the same ‘Learner Support’ label the following links for student were listed. These links satisfy several of the specific standards required by Quality Matters Higher Education Rubric⁴.

1. Link to online help. Students can chat, send email, get access to FAQs, information on password reset etc.
2. Learn how to use Moodle. Moodle is the course shell author’s university is currently using.
3. Link to University Library.
4. Link to Student Development service.
5. Tutoring Center at the University.
6. Google Accessibility Statement⁹.
7. Moodle’s Accessibility Statement¹⁰.

After properly posting the courses component in the course shell can be developed further in two different ways. The first is modular way, where certain number of modules are created and each module has specific learning outcomes, topics, resources, activities, and lecture videos. Students cannot go to the new module until all the previous modules are complete in terms of all the activities and to do components of that module. The second method of populating course components is to develop weekly or chapter-wise course content. This author chose to implement the latter method.

Quality Matters Higher Education Rubric⁴ emphasizes on active learning. Students should be provided with learning objects/outcomes for each chapter, clearly stated ‘to do list’, audio, video and/or textual material required to complete each chapter as resources, how assignments are graded, other tools that facilitates active and engaging learning. The developed course shell was reviewed by the institute’s online teaching experts and scored 93/99 meeting all “3” points essential standard. Only a few “2” and “1” point important standards were not met missing the maximum possible score by 7 points.

Strategies for Online Instruction

In order to facilitate active and engaging learning, this author listed the following course component in each chapter.

1. Lecture video.
2. Lecture presentation slides.
3. Chapter learning objectives.
4. Quiz.
5. Forums or Case Study whichever is appropriate for the chapter.
6. Grading rubrics for Forums or Case Study.
7. Additional audio, video and/or textual materials (whenever appropriate).
8. Control charts process capability templates in Excel (whenever appropriate).
9. Other tools (e.g. access to Minitab statistical software)

Course components 1-5 in the list are mandatory as rubric demands varieties of interactive learning methods active and engaging learning. If at least two out three methods out of quiz, forums or case study is used in each chapter, it satisfies several essential standards.

Quiz may contain True/False type questions, multiple choice questions, question requiring calculations, matching questions, etc.

Case study on QC course related topics can be assigned as an individual assignment or group assignment which student/s post on forum after interacting with group members and other group or individual write comments on the solution presented for the case study.

Similarly, individual forum can be created where individual must present his/her answer to the questions and present idea/comments to fellow students' posts. The number of posts to answer can be controlled by the instructor. An example of forum and interactions:

Here is an example of forum author created on the topic 'What is quality'. Your definition of quality may be known to you or it may only be perceived once you think of a certain product or service.

"Pick five products or services and write for each product your definition of quality. Some examples are: car, house, book, notepads, phone, teller service at banks, restaurant service, airlines' services, etc. After you have written, upload that file with for everyone to see in this forum. Remember, all of us can see every forum posting.

After you have posted, you need to open forum posted by others (at least 2 forum posts) and reply with your thoughts about the post. Be courteous, professional and polite in your reply. If you do not see other forums, you may wait for a day or two until you see at least 2 forum posts. Try to reply to posts that have no other replies".

Here is an example of a forum post by a student in author's class.

"...Cars. I think the quality of a car should be very high. A car on average costs around \$35,000. The vehicle should be in top condition and free of defects from the factory. A vehicle should be able to get you from point A to point B with no problems. The vehicle

should also be comfortable during your commute and allow you to ride in the vehicle with no discomfort.

Phone. *I think a phone should be sold to you free of defects and be tested thoroughly. We spend anywhere from \$100 to \$600 on a phone and sometimes they are not 100% in working condition. The companies tend to send the phones out before thorough inspection which causes us to receive defective phones.*

Teller service at a bank. *I feel like a teller should welcome you into the bank with a smile. A teller should be there to help you in all of your transactions. A teller is in charge of my bank account and I trust them to not mess anything up. The teller should also be willing to help in any other troubles I have with my account.*

Restaurant service *should be very prompt and free of hair in the food. I tend to receive a free hair in almost all of my meals. I feel like the cook should be required to wear a hair cap. The food should be warm and prepared in an attractive manner. The food should be as I ordered and not missing things that I requested. The drinks should stay full as well as our condiments.*

Airlines services *should have a flight attendant who is always trying to satisfy the members on board. The flight attendant should bring refreshments upon request as well as pillows or other things to help comfort you during the flight....”*

This student got comments from two other classmates as:

“...I agree with what you expect from each of these products. Apple has quality, but you pay so much for that name...”

“...I agree with everything you have stated. Especially with a truck, but you could have also said that it needs to be fuel efficient. With the technology we have in today, cars and trucks have the potential to get up to 30 mpg....”

This shows that making students participate in forums engages them in active learning.

Conclusion

This paper describes the development of an online course shell for a Quality Control course, which is traditionally taught face-to-face. It discusses the alignment of the online shell with the QM rubric. Furthermore, it describes additional content and strategies to facilitate learning in a distributed online environment. There are several lessons learned through this work, where and an online course shell needs to include (but not limited to):

- Efficient and effective multi-way communication between instructor and students
- Articulation of learning objectives per chapter
- Articulation of feedback and assessment mechanisms
- Timely feedback
- Inclusion of discussion forums

- Inclusion of case studies and independent/group practice opportunities

Future development of the online course on quality control include inclusion in a new post-baccalaureate certificate program on at the university

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