The Missouri-Iowa (MI) Plan for Course Improvement

Traveling Toward TQM: the OTIS Route

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Introduction

Three years ago, our odyssey to apply Deming’s Total Quality Management (TQM) to college courses began. As we considered alternative routes to effective teaching, we found it necessary to consider carefully the organization of our classrooms, technology used for instruction and assessment, and student input opportunities as we strove to shape our courses. This is, for the purposes of this paper, the OTIS (organization, technology, input, shaping) route. Though we consider ourselves to be far from the end of the journey, the experiences have been challenging and renewing, and we would like to share some of our work with you. Our hope is that you will begin the same journey toward TQM in the classroom, you will do so with practical travel tips in hand.

TQM/CQI

The philosophy of W. Edward Deming has been extensively addressed in both public and special interest arenas. His beliefs about continuous improvement, problem solving, and teamwork strike chords with many people in business and academia. The statistical basis of much of his work connected with Juran (1989), Shewhart (1991), and Ishikawa (1985) has also attracted researchers.

TQM has provided a broad base of support for those of us who wish to travel beyond past practice. Although Deming died two years ago (in his nineties), he is esteemed in Japan as one of the chief forces behind their remarkable improvement in production practices. During his later years, American business began to heed his message, and more recently still, educators have also taken notice of TQM under the name Continuous Quality Improvement (CQI).

Glasser (1990), Bonstingl (1992), Cornesky (1990), and Spanbauer (1981), among others, have interpreted CQI in practical ways for educators at all levels. However, institutional attempts to adopt CQI have been only sporadically successful. One path to successful implementation, however, follows a belief that is core to many educators’ philosophies: focus on the learner.

Deming preached above all the importance of the customer. This premise was our first bridge into implementation of CQI and it remains a readily negotiable route for colleagues and students to explore. This key principle of putting the learner first is related directly to Angelo and Cross’s Assessment Assumption #3: “To improve their learning, students need to receive appropriate and focused feedback early and often; they also need to learn how to assess their own learning (1993, p. 9). As a working basis for our work, we have combined our understanding of Deming’s customer centered principle with the work of Angelo and Cross to arrive at the following navigational tool:

To improve their learning [and teaching], students [and instructors] need to receive appropriate and focused feedback early and often; they also need to learn how to assess their own learning [and teaching].

It is from this starting point that we have developed our route.

Settings

We speak from two different settings: a required Foundations of Education course with an enrollment of over 100 students in each section at The University of Iowa, a public university, and three courses in teacher preparation with 30-35 students each at Lindenwood College, a private school in Missouri. The expectations and constraints in two such diverse settings are very different; however, Deming’s suggestions apply equally well to both.

Although our combined experience includes more than 40 years of public school teaching and about the same number of years in post secondary education, it is only for the past 3 years that we have worked to apply TQM principles to our classrooms. We are enthusiastic newcomers to this approach. Perhaps we provide evidence that it is never too late to begin the kind of odyssey this article documents.
Four Key Issues- The Otis Route

We found there were four key issues we needed to consider as we worked with students to reshape our courses through the use of CQI-based changes:

1) Organization
   What were the flexible and inflexible elements of the course in terms of time, physical facilities, and classroom management strategies?

2) Technology
   What would be the role of technology in organization, input, and shaping? How could we make effective use of technology and improve access to it?

3) Input
   How could we elicit, collect, and make use of the continuing flow of information about student needs and course revisions?

4) Shaping
   How could we democratize the process of reshaping our classes based on course and student needs?

The mnemonic acronym for these four issues is OTIS. No matter the curriculum we taught or the number of students assigned to our classes, these four issues repeatedly appeared as crucial concerns, and we found that we could address these concerns through the implementation CQI. OTIS served as an easy reminder to ourselves that we must think of process and systems when we sought to promote continuous improvement.

This is not a journey we undertook by ourselves. Indeed, one of the major tenets of successful TQM/CQI implementation mandates that everyone involved share power in the organization of the system have unrestricted opportunities for input and feel welcomed to evaluate and assess products and progress toward shared goals. In educational settings, this involves other faculty members and administrative and support staff. At the college or university level, division or departmental support is a desirable aspect of the journey.

Beginning the Journey

We have found that sharing information is the first step toward successful implementation of CQI strategies. Students need to know what we are doing and why. They need to understand that the opportunities for input, re-evaluation of teaching and learning, and options to rewrite or retake tests are not the result of our being “soft touches” or seekers of personal popularity. In fact, they soon come to understand that the rigor of the courses and the work of continuous improvement is challenging and sometimes tiring.

In the large class at The University of Iowa and the graduate education course at Lindenwood, a mini-seminar on CQI is conducted during class time. This seminar ranges in length from a portion of one class to two days of class time. The goal of the seminar is to clarify the reasons for using CQI and invite students to join us in our efforts. This mini-seminar consists of an overview of Deming’s philosophy, achievements, and guiding points, and summaries of CQI as it is applied in post-secondary education.

Two important results occur based on the seminar. First, our reaffirmation of philosophy and goals reminds us to enact what we propose for we will be held accountable for acting on those beliefs. Vital to good teaching is the modeling of requisite skills; therefore, in order for us to be able to tell our students that, as teachers, they need to listen to student needs and concerns and structure their courses in order to respond to student voices, we needed to model methods by which this could be accomplished.

Second, we often discover resident CQI experts among our students. Last semester, the large University of Iowa class had six non-traditional students whose full or part-time work was in TQM environments. Another student’s parent was in charge of implementing TQM at a newly-built plant employing over four hundred people. These resident experts invariably provide meaningful input about what works and what does not in the world outside our classrooms. This set of prior knowledge helps us understand where to begin our journey and spots in the road to CQI that will be smooth and where it might be rough.

In addition to a mutual understanding of TQM, we have found that it is important that students and instructors know one another in order to develop a supportive community. Through that community, we believe we are able to create an atmosphere of trust in which suggestions and constructive criticism are free to be explored. One way in which we do this is through introductions of instructors and students. In the large classes, students are asked to fill out 6x8 cards which request demographic information as well as personal experiences related to education. We begin each class of the semester by using these cards to introduce 4-6 students. An added benefit of this get-acquainted method is that students are able to create content and interest-oriented networks for project preparation and the formation of study groups both in our classes as well as in others. Finally, both in the large and smaller classes, knowing students’ areas of concentration as well as talents and interests makes it possible for grouping and regrouping for cooperative learning projects or small discussion groups.

OTIS

As we worked to restructure our courses in order to reflect the needs of our students, we kept firmly in mind the four directional signals to guide our journey: organization, technology, input, and shaping.
Organization

How do time, physical facilities, and classroom feedback concerns affect the continuous improvement of our classes?

Time. Time seems the least flexible of all our course elements. The course catalog designates the hours we meet and while it is often possible to meet for less time, it is almost never possible to meet for more. As the number of class members increases, the ability to modify time frames to meet individual student needs declines markedly. In order to best accomplish our purpose, we accept that every syllabus is a “work in progress.” At Lindenwood, each “Schedule of Class Meetings” is prefaced with the statement “This schedule will change and serves, at best, as a tentative guide for students.” Through input strategies discussed at length later in this paper, we are able to determine the needs of the students in class for any given semester thereby modifying the course to meet those needs. For instance, based on instructor input in previous courses, students one semester may have a high level of knowledge about a given topic thus making it less vital that the same topic be covered in depth in our classes. In addition, current educational news and trends often make it necessary that a topic be covered in one semester that was not touched upon the previous semester. This means that the curriculum changes somewhat each semester, some topics are dealt with briefly or omitted, some content and activities are added from one semester to another and sometimes from one class session to another. Flexibility may not be possible in terms of the number of minutes each class meets, but is certainly possible in the way in which those minutes are used.

The large class (100+ students) meets twice weekly for 70 minutes per session. The classes at Lindenwood (20-40 students) meet for 150 minutes once or twice a week. These time frames make it necessary that we employ a variety of teaching methods and strategies; among the methods used are individual reflections, student written comments, paired and small-group discussion, presentations by guest speakers and students, videos, and teacher presented information. This variety serves the purpose of keeping student attention while modeling effective strategies to use when students begin their teaching careers.

Physical Facilities. All of us have, at one time or another, probably been frustrated by the constraints of physical facilities. We have taught in rooms which are too hot, too cold, too noisy, or too far away from offices and support facilities. The problems are exacerbated by uncomfortable desks screwed to the floor, poor acoustics, and inadequate lighting. It would be easy, at this point, to become frustrated and accept the negatives as the way it must be. However, according to Deming, it is vital to the success of organizations to “remove barriers to pride of workmanship” (Schmoker & Wilson, 1993, p. 11). “Barrier” in this sense is taken literally, for poor lighting and acoustics and seating that does not encourage small group discussions are, indeed, barriers to successful teaching and learning. At this point, students are encouraged to become problem solvers and demonstrate their leadership capabilities. When unable to hear, students will ask others to speak up. When asked to work in small groups, students may choose to move into the hallway, sit on the floor of the classroom, or go outside and sit on the steps or lawn. Speakers are encouraged to move around the room, use microphones, and create overhead transparencies with large print rather than use blackboards or chart and markers. Accepting the barriers only makes them more “un-barrierable”; working together to overcome the barriers creates unity.

Classroom Feedback. Deming’s eighth point concerns the need of an institution to drive out fear. “This is an essential element of (his) philosophy. Fear is the enemy of innovation and improvement. ‘No one,’ states Deming, ‘can put in his best performance unless he feels secure. Secure means without fear, not afraid to ask questions.’... The inverse of fear is trust... Management must relentlessly eliminate anything that inhibits risk taking, collaboration, and improvement” (Schmoker & Wilson, 1993, p. 14).

In our attempt to eliminate fear in our setting, we make use of test re-takes and paper rewrites. It has been said that education is one of the few times in our lives that we are not allowed to fix our mistakes.

The routine is always the same: Begin the unit, teach the unit, give the students a test, correct the test, return the test, review the ‘right’ answers with the class, collect the tests, and record the grades. Then move on (to) the next unit. If we continue this practice, how will students learn to use experiences from past units to improve the work they do on future units?” (Bonstingl, 1992).

We want to avoid this routine and encourage learning from one situation to the next. We believe that a test taken or a paper written the first time may be viewed as a sample of what the student has to offer, but it may not always be the best sample. Students may do better on one exam than another based on the test format, the time of the day or even the temperature of the room. Students who have multiple exams on one day may also do their best work. In the large University of Iowa classes, the mid-term and final exams are machine-scored, a recognition of the need for declarative knowledge; the second chance exams, however, are hand-scored short answer and essays. Generally, about 10-20% of students in the classes choose to retake the exams, and typically, they improve their grades.
In the classes at Lindenwood, the students are all secondary education majors. They are more frequently asked to connect theories and issues to their teaching specialties. For instance, one essay test item asked them to discuss how ability grouping will be used in their classrooms. Another question required them to apply Gardner’s theory of multiple intelligences to their future teaching in their discipline. Such application questions prompt “...students to think...and as a consequence, to connect newly learned concepts with prior knowledge” (Angelo and Cross, p. 236). Not all students, however, are able to function comfortably with this type of testing arrangement, for those students who have difficulty with an application essay exam, a test retake option is available. Students may take an objective exam or choose to discuss the material with the instructor thereby demonstrating their grasp of the subject matter.

The paper re-write is an option given to students for the purpose of “fixing their errors.” The major large class assignment at both The University of Iowa and Lindenwood, a research project connecting course content to individual teaching goals, is due at midterm time. The early due date gives us time to read the paper, offer constructive criticism, meet individually with students if they so desire, provides each student the opportunity to rewrite or rework their projects and provides students with fresh, research-based opinions which enrich discussions. In this way, we believe they are learning from their errors, not just receiving a grade and putting their errors aside only to make them again.

An ongoing difficulty in classes of any size is supporting students over the course of a long term project prior to turning in the final project. Assessment matrices (Angelo and Cross, 1993) Chapter 7 offer a method for frequent assessment of student progress in such assignments, and in many cases, matrices have cut down the number of project rewrites because they help keep students organized and avoid last minute time crunches. In the case of the research project or unit development, the instructor does not assign a single grade at the completion of the project. Instead, the instructor lists the various parts of the project down the left side of a piece of paper and creates columns across the top. When a student hands in a draft of a project section, the instructor dates a top column, thereby making note that the section was completed. If the section needs revision, that is also noted in the next column, followed by the date of the next submission. This continues until the entire project is complete.

At Lindenwood, candidates for a Master’s Degree in Education must create a curriculum that covers a 1080 minute time crunch. In the case of the research project or unit, the mismatches of equipment and site (e.g., Is it dark enough to project color photographs?... or...Is it too dark to write notes?), and the potential for setting up our preservice teachers for disappointment when they work in their own classrooms with two electrical outlets, one overhead (but no blank transparencies), and infrequent use of the building VCR or film projector.

One particular form of technology that has proved invaluable in our larger classes is the computer gradebook. We are able to keep track of all student input, even though much of it is reviewed and commented upon but not assigned a letter grade. We are able to record twenty different kinds of student work, put it in categories (tests, projects, or ungraded small group or individual responses), weigh each category, and offer updated weekly printouts that show totals in points, percentages, or letter grades. Students check these printouts frequently and are readily aware of their standing in terms of the cut-off scores for letter grades. This also strengthens our position on achievement as criterion-referenced, not norm referenced. Theoretically, all students may continuously improve to a point where they, with others, are attaining the highest possible grade, and at no time will a student be justified in stating that a final grade came as a total surprise. Our focus, in all that we do, is on individual learning and improvement, not comparative achievement.

Technology

Technology has proved to be the most Janus-like issue in our attempt to improve instruction and affect learning positively. One face beams down benevolently, offering ways to meet diverse learning styles, model appropriate classroom uses, and present material in innovative and meaningful ways. Technology offers us wonderful opportunities to share information direct from the computer screen, the latest educational video or laser disk, and artifacts and photographs that previously could only be described or passed around the room. The other face frowns at the unavailability of equipment and training, the mismatches of equipment and site (e.g., Is it dark enough to project color photographs?... or...Is it too dark to write notes?), and the potential for setting up our preservice teachers for disappointment when they work in their own classrooms with two electrical outlets, one overhead (but no blank transparencies), and infrequent use of the building VCR or film projector.
Even with our concerns, we have found technology to be a key force in organization, input, and shaping issues. We have resolved to accept the messiness of the current state of affairs and use as much technology as possible. We encourage our students to use the Internet for research and e-mail for immediate and meaningful opportunities for communication, and consider CD Rom as a tool for the classroom. A few students are using Powerpoint presentations. Familiarity with current technology, we acknowledge, will not totally prepare our students for the classroom they will face; however, every little step we can offer them now may save a mile of running to catch up.

**Student Input**

"Improvement is not a one-time effort. Everyone in the organization must constantly be looking for ways to reduce waste and improve quality, to save time, and to promote achievement" (Schmoker & Wilson, 1993, p. 12). Based on Deming’s fifth principle of TQM, “Improve constantly and forever the system of production and service” (Smoker & Wilson), student input becomes the basis on which instructional material and strategies are developed and altered. In addition, effective eliciting and use of input encourages a more constructivist approach to learning in both our large and small classes and demonstrates to the students that their opinions are valid and crucial to the development of the class. Perhaps most important, all of the ways we ask for input serve as models for our students as they look toward the beginnings of their own teaching careers. It is our hope that the description of student input methods that follow will help you along the path to successful implementation of CQI in your classroom.

Student input takes a variety of forms. One of the first needs of an instructor is to know the amount of information concerning a given topic students have prior to teaching that topic. **Focused Listing** is one method of determining prior knowledge and thus, instructional needs. In this method, the instructor names an upcoming course topic, and for 3 minutes, students write everything they already know about that topic. When these lists are finished, a quick scan will help the instructor determine how to proceed, how much background information is needed, the range of information possessed by the class as a whole, and the probable pace of instruction. Even in a large class, an instructor can quickly and easily glance through one hundred or more focused lists in just a few minutes and have the information that is needed (Angelo & Cross, 1993, p. 126).

Another beginning strategy is to make use of the KWLS chart. An often used strategy in the elementary classroom and even at the college level, the KWLS chart allows the instructor another method of quickly determining current level or knowledge and understanding. In this method, students make four columns on a sheet of paper labeled know (K), want to know (W), have learned (L), and still need to know (S). This variation of an older KWL chart enables students to chart their improvement over time with specific subject matter (Journal of Adolescent and Adult Literacy, ....).

An additional method of assessing beginning student knowledge is the *Misconception/Preconception Check* (Angelo & Cross, 1993, p. 132). However, not only does this strategy allow the student to demonstrate current levels of understanding, it also uncovers prior beliefs or misconceptions that may stand in the way of student understanding. For example, an instructor who plans to discuss the issue of inclusion of students with special needs in the regular classroom might ask the students to respond to the statement: “The advantages and disadvantages of inclusion of students with special needs in your regular middle school classroom are...” Based on student responses, the instructor would be able to determine which students in the classroom have prior knowledge concerning inclusion. Additionally, that same instructor would also be able to determine if students have misconceptions about mainstreaming or personal experiences that may stand in the way of unbiased consideration of the issue of inclusion.

A second form of student input consists of after-the-fact summary activities. These activities allow students to evaluate levels of knowledge after a lesson has been completed. If confusion exists, the instructor can choose to reteach or review prior to moving beyond that point. Students can also use these methods to organize their thinking, put new information with prior information, and employ higher levels of organizational thought. Angelo and Cross (1993, p. 137) suggest the use of a **Pro and Con Grid**. This method gives a quick overview of students’ analysis of the positives and negatives associated with an issue as well as indicates their understanding of the material. Students are presented with an idea such as year-round schools, classroom management methods, or national standards. They then take 3-5 minutes to review material discussed in prior classes to list the pros and cons of a given idea. This input strategy enables students to recognize their levels of understanding and identify areas where they need to know more. Once again, by a quick scan of the completed charts, an instructor is able to determine whether or not students were able to synthesize material discussed in class.

Another ending activity is to ask students to identify the **muddiest point** in a specific class (Angelo & Cross, 1993, p. 154). Students are asked, at the end of a class period, to identify what they consider to be the most confusing and least clear point covered that day in class. These points, then, provide a starting point for the next class. This activity...
crosses (1993), this is a method by which "faculty can quickly prevents instructors from charging ahead to cover material when there are important muddiest points to be clarified.

One of the most commonly used summary activities used in our classes is the Minute Paper. Advocated by Angelo and Cross (1993), this is a method by which "faculty can quickly check how well those students are learning what they are teaching..." and help teacher decide whether any mid-course corrections or changes are needed and, if so, what kinds of instructional adjustments to make... (II) also ensures that students' questions will be raised... and... answered in time to facilitate further learning" (p. 148). For example, an instructor might ask students to respond to any of the following questions a few minutes prior to the end of class: "What change would make this class more responsive to your individual needs?" "What do you like best about how this class is taught?" "What one change would you make to this class? What one thing would you leave the same?" As is true with the methods discussed previously, this classroom assessment strategy requires only a quick scan to determine student concerns. As a means of involving students and ensuring them that their opinions do count, we often read anonymous excerpts from student comments and directly state what modification we will make.

The third form of student input consists of student-directed Mid-course Corrections. A portion of each class we teach is mandated by state teacher certification requirements. For instance, preservice teachers are required to have taken coursework centered on legal issues and historical, philosophical, and sociological foundations of education (Missouri Department of Elementary and Secondary Education, 1994).

In each class, however, the depth and breadth may vary based on the previous coursework and experience of the student within the class. The degree to which each is covered is based, to a certain extent, on the results of previously mentioned pre-teaching surveys; however, just prior to midterm, we also conduct a student survey which asks for input into what topics might be covered in the second part of the course, what current issues are of interest to the students, what topics they feel they need to re-cover or those that students believe need not be covered as deeply. After reviewing these responses, course instructors are able to adjust the direction the course will take during the final weeks of the class.

Finally, we make every attempt to improve the amount and quality of student participation. In the large class at The University of Iowa, a professor and a teaching assistant instruct. While one is presenting, the other marks on a seating chart and to keep track of student contributions. This seating chart is not used to award points for participation. Rather, it helps us try to reach our goal of 100% participation by class members. If it becomes apparent that students from only one side of the classroom are participating, we use various strategies to involve students on the other side. It also makes us aware of students who attempt to monopolize the discussion. A quick look at the chart and the new marks for the day informs us of who might need encouragement to speak.

Shaping

"Feedback... lets us know the extent to which (a) learning environment and its curricular content is being received and integrated into the life of the student. It... (brings) the students alive because they... realize that they had some opportunity to participate in shaping the educational process" (Rogers & Freiberg, 1994, p. 344). Through mid-course corrections, minute messages, and other CQI methods, students learn that their ideas and needs do count and that their concerns are heard.

Twice each semester, we use more formal shaping procedures. The first is the mid-course correction. The second is an end-of-the-semester evaluation of the course, its content, and the instructors. We have found that a combination machine-scored and open-ended question form works best. Students may quickly answer the machine-scored portion of the questionnaire, and they are then encouraged to discuss more fully their ideas or concerns in the open-ended portion. Vital to the success of such methods of class evaluation is the knowledge that "quality is defined by the customer. Improvement must be aimed at anticipating customers' future needs. Quality comes from understanding and improving the process" (Holt, 1993, p. 382). While the ideas shared at the end of the semester for one class might hint at needed alterations in the next semester's course, it must be recognized that each class is different. What worked this semester may not work with next semester's students. Again, each semester, it is important to ask for student input not only at the end of the semester but continually along the way.

In some college classrooms, CQI-oriented instructors set up variations of quality circles, such as student advisory councils, to assist with course improvement. Less formal methods of student shaping consist of conversations with students over a cup of coffee or during individual student meetings in instructors' offices.

In all cases, in order for CQI to be effective, instructors must overcome any fears they have of hearing "the negative." There is a choice we each must face: either receive and react to the suggestions of our students or choose not to know in an attempt to avoid hurt feelings. If we ask for student input or shaping ideas, we must be willing to hear the criticisms and not be offended by what students have to say. Helpful comments that have made great improvement in our classrooms include: leaving one bank of lights on when using the overhead; speak a little more loudly or slowly; encourage more student opinion. In addition, we have, at times, been told that what we are discussing was covered in a class the
previous semester or that terms we are using, which we thought students would know, were new and confusing. Each of these comments, when received and addressed, make the learning experience more positive for all.

One of the most difficult aspects of shaping our courses is sharing the power. Some instructors do not feel comfortable putting the direction of the course into the hands of their students, thereby democratizing the process. They believe that it is their own responsibility to decide on the curriculum and methods for their classrooms. However, “Deming stresses that all significant participants in any process or endeavor communicate frequently to discuss and then monitor their interdependent efforts” (Schmoker & Wilson, 1993, p. 19).

Teaching and learning are interdependent efforts; therefore, we must recognize and respect the knowledge and prior experiences of our students and the effect that those experiences have on their learning in our classroom. They come to us from all over the state, the country, and the world. They are of various ages with various backgrounds. Their life journey led them to our institution and our class, and it should be our goal to help direct their paths to their chosen career in education.

**The End of the Journey?**

It would be misleading to leave the impression that our travel plans are complete. No, we still have some planning and implementing to do. For instance, we recognize the need and desirability of maintaining advisory councils for students who are responsible for gathering input from students and sharing in the direct planning of the class. We also have the desire to make better use of actual documents in our teaching, but based on the size of our classes, as yet this is difficult, if not impossible. We would also like to be able to take more field trips and make additional use of technology. However, as of yet, these issues have not yet been resolved. These are our ideas; we are sure the students have ideas of their own. It will be our continued goal to honor the needs and ideas of our students, and perhaps together, we can overcome these roadblocks and continue our travels.

**References**


Missouri Department of Elementary and Secondary Education. (1994). *Policies and procedures for teacher certification in Missouri*.


