

Quality indices can be used to improve the process of interpreting and acting on routine student evaluations, demonstrating how traditional quality tools can be applied to higher education.

Transforming Teaching Evaluation to Quality Indices

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Abstract

Several studies have examined how to embed quality improvement methodologies in education. These efforts, however, focused on using the quality improvement tools developed for general use in industry instead of developing more appropriate tools for educational practices. In this article, we focus on achieving the goals of quality methodologies by incorporating their key goals into traditional educational tools. This approach can transform routine student course evaluations into a quality improvement tool through the establishment of quality indices. We demonstrate the development and application of the quality indices by presenting two examples, which are calculated using student evaluations of teaching surveys from two different instructors' courses.

Introduction

Global competition has fueled the drive for quality improvement in all areas of life, including higher education. Several research efforts have focused on developing tools and processes for

quality improvement in higher education. For example, to improve the quality of teaching and learning, the National Academy of Engineering in 2007 organized a workshop to address the development and implementation of a system to measure the instructional effectiveness of engineering faculty members.¹ Other efforts concentrate on embedding quality improvement methods in education using quality function deployment (QFD). In one case, the authors outlined the considerations needed for developing an assessment tool and process using QFD.² In another research effort, an experiment focused on treating students as customers and applying QFD to study the effect on teaching quality.³ A separate QFD study involved several educational institutes in India.⁴ In this study, education was considered as a service that needs to adopt the techniques of other industries in measuring service quality and customer satisfaction. The institutes were studied in terms of how well they meet the needs of their local industrial customers and the results clearly demonstrated a lack of customer



satisfaction. Another research effort centered on student retention with results prompting mandatory use of student evaluation of teaching (SET) surveys at Japanese universities.⁵

This article presents a different approach for developing a quality improvement tool for higher education. It is built on being “learner-centered” through getting continuous meaningful feedback from the learners and reflecting on this feedback as a key to improvement.⁶ The main concept is to focus on achieving quality improvement goals by transforming SETs, a traditionally accepted tool embedded in higher education. We make use of the goals established in methodologies already utilized for quality improvement in industry and apply the concepts to SETs to generate meaningful data that faculty can use for quality improvement.

Quality Improvement Methodologies

The Kano Model⁷ and QFD⁸ are two of the most prominent methodologies used for quality improvement today. The Kano Model identifies three types of customer requirements as shown in Figure 1. These requirements are defined as follows:

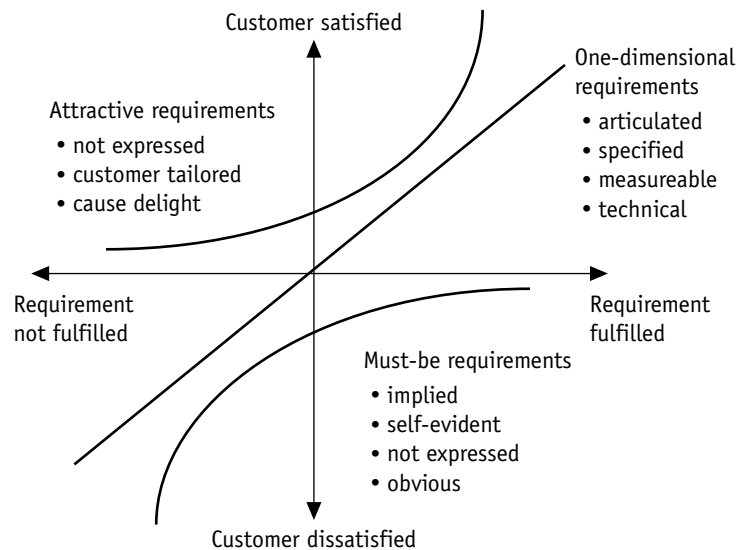
- *Must-be*: These are the requirements that the customer may not explicitly demand but they will be extremely dissatisfied if the requirements are not met.
- *One-dimensional*: The customer not only demands these requirements, but satisfaction is also proportional to the level of achievement.
- *Attractive*: The customer does not usually expect these requirements, but they lead to excitement and more than proportional satisfaction.

In general, this model identifies the following main issues:

- Some attributes are more important than others in the eyes of the customer.
- The expected level of satisfaction varies for different attributes.
- Surveying customers to obtain importance and satisfaction levels are the keys for any quality improvement.

The QFD concept, introduced in Japan, is based on building a sequence of operations to translate

Figure 1: Kano's Model of Customer Satisfaction⁹



the voice of the customer into the final product or service.^{10,11,12} The traditional QFD four-phase approach uses a series of matrices that guide the development activities.⁸ Each phase has a matrix consisting of a vertical column of “WHATs” and a horizontal row of “HOWs.” This QFD model includes the following key components:

- *Customer requirements*: These are the “WHATs,” the customers’ wishes, expectations, and requirements for the product or service.
- *Customer importance ratings*: These are the customers’ numerical ratings to the “WHATs” in terms of their importance. A rating of one to five is often used, where five represents the most important and one is the least important. These ratings are used as multiplicative factors to create indices, which help prioritize action.
- *Customer competitive evaluations*: A comparison is made between the assessed product or service and similar competitive products or services. The customer gives a rating of one to five where five is the best and one is the worst.

Based on these methodologies, it is clear that understanding customers’ priorities and levels of expectation and satisfaction are the keys for quality improvement.

Student Evaluation of Teaching Surveys

Performing course evaluations to obtain students’ feedback is one of the most routine practices in higher education.¹³ The goal of SETs is capturing

students' perceptions of instructors' performance based on students' opinion.^{14,15,16} Several tools, varying from written forms to electronic surveys, are used for collecting the evaluation data.¹⁶ The collected data from any of the course evaluation tools is used to evaluate the effect of the instructors' teaching practice on students' learning.^{17,18,19} For some institutions, the evaluation results are also used to evaluate faculty member performance for merit raises, tenure, and promotion.²⁰ Several efforts address the process of building and operating a comprehensive faculty evaluation system and improving faculty performance both with faculty peer reviews and with SETs.^{1,21,22}

Although "measurement of the quality of teaching activities is becoming increasingly important since universities are rewarding faculty performance in terms of promotion, awards, and bonuses,"²³ most published research efforts question the effectiveness of using SETs to assess quality and teaching performance. Some researchers have made the following statements:

- "Student evaluation of instruction in college and university courses has been a routine and mandatory part of undergraduate and graduate education for some time. A major shortcoming of the process is that it often relies exclusively on the opinions or qualitative judgments of students rather than the learning or transfer of knowledge that takes place in the classroom."¹⁸
- "The use of student evaluations of teaching (SETs) to assess teaching effectiveness remains controversial. Without clear guidelines regarding how to best document effective teaching, faculty members may wonder how to convincingly demonstrate teaching effectiveness in preparation for promotion and tenure review."²⁰
- "There has been considerable debate as to whether course evaluations are valid measures of teaching quality, or whether students instead reward tutors who give them high grades and assign low levels of work."²⁴

Although it is not clear if improving course evaluation scores can be directly tied to improvement in teaching quality, it is clear that SETs evaluation data is routinely used as an indicator for rewarding and retaining faculty with the hope that it will serve as a motivating factor for improving teaching quality. In other words, just

conducting SETs does not directly connect to the desired results of continuous quality improvement. Moreover, the current reward system is based on the scores of some discrete evaluations for different classes, instead of the long-term commitment of the faculty member to quality and continuous improvement.

Most SET tools in their current form are limited in enabling deliberate and sustained quality improvement for numerous reasons. First, most SET tools assume that all surveyed attributes are equally important. As a result of this assumption, there is usually a lack of identified priorities for addressing the surveyed attributes. Most SET tools assume that all those surveyed demand and express their level of satisfaction by marking the top score for each surveyed attribute. Furthermore, in most institutions the same evaluation form is used; thus, the evaluation tool does not allow for variations based on students, course content, and instructor needs. Finally, the SETs are based on students' feedback (perceived voice of the customer) at the end of the course. The course improvement effort, if any, will be directed to a different group of students the next time the course is taught.

Methodology for Transforming Student Evaluations

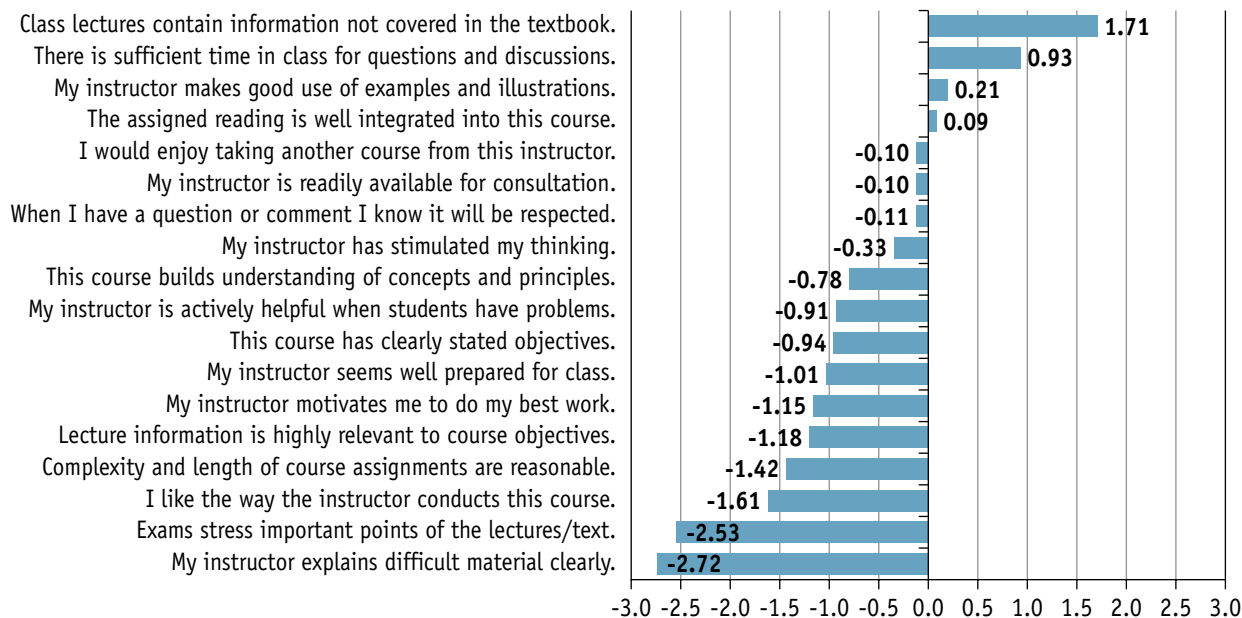
To help facilitate quality improvement, we need to transform traditional SETs into a tool producing data that can provide valuable feedback to the instructor. Our tool is based upon the two previously discussed quality improvement methodologies, the Kano Model and QFD. In accordance with these methodologies, it's vital to obtain the student's perception of the product or service from three independent elements. First, determine what the student expects of this product or service, or, in other words, the student's level of expectation. Second, establish how satisfied the student currently feels about the product or service, or the level of satisfaction. Finally, find out how important the surveyed attribute is to the student, or the level of importance.

We transform the traditional SETs by surveying students using Likert scales for the importance, the expected level of satisfaction, and the current level of satisfaction for each attribute on the traditional SETs. These data are then compiled to

Table 1: Sample of Student Assessment of Teaching Quality Surveys (SATQs)

Please rate the following statements based on the following scale:			
1	2	3	4
Not important/ Not satisfied		Neutral	
			5 Very important/ Very satisfied
My instructor seems well prepared for class.		There is sufficient time in class for questions and discussions.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	
My instructor explains difficult material clearly.		I would enjoy taking another course from this instructor.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	
My instructor makes good use of examples and illustrations.		Exams stress important points of the lectures/text.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	
This course builds understanding of concepts and principles.		The assigned reading is well integrated into this course.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	
My instructor is actively helpful when students have problems.		Complexity and length of course assignments are reasonable.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	
My instructor is readily available for consultation.		Class lectures contain information not covered in the textbook.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	
When I have a question or comment I know it will be respected.		I like the way the instructor conducts this course.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	
This course has clearly stated objectives.		My instructor motivates me to do my best work.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	
Lecture information is highly relevant to course objectives.		My instructor has stimulated my thinking.	
How important is this characteristic to you?		How important is this characteristic to you?	
What is your <i>expected</i> level of satisfaction?		What is your <i>expected</i> level of satisfaction?	
What is your <i>current</i> level of satisfaction?		What is your <i>current</i> level of satisfaction?	

Figure 2: Course One—Compiled Student Assessment of Teaching Quality Indices



EX: My instructor explains difficult material clearly.	Quality Index = 4.85*(4.02-4.59) = -2.72
How important is this characteristic to you?	4.85
What is your <i>expected</i> level of satisfaction?	4.59
n=22 What is your <i>current</i> level of satisfaction	4.02

produce a quality index (QI) for each attribute based on the average student response to the three scales.²⁵ This QI index is defined as:

$$QI = \text{relative importance} \times (\text{current level of satisfaction} - \text{expected level of satisfaction})$$

In the QI formula, the difference between the current level of satisfaction and the expected level of satisfaction is called the satisfaction gap. A negative satisfaction gap will result when the level of expectation is higher than the level of satisfaction. Multiplying the negative level of satisfaction by the relative importance results in the weighted quality gap, which, in this case, is a negative QI indicating an unsatisfied student. On the other hand, a weighted positive satisfaction gap results in a positive QI indicating a delighted student, since the level of satisfaction exceeds the level of expectation. A zero QI indicates a satisfied student. Since we use a five-point Likert scale to capture the students' perceptions, the QI for the least satisfied student could equal -25, whereas the QI for the most satisfied student could equal 25.²⁵

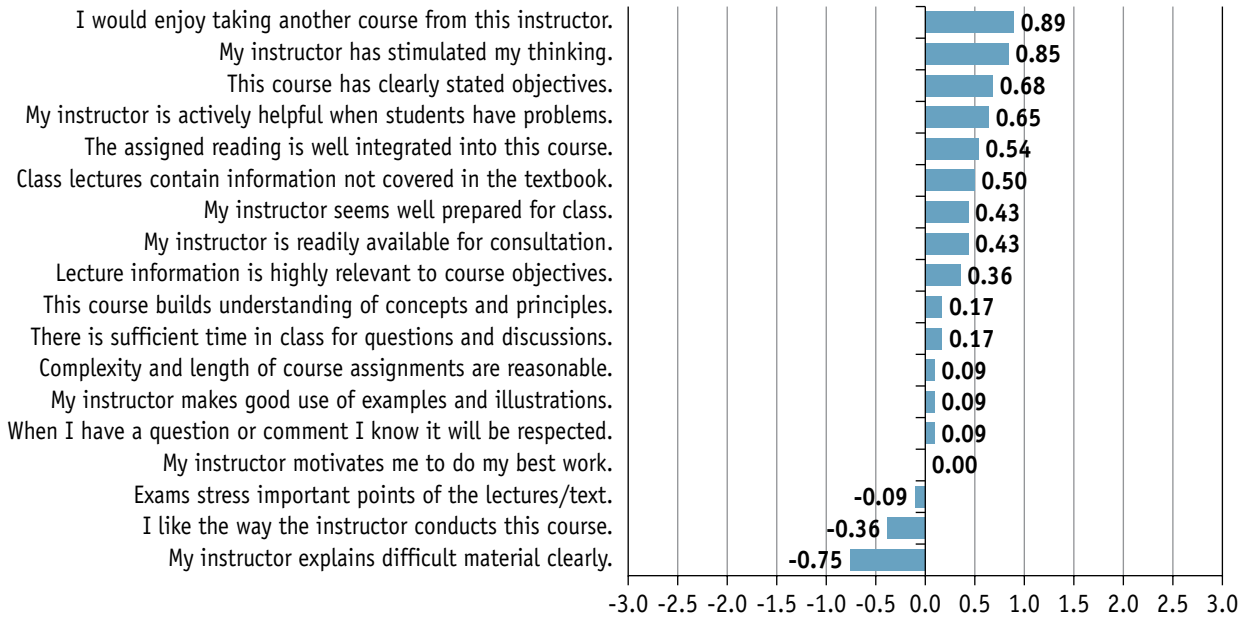
Examples of Student Assessment of Teaching Quality Surveys

In a department at a small public liberal arts institution, the end-of-semester SETs consist of 18 items that are uniform across all departmental courses. To transform these evaluations into information that faculty can use to improve performance, three questions were used for each characteristic. The first asked the students how important the characteristic was to them. Next, they were asked what their expected level of satisfaction was for each of these items. Finally, they were questioned about their current level of satisfaction with each of the items.

The transformed survey instrument is displayed in Table 1. Two different instructors in two different major courses utilized the transformed survey instrument after the midpoint in their courses. In course one, 22 students were surveyed, and in course two, 51 students completed the survey.

The average QIs for each characteristic were compiled for both courses and are displayed in Figures 2 and 3, respectively. The average QIs were

Figure 3: Course Two—Compiled Student Assessment of Teaching Quality Indices



EX: My instructor explains difficult material clearly.	Quality Index = 4.87*(4.42-4.58) = -0.75
How important is this characteristic to you?	4.87
What is your <i>expected</i> level of satisfaction?	4.58
=51 What is your <i>current</i> level of satisfaction	4.42

sorted from smallest to largest for ease of interpretation. The sign and magnitude of the average QI for each attribute clearly define the strengths and areas of improvement for the instructor of each course. The magnitude of each positive QI indicates the level of satisfaction for the specific attribute. The magnitude of each negative QI indicates the level of dissatisfaction for the specific attribute.

An example of how the average QI was calculated using the “My instructor explains difficult material clearly” is shown on each figure. Note that an individual QI value cannot be determined if one of its three constituent values is missing, so it is important to calculate individual student QI values first and then average them into the course QI when there are any missing responses. If there are no missing responses, the averaged constituent values may be used to determine the average course QI, as was done for this example. Interestingly, the students in both classes have similar levels of importance and expectations for this characteristic. Their current level of satisfaction, however, is lower in course one than in

course two, yielding a lower QI for the instructor in course one. This is an area for improvement for that instructor. By giving special attention to students’ comments for areas where their satisfaction levels are lower than expected, the instructor can gain insights on why and how to close those gaps and continuously improve the quality of his/her course.

Conclusion

To achieve the quality improvement objectives set by the Kano Model and QFD, two of the most prominent quality improvement methodologies, it is clear that students’ priorities, levels of expectation, and levels of satisfaction are key measures. Guided by these quality improvement methodologies, the QI approach can transform routine SETs into student assessments of teaching quality. The transformation process is possible by surveying students to obtain their perception of the importance, expected level of satisfaction, and current level of satisfaction for each attribute. The survey data can then be used to calculate a QI for each attribute. Having one measure that provides

the magnitude and priority of improvement for each attribute displayed graphically can simplify the assessment process and provide guidance for quality improvement efforts.

Although the QI shares many of the disadvantages of SETs, it does provide several advantages over the traditional student questionnaires used for teaching evaluation:

- The data obtained through surveying for the current level of satisfaction represents what would be surveyed in traditional teaching evaluations or questionnaires; however, traditional teaching evaluations do not include what the students expect, which is needed to quantify the magnitude of the gap between what was expected and what is delivered.
- The level of expectation can be used by itself to discern the students' average expectation for each attribute. However, using the level of expectation to calculate the satisfaction gap is important for determining the magnitude of the needed improvement effort.
- Surveying for the level of importance reflects the relative importance as perceived by the students, not the faculty or administration. Although this measure can be used by itself to discern the relative importance of each surveyed attribute, using it to calculate the QI provides a single measure for each attribute and simplifies the process of prioritizing the different attributes for improvement.
- Using the levels of expectation and importance together can lead to a better understanding of the students' perception of a specific attribute. For example, an attribute with high expectation and high importance could be a "must be" attribute on the Kano Model because the satisfaction gap is likely negative. An attribute with moderate or neutral expectation and high importance might be considered "one-dimensional," because the satisfaction gap could be either positive or negative. An attribute with low expectation and high importance would be "attractive," because the satisfaction gap will most likely be positive. Finally, low and moderate importance reflects student indifference, no matter what the satisfaction gap and should receive a low priority for improvement efforts.

Ultimately, obtaining the QIs at different intervals during a specific course or over a sequence of courses will provide instructors with information about areas that students perceive as needing improvement. Instructors can ask students and peers for feedback on these gaps and get more insights on ways to improve those attributes. In this way, QIs become much more useful to improvement efforts than traditional SETs.

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