

STUDENT LEARNING THROUGH CONTINUOUS QUALITY IMPROVEMENT PROJECTS

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Introduction

From Fall 1995 to Spring 2013, more than 2,650 students completed a one hour Personal & Professional Development course in the College of Engineering at Kansas State University. The course originated from a late 1980's series of Saturday morning professional development workshops designed for key student leaders. The workshops were combined into an elective one hour course (DEN 275) named "STARS" in the early 1990's. Enrollments were low (10 to 15 students per semester) and decreased when the university changed from semester to hourly tuition rates.

In the mid-1990's the Dean's Office worked with electrical and computer engineering faculty to create and implement a one hour sophomore level required course "DEN 275: Introduction to Personal and Professional Development" – enrollments increased. The course content was designed to meet ABET a-k criteria. Student Learning Outcomes (SLO's) included:

- Understand and apply personal and professional development concepts in leadership, teamwork, and continuous quality improvement.
- Learn about and apply the basic concepts of several personal assessment tools.
- Practice technical writing and oral communications skills.
- Develop a personal plan for improvement.

Civil engineering soon followed and enrollments increased. Later, the course was added as a requirement to the computer science and information systems, and, the biological systems engineering curricula. Over the years, the course was required by 4 departments and 5 degree programs. Enrollments reached their peak at ~100 students per semester. In the early 2000's, university general education requirements changed and the course number was changed to DEN 325 to help students obtain < 300 level general education credit.

Course Instruction

The course was taught twice a year (fall and spring semesters) with large group lecture on Tuesday and small group activity (~30 students) on Thursday afternoons. Students were assigned to teams and sat with their teammates throughout the semester.

The first 6 to 7 weeks of the course focused on student self-assessment: Covey's 7-Habits, Myers-Briggs, time management, personal goal setting, resumes and dress for success. The course text changed from Covey's *7-Habits of Highly Effective People* to Rath's *StrengthQuest* in 2010 in collaboration with university leadership studies program. Course instruction throughout the semester included guest speakers (campus & industry professionals) with support from learning assistants.

During the last 7 weeks of the course students were introduced to Continuous Quality Improvement (CQI) concepts including the Deming Improvement Cycle (Figure 1). Other course topics included: team building, ethics, leadership concepts, and, project management tools (scheduling, flowcharting, cost analysis, etc.)

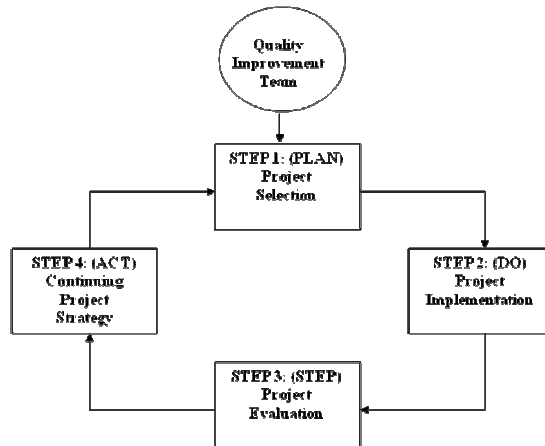


Figure 1: Deming Improvement Cycle.

Student teams were given a series of assignments which resulted in a completed CQI project. At the end of the semester, student teams presented project results and recommendations (a 6 to 8 page written report and a 20 minute oral presentation) to a panel of industry experts.

In eighteen years, more than 450 team projects focused on continuous improvement and collaborated with Kansas Award of Excellence from 2003 till 2009. A number of project recommendations were implemented and resulted in positive change to physical space and college operations.

Results

A pre/post course assessment was administered each semester. Students completed an 18 question assessment the first day of class before any instruction and the last day of class following evaluation and discussion of team presentations. The assessment focused on basic knowledge / level 1 questions (Bloom’s Taxonomy and Kirkpatrick).

Pre/post assessment results show significant increases in student understanding related to CQI. The physical and operational improvements made to the College of Engineering are a separate measure of success.

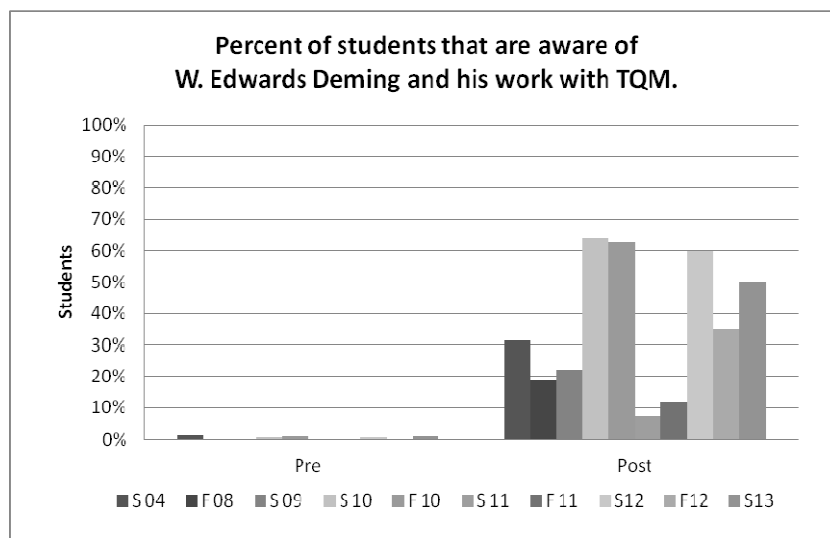


Figure 2: Who was W. Edwards Deming and why is he well known in the quality world?

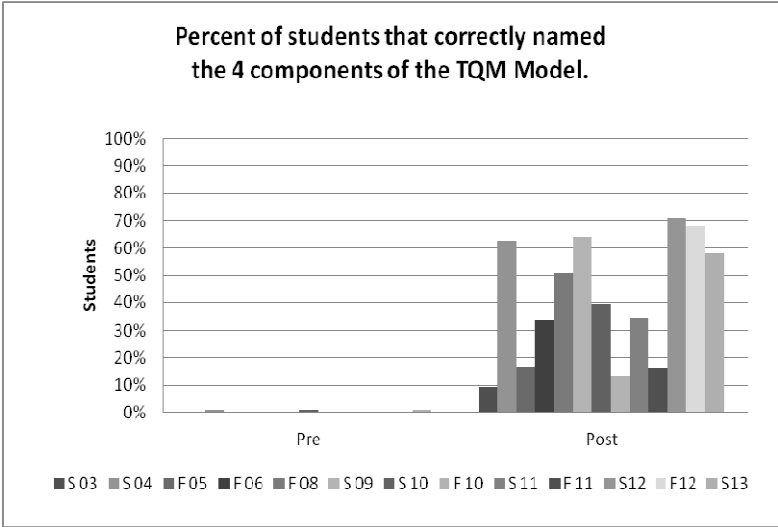


Figure 3: What are the 4 key components of the Continuous Quality Improvement (TQM) Model?

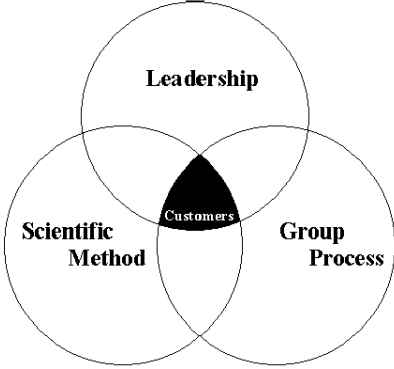


Figure 3A: Total Quality Management Model.

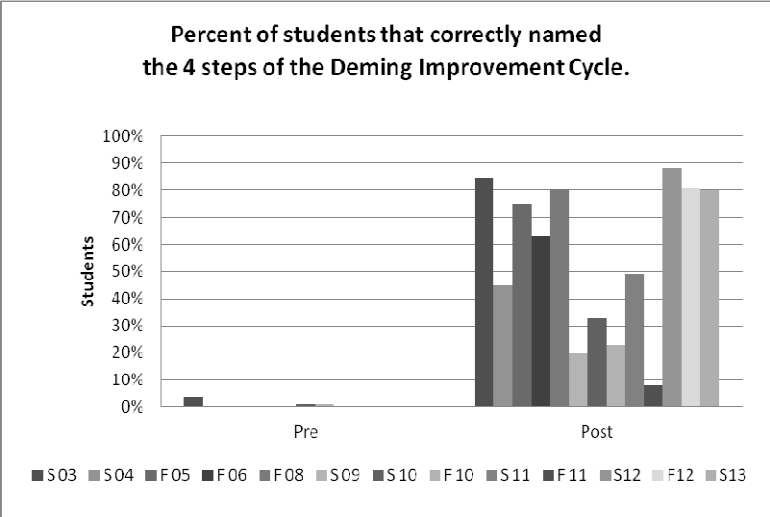


Figure 5: What are the 4 steps of the Quality Improvement Process Model?

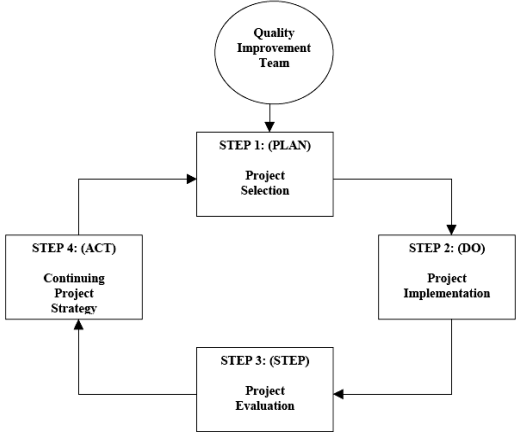


Figure 5A: Deming Improvement Cycle.

Partial Listing of Physical and Operational Improvements:

Approximately \$1000.00 per year was spent to fund physical and operational improvements. The funds were primarily from interest earned on a foundation account created by the Black & Veatch Corporation. Supporting funds (approximately \$500.00 per year) were provided by the College of Engineering, the Division of Facilities, and, Housing and Dining Services.



Figure 6: Fiedler Library – Equipment, Study Areas, Hours of Operation, and a Web-based Room Reservation System.



Figure 7: Multiple Bicycle Rack Projects – North and South of the Engineering Complex, Nichols Hall, and Cardwell Hall.



Figure 8: Lockers and Keyless Entry / Laboratory Access for Electrical & Computer Engineering.

Additional Projects: Engineering Complex way-finding and signage, advising and enrollment processes, recycling & sustainability (including new water-bottle filling station), auditorium seating and maintenance, use of lecture hall equipment and sound systems, expansion of tutor sessions, residence hall sidewalk improvements, vending and Café Q food service improvements, building security, and promotion of design team membership.

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Tom has more than 30 years experience in planning, organizational development, and leadership training programs. He worked for Black & Veatch for 16 years, formed Upward Consulting in 1989 and has served as a learning organization and process improvement consultant for a number of manufacturing and service companies, and educational institutions.

SHAGUN SHARMA

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Shagun is a senior focusing on data analysis and computer languages. She completed the Personal and Professional Development course in 2010 and served as Learning Assistant for the course from Spring 2012 to Spring 2013.