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# A Process for Improving Course Quality Based on Mid-semester Feedback

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**Abstract.** Quality control mechanisms are becoming more important in higher educational institutions. Student evaluation of teaching is typically used to obtain feedback from students about a learning experience but its effect in the course may take too long. Fast feedback mechanisms, in exchange, look at obtaining feedback in order to apply corrective measures quickly. In this paper a process is described to obtain feedback from the students about a course, analyze the received results, and identify the most significant aspects. The process has been applied to a course and led to some adjustments that had immediate impact on the course.

**Keywords:** student evaluation of teaching, quality improvement, course evaluation.

## 1 Introduction

Under pressure to increase the quality of their services, higher educational institutions are exploring the implementation of total quality management procedures as well as continuous quality improvements. Student Evaluation of Teaching (henceforth simply SET) is typically included among the procedures that are part of quality assurance programs. But the overall feedback process has a cycle larger than the course and the results are usually more oriented toward teacher promotion or salary increase processes than course quality increase.

Mid-semester feedback or fast feedback [1,2] is a mechanism with a shorter latency. This technique consists on obtaining feedback from students at different times during the semester. Results reach the teaching staff quickly enough to consider immediate adjustments. However, this type of SET is challenging to deploy because it needs an unobtrusive feedback gathering procedure, quick post-processing time and fast response by the teaching staff. Furthermore, no formal process to analyze the answers is used.

This paper describes a process to implement a quality assurance mechanism in a course where feedback is obtained using multiple unobtrusive mid-semester student evaluations. Answers are classified through a subjective categorization

process. The most significant aspects of the course are then analyzed for potential corrective actions. The process has been deployed in a course in which the teaching methodology shifted from conventional lecturing to active learning, learning outcomes about teamwork and self-learning were included, and grades were obtained with continuous evaluation paradigm. The analysis of the obtained results has proved that this process facilitates adjustments while the course is being taught.

## 2 Related Research

Quality of services in higher educational institutions is becoming a very important issue. However, implementing measures to achieve this quality is a complex task to the point that multiple organizations have joined efforts to describe and formalize quality management procedures [5]. Classroom assessment techniques [1] are designed to gather information about the activities in the classroom so that instructors can know the most effective measures to improve the overall learning process. These techniques are themselves part of a wider area known as “Student Evaluation of Teaching” (SET).

Looking at the large body of literature about this area, the correlation between SET and the quality of a course is, to say the least, controversial (see, for example [10]). Numerous scientific studies praise the benefits of SET to improve a learning experience, and an equally important number of authors cast doubts about its true value. Two conclusions about SET appear consistently in the related literature. First, a reliable measure of teaching effectiveness is elusive because of its multidimensional nature [8]. Second, results obtained with SET highly correlate with other measures obtained from sources such as peers, alumni or administrators [6]. As a conclusion, it can be stated that SET is a reliable measure of teaching performance [9].

A special case of SET are the mid-semester student evaluation, informal early feedback, or classroom assessment [1] techniques. The idea is to deploy a mechanism by which feedback (sometimes informal) is collected from the students with a frequency that allows the instructors to reflect upon the answers and deploy, if needed, any corrective measures. This type of evaluation is specially recommended when teaching a course for the first time, or when there is a significant change in methodology, to detect strength and weaknesses during the semester [7]. But recommendations for processing fast-feedback results are simply to browse through the answers, take student comments seriously and let students know what, if anything, will be changed.

Instructors rarely have full awareness of what is truly happening in a course and are inclined to misread how are students perceiving the course as a whole [3]. Fast-feedback answers are a tool to obtain an accurate and reliable measure of the course perception. But if open questions are used for this type of evaluation, and the number of answers is large (more than 20), informal analysis techniques might not reach information that is easily obtained with simple formalized procedures.

This paper describes a process starting with mid-semester student evaluation. The answers are categorized to identify those aspects that are having a significant impact in the course. The method to obtain the student feedback is inspired by the classroom assessment techniques described by Angelo *et al.* [1], but the forms were requested three times during the semester in an approach similar to the one described by Felder [7].

A categorization step is then applied to classify the answers and identify those aspects of the course with a significant impact for the students. With this information, the instructors may consider adjustments to be applied to the course.

### 3 The Process

The proposed process consists of four steps as depicted in Figure 1.

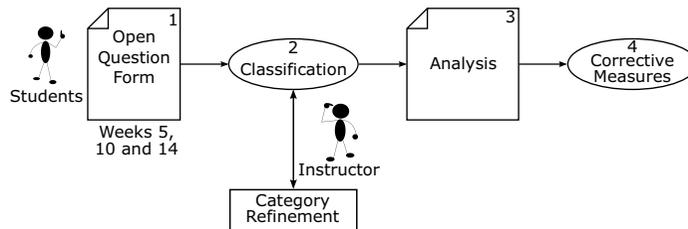


Fig. 1. Process Structure

#### Step 1: Obtaining Feedback from the Students

The form used in this step is designed as a compromise between the following aspects:

- The questionnaire should be brief and unobtrusive. A submission request with too many questions may have a low chance of being answered [4].
- There are numerous aspects to be monitored in a course. Any attempt to enumerate them produces a unnecessary long list.
- Students must understand the need and purpose of this questionnaire.
- The responses must be succinct to speed up the post-processing.

The resulting form starts with a succinct paragraph requesting the feedback and stating that the results will be kept anonymous, followed by two separated text boxes with the questions “Describe briefly the most critically positive (respectively negative) aspect that you encountered in the course so far”. The form limits the answers to only 300 characters. The combination of open questions and a limit on the answer size forces students to briefly analyze all the aspects of the course, choose the most critical one (positive and negative) and state it succinctly.

## Step 2: Categorization

A large number of these answers may mention an equally large number of course aspects, thus a systematic approach is needed to process them. In the second step, an initial set of categories is proposed corresponding with different “aspects” of the course such as “teaching methodology”, “lab organization”, “course organization”, etc. All answers are reviewed and marked as belonging to one or more of these categories. Although this classification step introduces some bias, the obtained results highlighted certain aspects of the course so clearly that it was perceived as an improvement over simply browsing the answers.

## Step 3: Analysis

After step 2 each answer is labeled with one or several course aspects. For each category three measures are derived. The number of positive and negative appearances, referred as the “positive” and “negative” ends respectively, and the difference between these two measures. With these numbers the issues are differentiated as follows:

- Issues with both high values on the negative end and the difference need to be analyzed for corrective measures.
- Issues with large positive and negative ends, but with a small difference are labeled as “controversial”. They are considered to deploy adaptation measures.
- Issues with large positive end and large difference are ruled as positive.
- Issues with low values in all three numbers are ruled not significant.

## Step 4: Corrective Measures

With this categorization and informal analysis, the issues that are most significant for the students are identified. Instructors may now decide if any corrective measures are needed.

## 4 Empirical Scenario

The described process was deployed in the first edition of the semester course “Systems Architecture”, which is part of the degree in Telecommunication Engineering<sup>1</sup> The total number of students that initially signed for the course was 204 and were divided into four groups. Of those, only 166 (81.37%) remained after the drop-out deadline. The course contained the following learning outcomes:

1. Design and development of applications in the C Programming Language.
2. Use proficiently the tools for application development.
3. Apply team working techniques to develop an application for a mobile device.
4. Use of self-learning techniques.

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<sup>1</sup> [www.it.uc3m.es/labas/syllabus\\_en.html](http://www.it.uc3m.es/labas/syllabus_en.html)

Outcomes 3 and 4 refer to generic methodological aspects. Team work was used during the second half of the course (six weeks) in which groups of four students were created by the instructors to work in a project. Several documents about team dynamics were requested as readings and a class session was devoted to analyze teamwork, agree on a team contract and discuss the different type of conflicts that may arise. The measures to achieve outcome 4 were applied throughout the entire course. Each session had two sets of activities, previous and in-class. The set of previous activities required an objective that would be reviewed in the following class. Students found this methodology significantly different to those used in other courses.

The course followed a continuous evaluation scheme. Five partial examinations spread along the semester were combined with small exercise submissions. The goal was to engage students to regularly work in the course. The final course grade was simply the sum of all these partial scores; no final exam was given.

The course also had some additional complications derived from outcome 2. The use of development tools, combined with the blended learning approach (students had a significant workload outside of the classroom) resulted in the need of tools properly configured as a development environment.

## 5 Experimental Results

The 14 week course had a first period (up to week 8) where students worked in pairs and individually. For the remaining weeks, teams of four students were created to work in a project. The feedback was requested in weeks 5, 10 and 14. In all three occasions answers were accepted during five days. A message was also posted in the course forum stating the importance of the feedback, that the results would be kept anonymous, and inviting students to submit their answers. The obtained results are shown in Table 1.

The number of received answers were 67 (of 204 students, 32.84%), 44 (of 166 students, 26.50%) and 43 (of 166 students, 25.90%) respectively. The higher sample for the first questionnaire is because the deadline for course dropping (students sign out of the course with no effect in their academic record) was on week 8 in the semester. For each of the three surveys, the number of appearances of the aspect mentioned as negative, and mentioned as positive are shown. An empty cell means the category was not mentioned in the survey. The number of aspects mentioned in each survey changes depending on the methodology being used at that moment. The three aspects with the higher number of negative appearances are highlighted.

In the first survey, course workload was the most negative aspect, and was mentioned only once as the most positive aspect, thus pointing to an area that needed further examination. The categories referring to course evaluation policy and student participation in lectures had also a large number of negative appearances, but in this case, there is also a significant number of positive mentions. The use of development tools also had a high number of negative answers.

**Table 1.** Results after the categorization step

N	Aspect	Week 5		Week 10		Week 14	
		Neg.	Pos.	Neg.	Pos.	Neg.	Pos.
1	Use of mobile devices in the labs	0	4			1	3
2	Student participation in lectures	24	14	5	5	3	1
3	Number of exercises solved in class	4	4	3	1	2	0
4	Course workload	29	1	9	7	7	3
5	Study a new programming language	0	6	0	2	0	2
7	Use of course forum	0	3				
9	Course evaluation policy	10	13	8	3	5	0
10	Motivation received	0	3				
11	Laboratory infrastructure	4	1				
12	Teaching staff in the laboratories	5	4	1	0	3	2
13	Given development tools	8	1			1	0
14	Presence of material written in English	1	0	2	1		
15	Organization of course material	1	7	0	1		
16	Availability of the instructors	0	4	0	2	0	1
17	Work in pairs in the lab exercises	1	0				
18	Work scheme in the lab sessions	0	5	1	2		
19	Exercise resolution in groups	0	1	1	2		
20	Documents on team work			1	1		
21	Team work as course outcome			1	4	3	11
22	The course project			1	5	0	14
23	Perceived changes due to comments			0	6	0	1
24	Group creation criteria			1	3	2	0
25	Final session to present the project					1	4

In this second survey, the categories about course load, evaluation policy and student participation had a significant decline in both positive and negative counts, and new categories appeared mentioning the course project and team work.

In the third and last survey only the course load and the evaluation policy maintain values similar to the previous ones, although both of them experience a decrease. On the positive column, two aspects have a significant increase: team work, and the presence of the course project.

### 5.1 Adjustments Derived from the Survey

After analyzing the results of the first survey, the following measures were applied in the course:

1. An in-depth review of the workload estimations for the remaining activities.
2. Devote time in class to explain the type of working habits required by the course structure with special emphasis on the previous activities.
3. Reduce the frequency of evaluations in the schedule.

The problems with the tools in the development environment were due to some initial misconfigurations that were solved, so no new actions were taken.

These measures were applied between weeks 5 and 10 and their effects can be seen in the results of the second survey. Although the same three categories have the higher number of negative appearances, their magnitude decreases more significantly than the number of received answers. Furthermore, the deployment of these adjustments was itself perceived as the most positive aspect of the course by six students. This result shows how the proposed process may also capture the effects of the measures derived from previous observations.

In order to check the validity of the results obtained with this process, an interview with student representatives was held at the same time the first survey was being answered. The issues covered in that meeting were totally consistent with those shown by the survey: course workload was perceived as excessive, previous activities were not accepted, the evaluation scheme could be improved and the technical problems should be solved. This coincidence increased the perceived reliability of the process by the teaching staff despite the potential bias introduced with the classification step.

## 6 Conclusions and Future Work

In this paper a process to deploy a fast-feedback mechanism to improve course quality has been described. The obtained results showed valuable qualitative information about the course and prompted measures that were deployed immediately. The impact of these measures was also reflected in the results obtained by repeating this process during the semester.

By extending conventional techniques to obtain feedback before the semester end with a categorization step, instructors can easily identify those aspects in a course that are perceived by the students as most positive and negative. The classification procedure, although subjective, helps to handle a potentially large number of answers about numerous course aspects. The process has been used in a course, the structure of which included a significant amount of changes. Answers were obtained from the students using a simple, unobtrusive, open-ended based form. Answers were limited in size to encourage clarity and facilitate post-processing.

As future lines of work, we are currently exploring to increase the automation in the classification step by using techniques such as latent semantic analysis.

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