

What is quality in a maritime education?

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Abstract

How do we know that we are delivering quality in a maritime education?

If we are measuring a product, do we count the number of students who secure jobs upon graduation, or do we look for stellar career achievements? How do we describe our ideal graduate? Do we care about character education? Do we measure knowledge? If so, do we define it as technical expertise or as a more general cultivation of the intellect? Or do we determine the qualities that employers say they want?

If we are measuring a process, do we address student growth in measures defined by Perry, Chickering, or Astin? Do we measure institutional systems by the criteria of Baldrige or Total Quality Management (TQM)? Do we apply the Seven Principles of Good Practice in Higher Education? Do we define quality as “community” by Boyer’s six principles?

In a world made uncertain by terrorism and change, when split-second decisions about security must be made by highly trained mariners, those of us in maritime education must ask ourselves: How do we define quality in our education, and how do we know we have it?

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1 Can quality in higher education be defined?

Van Damme [1] argues that despite “twenty years of expertise and operational experience in quality assurance in higher education,” there is no “growing consensus on how the concept of quality should be defined.” There are too many systems of quality assurance and too many possible criteria.

However, we can still raise some questions that might help to define quality in a maritime education. Keeping in mind that, as Van Damme [1] says, any definition must entail “a concept of academic quality that recognizes variety and diver-

sity,” we will establish a few commonalities that might lead us to an answer, whether we are defining quality as a product or as a process.

2 Do we define quality as a product?

If so, how do we characterize the ideal output, and how do we measure it?

2.1 Is quality determined by the achievement of our graduates?

If we decide that it is, we must be clear about how we define achievement. Are we counting the number of students who secure jobs upon graduation, or are we looking for impressive careers? We must first define what we want to measure before we determine how.

At Cal Maritime over 90% of graduating seniors have jobs, with an average starting salary of about \$60,000 [2]. On the other hand, we have little information about the long-range careers of our graduates. We do know that one of them became president of the college in 1996 and that others have successful careers in venues as diverse as Disneyland and Hanjin. We know, according to a survey, that employers are fairly satisfied with our graduates. However, if we wish to measure their achievement in earnest, we would need to design a long-term longitudinal study following graduates 5, 10, 15, and even 25 years after they graduated. We would need to ask them, at each stage, how happy they were, whether they were meeting their career goals, and whether they considered themselves successful. We would also need to interview their supervisors and co-workers to check for triangulation of results, ascertaining whether those working with them agreed with their self-evaluations. It is doubtful that most colleges would have the resources or patience to pursue such a long-term study.

Of course, we can interview graduating seniors to determine their level of satisfaction. But will a twenty-two-year-old graduate have the same perspective as a forty-year-old chief engineer? It's questionable.

2.2 Is quality determined by the character of our graduates?

If so, we must decide what traits define our ideal. Will we recommend “The Qualifications of a Naval Officer” attributed to Jones [3]? If so, we will agree that “It is by no means enough that an officer of the Navy should be a capable mariner.[...] He should be as well a gentleman of liberal education, refined manners, punctilious courtesy, and the nicest sense of personal honor.” If we prefer such criteria, how shall we assess whether our graduates have internalized them? At Cal Maritime[4]—where we stress the “core values” of dedication, honor, integrity, responsibility, and trust—we have a certificated leadership program assessed by a system of portfolios and mentors. However, as the program is in its infancy, we have not yet assessed its effectiveness.

2.3 Is quality determined by the knowledge of our graduates?

If so, what sort of knowledge do we claim, and how do we measure it? Do we cite the large percentage of students passing their licensing exams? Do we ask outside experts to accompany our training cruises or watch our simulation exercises, to comment on the skill with which our students can manage a ship or master STCW competencies?

Or do we aim to produce well-rounded, educated citizens of the world? Mass Maritime [5] has a rich core of electives demanding that a student be a well-rounded graduate, with many courses in humanities and the social sciences. If we are aiming at this output, how do we measure it?

2.4 Is quality determined when our graduates meet the needs of industry? If so, what traits do employers say they want?

The Cal Maritime Industry Review Board, a committee of executives, meets regularly with the Academic Dean to advise him on the needs of employers. During a session in January 2001 the board, in a response echoing the remarks attributed to John Paul Jones, said that technical expertise is assumed in a graduate; what employers want—and sometimes fail to find—are skills in critical thinking, oral and written communication, problem solving, and multi-tasking. At Cal Maritime we have examined our curriculum and instituted more assignments and exercises requiring these skills, but we have no surveys or interviews to measure whether employers have determined a significant difference in our graduates. We also have no institutional pre- and post-tests to measure the skills of students upon entry and graduation.

3 How can we measure quality as a product?

Do we use surveys, interviews, focus groups, observations of tasks? How do we know that they are working?

Clearly, the method must be determined by the purpose, the resources, and the methodologies of a well-constructed experiment in the social sciences. Triangulation of results is important: if a focus group, a series of interviews, and a survey all yield the same data, it is more likely to be valid than if an interview yields one set of information and a survey, another. Methods should be varied; interviews can enrich the bare numbers of surveys, and surveys can be used to suggest the questions in later interviews.

Another point to keep in mind is Pascarella's rule that "input is the best predictor of output" [6]. A top college may boast that it produces government leaders and Nobel Prize winners, but can it take all the credit for their achievements, or do the advantages of social class, background knowledge, or genetics play a contribution?

This point brings us to the next major question.

4 Do we define quality as a process?

The Accountability movement in the U.S.A. measures quality by the achievement of outcomes. However, Chaffee and Sherr [7] question this assumption: “You cannot inspect quality into a product or service at the end of the line. Quality requires not just the detection of defects, but also their prevention. . . . All work is a process. The details of organizational processes are important because they are the substance of organizational work that ultimately produces the results.” If we look at process in a maritime institution, what are some factors to consider?

4.1 Is quality defined by the cognitive growth of our students?

In the 1960’s William Perry achieved fame by defining a theoretical framework for cognitive growth during the college years. Though some details of his framework have been disputed, and there is some evidence that it is slightly different for most women [8], the broad outlines are still accepted.

By interviewing Harvard students in the 1960’s, Perry [9] defined nine stages of intellectual growth, usually delineated into four broad stages. In stage 1 the thinker is a dualist, believing that there is a right and wrong answer to every question and that Authorities have the answers. The function of the student is to listen to Authorities, soak up their knowledge, take notes, and reproduce the correct answers on tests. Eventually, however, the student discovers that Authorities can disagree, and cognitive dissonance sets in. At first the student may wish to discriminate between False and True Authorities, but eventually he or she decides that truth must be relative and that different people can rightfully hold different opinions. At this point the thinker enters Stage 2, Multiplicity. Everyone’s opinion appears to be equal, everyone has a right to his or her own opinion, and the instructor is sometimes scorned for “grading me on my opinion.” Research following Perry’s study [10] has revealed that during this stage, young men tend to argue their own opinions and young women tend to listen carefully to the opinions of others, empathizing with them and trying to understand them. The emphasis, however, is on the belief that one opinion is as good as another. Eventually, however, some thinkers realize that not all opinions are equal. Some problem-solving methods yield better results. Some reasoning is more logical and free of bias. Experts have a better grip than novices. At this point the thinker enters the stage of Relativism, understanding that opinions are only as good as the knowledge and reasoning upon which they are based. The thinker learns to discriminate among so-called opinions and realize that some are flimsy constructs based on prejudice and irrationality whereas others are sound hypotheses based on reasoned judgment and experience. The thinker learns to apply the better models of reasoning to arrive at conclusions.

The final stage is called Commitment. The thinker becomes dedicated to a chosen set of values and achieves a strong sense of identity and responsibility—perhaps even an identification with Authorities.

If we wish to produce graduates who are committed to the search for truth and who can examine their own reasoning impartially, we may wish to employ such a framework and assess students as they enter, begin the third year of study, and exit. We might assess them, as Perry and Baxter Magolda did, with interviews; or as Alverno College did [11], with essays later evaluated for level of reasoning. This method can be expensive and time-consuming but can yield rich data about the impact of the college experience on the thinking processes of young adults. In this way we can measure both product and process.

4.2 Is quality defined by the affective or personal growth of our students?

Rather than addressing cognitive development, Chickering [12] delineates the personal challenges that young adults face: Developing Competence, Managing Emotions, Moving Through Autonomy Toward Interdependence, Developing Mature Interpersonal Relationships, Establishing Identity, Developing Purpose, and Developing Integrity. He believes that higher education has a responsibility to help young adults navigate these emotional crosscurrents. He also defines environmental factors contributing to this purpose: Clear and Consistent Institutional Objectives, Institutional Size, Student-Faculty Relationships, Curriculum, Teaching, Friendships and Student Communities, and Student Development Programs and Services. A quality education, as Chickering describes it, should not address the intellect alone but should actively assist young people with their personal growth. The goal of higher education is a successful citizen.

4.3 Is quality defined by the overall influence of our environment on our students' growth?

Like Chickering, Astin is concerned about the college experience as a whole. In his famous I-E-O model [13], he recommends measuring the impact of college by defining Inputs, Environment, and Outputs. The Input is the student upon matriculation: the intellectual ability, background, knowledge, personality, predispositions, motivation, and skills. The Environment consists of the entire college experience: the courses, the co-curricular activities, the relationships with students and faculty, the knowledge, the intellectual breakthroughs. The Output is the graduate: "the student's characteristics *after* exposure to the environment." According to Pascarella and Terenzini [14], though, it can be difficult to define what variables caused the Output. Because students take different classes, experience diverse teaching styles, and join different clubs, they belong to a number of distinctive different "subcultures." Hence the difference *within* an institution may be greater than that *between* institutions.

Another element is the quality of the student's engagement with the learning process. The National Survey of Student Engagement (NSSE) [15], based upon the work of Astin and Chickering, measures variables such as time spent out of class studying or contacting faculty. The assumption is that the more engaged the student is with the learning process, the more impact the environment has on his or her development.

5 How do we measure quality as an institutional process?

Which system is optimal? Or do we need, instead, objectives that will help us create our own systems?

5.1 Do we use the Baldrige criteria?

The well-known Baldrige criteria have been adapted to higher education in a 52-page report [16] suggesting seven global measures of quality: Challenges; Leadership; Strategic Planning; Student, Stakeholder, and Market Focus; Measurement, Analysis, and Knowledge Management; Faculty and Staff Focus; Process Management; and Organizational Performance Results. If we want a thorough inventory of institutional quality, these criteria would be enough.

5.2 Do we use TQM?

Total Quality Management (TQM) assumes that most employees want to perform well but are hampered by flaws in the system. A vivid example is “the bead game” [17]:

A large bowl contains 1,600 white beads and 400 colored beads. Colored beads are defects. Employees are equipped with a paddle containing 50 bead-sized indentations. They scoop the paddle into the bowl, and it comes out containing 50 beads. The beads are hot, so workers cannot touch the beads or container.

The goal is to have no more than five defects for each immersion of the paddle. The flaw in the process soon becomes evident: the beads are scooped out randomly, and nothing the players do can make a difference. By sheer chance, some workers scoop out more than five flawed beads.

People who play the Bead Game soon recognize both its parallels with actual work situations—setting goals, trying hard, motivating, warning—and its hopelessness. Ultimately, the best and perhaps the only way to obtain lower defect rates is lowering the proportion of colored beads in the bowl. But the workers cannot lower the proportion, for they are dippers, not process designers, purchasers, or managers.

Hence, for TQM [7], “The primary job of administration is to remove the barriers that prevent people from achieving quality work processes.”

5.3 How do we determine a quality process?

Let us say that the administration of a maritime college decides to buy a simulator. However, the president of the college is concerned about the budget. He tells the Director of Simulators to choose the best machine possible for the lowest possible cost. The director asks to visit maritime institutions in other countries to investigate their equipment. No, he is told, that will be expensive. Then the director asks to interview the faculty, to ascertain their future needs. No, he is told, the faculty might want too expensive a simulator, with unnecessary frills.

The Director of Simulators should use his judgment simply to buy the “best” equipment for the needs now.

The Director has been invited to play the “bead game.”

Without appropriate data or funding, he will choose equipment that will be obsolete within ten years. He may even be blamed when dollars are spent later for replacements or upgrades.

In a personal interview, Green[18] said that it is “crucial” to scour the world investigating state-of-the-art equipment “to know enough to buy what you really need.” It is also important to allocate funds for software with sophisticated “modelling.” The best equipment, he says, “uses black magic to recreate” situations “in the real world.” For instance, the Haven simulator pump “doesn’t go from zero to fifty. . . . The needle fluctuates and pressure gradually builds,” replicating “diagnostic tools that an engineer in practice would really use.”

Even more, says Green, “Faculty must be involved” in the choice of equipment. What lessons can they envision today, 5 years from now, 10 years from now? What can they imagine that they would like a simulator to do? A quality process, he believes, emerges when there is quality equipment used by well-trained instructors who know how to employ it for optimum effects in class.

5.4 Do we apply the Seven Principles of Good Practice in Undergraduate Education?

According to these principles [19], good practice in undergraduate education “encourages contact between students and faculty, develops reciprocity and cooperation among students, encourages active learning, gives prompt feedback, emphasizes time on task, communicates high expectations, and respects diverse talents and ways of learning.” If we wish to apply these criteria, Chickering [12] recommends that we investigate six areas: Institutional Climate, Academic Practices, Curriculum, Faculty, Academic and Student Support Services, and Facilities. Other resources [20] have been developed to apply these criteria in diverse ways.

5.5 Do we define quality as “community” by Boyer’s six principles?

Boyer[21] defined six traits by which the quality of an educational institution should be judged: “an educationally purposeful place where learning is the focus, an open place where civility is affirmed, a just place where persons are honored and civility is affirmed, a disciplined place where group obligations guide behavior, a caring place where individuals are supported/service is encouraged, a celebrative place where traditions are shared.”

These principles, though not a coherent system in the manner of Baldrige and TQM, have inspired initiatives in the Cal Maritime strategic plan.

6 What is the answer to this question, then?

In a world made uncertain by terrorism and change, when split-second decisions about security must be made by highly trained mariners, how do we define quality in our education, and how do we know we have it?

6.1 There is a three-part, tentative answer.

First, we must entertain campus conversations about quality. We must agree on what we are trying to achieve: technical proficiency, cognitive growth, character development, intellectual breadth and depth, or a particular combination thereof. Second, we must devise a series of measures to assess whether we are achieving our goals. Are we doing what we say we're doing? How do we know? At Cal Maritime the Mechanical Engineering and Engineering Technology Departments have defined specific objectives, traced them through the curriculum, and evaluated them in course portfolios, student portfolios, student exit interviews, and cruise evaluations. The ABET 2000 criteria have furnished the standards, and the faculty have meticulously implanted and measured them in multiple ways. Pronchick[22], adds, "The results of assessment must be used to re-examine and improve the processes that are in place." We must ask not only "How are we doing?" but "How can we do better?" "In TQM," says Pronchick, "this is the Shewart cycle: PLAN (Define quality, develop ways to improve quality); DO (Implement the improvements); ASSESS (Did quality improve?); ACT (Keep what works, discard what doesn't). We must know what we're doing, why, and how we can do it better. This point brings us to the third factor.

The mission and objectives of the institution must be clear, and they must be aligned throughout the curricular and co-curricular experience. At Dickinson College, according to Kirp[23], "The key goals are printed on a laminated wallet card, widely distributed so that everyone, from the trustees to the ground keepers, can know at a glance where Dickinson is heading." At Alverno College[24] students are trained to progress from beginning to advanced levels in eight core abilities, with sophisticated forms of feedback and self-assessment to ensure the progress of all. In brief, these colleges follow the advice of Smith[25]: "Everyone, drawn from all parts of the institution, must share a common vision and a consistent set of assumptions if the university is going to be effective."

6.2 Where do we go from here?

"Continuous improvement" is the mantra of quality control, from the process-oriented system of TQM to the product-oriented emphasis of Accountability in the U.S.A. With the plethora of available measurements, we have difficult choices to make in establishing a quality system. But we must all try to hit this ever-moving target.

The time for change is now, and our students must be ready to meet an uncertain future.

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