

Implementation of a 360-degree feedback assessment process for the development of the leadership competence of senior engineering students

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Abstract:

Project Management in Practice (PMP) course at the School of Chemical Engineering (Tarragona, Spain) aims to develop senior engineering students' leadership competence. Over the last decade, 360 degree feedback has been widely used in leadership development practices. This paper describes the implementation of the 360 degree feedback process into PMP course. Within the scope of this implementation, a "Leadership Competency Questionnaire" was designed and applied as an online tool. The effectiveness of the 360 degree process was evaluated in terms of obtaining students' reactions and perspectives about its implementation.

Keywords: 360 degree feedback, leadership development, engineering students

1. INTRODUCTION

Starting from 1995's School of Chemical Engineering (ETSEQ) at the University of Rovira i Virgili employs a competency-based educational model to help engineering students meet the demands of a notoriously competitive global future [1-3]. The model aims to align chemical engineering curriculum with future's top competences so that today's engineering students can effectively respond to tomorrow's job demands.

In the fast-paced and competitive new world, *leadership* became a major concern in many organizations and industry [4] which in turn triggered the need to develop leadership competence. For some time now there is an increased interest in identifying the best practices as how to implement a successful leadership development programmes [5-7]. Likewise, Project Management in Practice (PMP) course at ETSEQ aims to equip senior engineering students with leadership competence.

To facilitate students' leadership development, it is crucial to provide the students with the right feedback [4] so that students can identify their leadership strengths and blind-spots to create their developmental priorities [8]. Apparently, 360 degree feedback is the most prevalent and powerful process used to help development of leadership [8-12]. In fact, numerous studies have reported improvements in performance following 360^o feedback [13-15].

In spite of its wide use in many companies and organizations, the effectiveness of the 360 degree feedback is rarely evaluated [16]. However, such evaluation is essential to ensure that the process was valuable to the participants.

This article presents the implementation of 360 degree feedback process into PMP course in the 2007-2008 academic year. The paper begins with a detailed description of the PMP course and follows with the presentation of the theory underlying 360 degree feedback process. The following section explains the sequential steps involved in the deployment of 360 degree feedback process. The last section presents students' reactions to the 360 degree feedback process.

2. PMP COURSE

Project Management in Practice (PMP) is an elective course aimed at enhancing fourth-year engineering students' competence in leadership and skills in project management and facilitation. In this course, part of the fourth year students take on the leader role of project teams composed of first-year students.

First-year project teams work during two consecutive fifteen week periods on a design project concerning a manufacturing process (i.e. transformation of a specific raw material into different final products) and try to solve the design problems by applying the knowledge from their first-year courses. To help first year students cope with this challenging project-based learning experience, fourth year students are given the responsibility to take the leader role of the first-year project teams.

To ensure that first-year project teams are led by the students with the highest potential and motivation to lead, a methodical leader selection process is applied. After the selection, about a dozen students (one third of the class) become the leaders of first-year teams. Rest of the students works in various fourth-year project teams.

To support the development of leader students, PMP course implement both enabling and assessment processes that are key to leadership development. Enabling processes provide students with formal training, coaching and experiential learning processes (Figure 1).

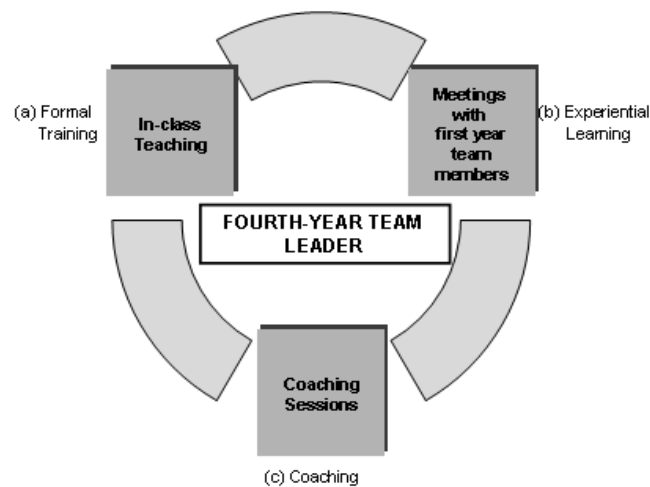


FIGURE 1: Leadership enabling processes implemented in PMP course

Formal training, done through in-class teaching, equips students with the key concepts relevant to leadership, project management, and facilitation techniques and tools (2 hours/week). Formal meetings with first-year project teams (1 hour/week) enable students to experience and apply those concepts that are thought in the class. The coaching sessions are conducted to help the leader students identify their development needs. Every leader student meets with their coach individually (one of the course professors) at least twenty minutes per week.

In addition to the enabling processes, leader students are also provided with feedback processes to help them realize their effective behaviours and the ones that need modification in relation to leadership, facilitation and project management. The feedback processes involve:

- **Formal Meeting Observation Feedback:** Leader students are monitored during their weekly meetings with first-year teams to determine how the leaders manage and facilitate their team meetings. The observation data are then formulated into a feedback report and sent to leaders and to their respective coaches.
- **Team Climate Survey:** The members of the teams at the end of each academic semester fill-out a survey to measure the climate within the team. This information is fed back anonymously to leaders.

In addition to above mentioned feedback process 360 degree feedback process, which constitutes the scope of this paper, is implemented to PMP course. This process aims to help leader students identify their leadership strengths and areas of improvement. The following section explains the theoretical background and the implementation of this particular process.

3. THEORETICAL BACK-GROUND

The process of 360⁰ feedback is fairly straight forward. It collects both self-ratings of leadership and leadership ratings from “significant others” and feeds back them in terms of a report to the focal person [11]. The perceived value of 360⁰ feedback is based upon several theoretical principals:

- Obtaining information from multiple perspectives will yield a fuller and more accurate picture of performance strengths and weaknesses than observations from only one person [17-18]. This in turn enables the individual to accept the feedback as a valid comment on his/her actual behaviour [17] thus making it harder to discount negative feed-back as just one’s person’s view point [19].
- The process of self/other comparison increases the notion of self-awareness. When individuals compare their self-perception with others’ views they develop an increased awareness about their actions [17-18] and their blind-spots.
- 360 degree feedback process can also help uncover and resolve conflict by allowing individuals to find the opportunity to express their opinions which might not otherwise have been expressed [18].

Basically 360 degree feedback is used for two major purposes; *developmental* and *evaluative*. The developmental feedback aims to enable the individuals to become more aware of their strengths and weaknesses and to identify areas of improvement. On the other hand evaluative feedback is used to make administrative decisions (i.e. salary administration, promotions) [17]. As it has been noted earlier, this process is implemented into PMP course for developmental purposes.

4. IMPLEMENTATION

In a typical 360 degree feedback process, the competence evaluations are gathered from the focal person’s colleagues. In this study, team members have been selected as the feedback providers due to their frequent interaction with the team leader. This frequent interaction enables team members to provide more accurate information about leaders’ performance than their clients and professors can do.

The 360 degree feedback process was implemented into PMP course in four sequential steps (Figure 2). Primarily, a “Leadership Competency Dictionary” was developed to form the basis of the 360⁰ feedback competency questionnaire. Following this, students were trained about the process and the use of the on-line questionnaire. After the training, students answer the on-line questionnaire and feedback reports were sent. In the last step, a mini-survey was conducted on all students to evaluate the effectiveness of the implementation.

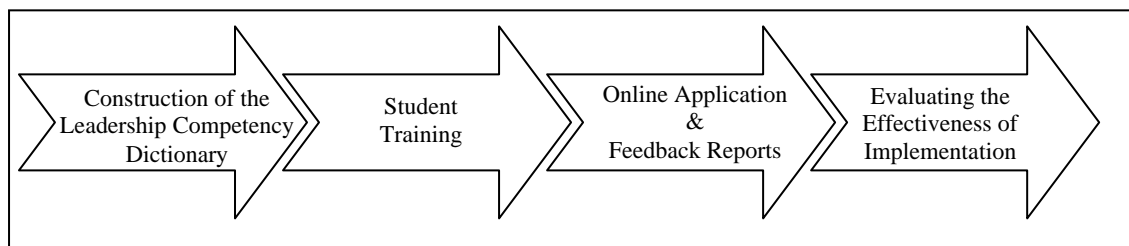


FIGURE 2: Sequential steps involved implementation of 360 degree feedback process into PMP course

(a) Construction of the “Leadership Competency Questionnaire”

Typically 360 degree feedback processes involve a competency questionnaire. For this purpose, a “Leadership Competency Dictionary” was created based on the Fundamental Concepts of Excellence of the EFQM Excellence Model [20]. Eight competences were identified to be related to effective leadership: Commitment to learning, interpersonal communication, drive for excellence, integrity, results orientation, client orientation, responsiveness to change, and teamwork. The dictionary involves three levels of proficiency. For the purposes of this study, the level which corresponds to “Team Leader” has been utilized. In the dictionary each of the eight competencies are explained in terms of a definition and five behavioural descriptors (See Table 1 as an example).

INTEGRITY
The ability to harmonize honestly words and feelings with thoughts and actions, with the only purpose of doing the good for others, without any evil intention or willingness to cheat, to take advantage of, to manipulate or control them; reviewing constantly his/her own determination as struggling for congruence.
LEVEL 2
COMPASSIONATE CONFRONTATION
Recognizes and confronts faults of integrity in others but within an authentic context of tact, concern, and warmth toward the others.
<ul style="list-style-type: none"> ■ Is able and willing to confront others as needed. ■ Admits openly mistakes and faults. ■ ...

TABLE 1: Part of the integrity competency from the Leadership Competency Dictionary

The sum of the behavioural descriptors corresponding to eight competencies gives rise to a forty-statement questionnaire. Team leaders self-assess their current leadership competence along those behavioural descriptors. Likewise, team members rate their team leaders against the same set of behavioural descriptors.

The behavioural items in the questionnaire are evaluated on a “rating scale”. In this study a five-point rating scale that has been proven to be extremely reliable and accurate, was used [21]. The scale goes from “much less than acceptable (coded 1) to “much more than acceptable” (coded as 5) with the inclusion of a “*I can not evaluate*” response.

The Leadership Competency Questionnaire has been completely automated by means of a web-based application (Boonsai[®]).

(b) *Student training*

One week prior to the application, a 360 degree feedback training program was held in university’s congress hall. As the 360 degree feedback was new to the process participants (first and fourth year student), students were trained on:

- Objective of the process
- Understanding of the competencies and the rating scale
- Using the online questionnaire

The objective of the process was made explicit by clarifying that the process was implemented (a) to assist students in their development of leadership competence, and (b) *not* to use it as evaluation criteria for their final grade. In the training, explanations were provided on the definitions of the competencies against which leaders' performance would be assessed. Information was provided about how to access the web-application and how to complete the survey on-line.

Ground rules governing the issues of *confidentiality* and *anonymity* were also communicated. It has been ascertained that all individual responses would be kept confidential and would be stored in an electronic database. Students were informed that the scores would be averaged across all members of a team to protect the rater anonymity.

(c) *On-line application and feedback reports*

The application took place in the beginning of the second academic semester (February) allowing the first year students to have had observations on their team leaders for at least four months as suggested by the literature [4]. The week following the training, invitation emails were sent to students to inform that they can access and complete the survey questionnaire. The emails included the information about the URL link to the survey, the password and username required to access the survey.

Upon the completion of surveys all the ratings were then collected and compiled into a feedback report and mailed to leaders. The feedback provided the following information:

1. Competency Model: Shows the competency model (competencies and their definitions in the dictionary) that the feedback is based on.
2. Competency Profile: Utilizes a radar diagram to summarize 360 feedback degree ratings for each of the eight competencies. Each one of the competencies is described by five behavioural statements and the ratings for each statement were collated and then assembled under their competency headings and then averaged. The ratings are summarized according to the respondent type (self and team members). For team members, ratings are averaged across that group. Any ratings for “I can not evaluate” are simply excluded from the averaging process (Fig 3a).
3. Behaviour Profile: Utilizes bar charts to represent the ratings for each one of the five behaviours that make up a competency (Fig 3b). Averages are presented for each respondent group. The behaviour average score shows the average of all rater scores (members and self) for each of the behaviour.

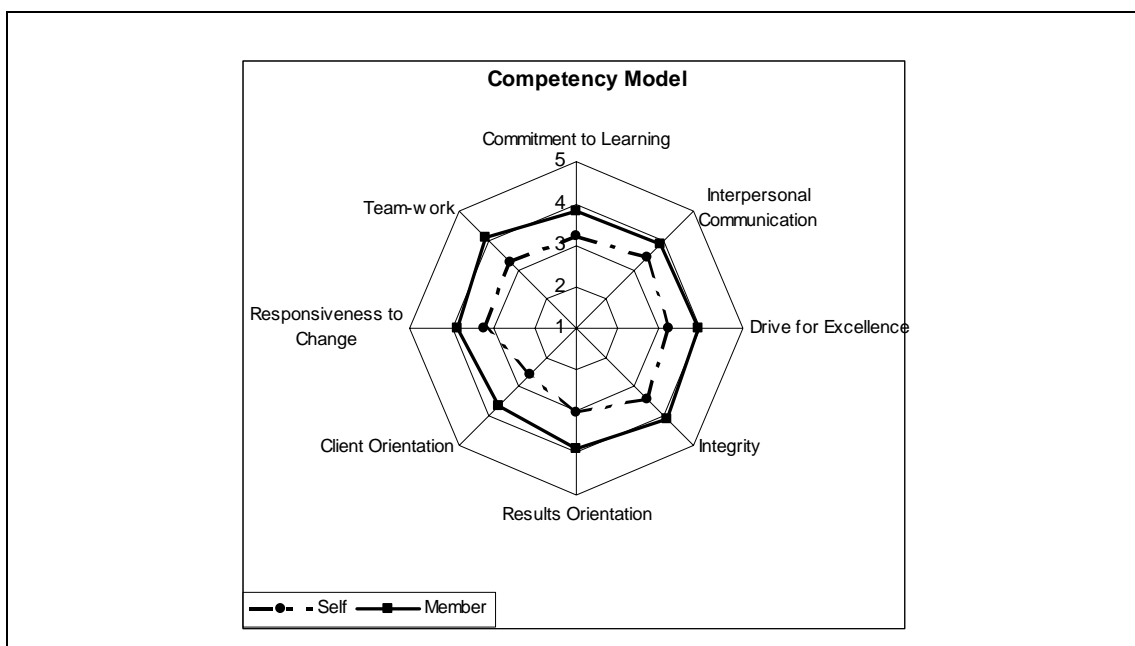


FIGURE 3a: Radar diagram illustrating the summary of ratings for each of the eight leadership competencies evaluated through 360 degree feedback process

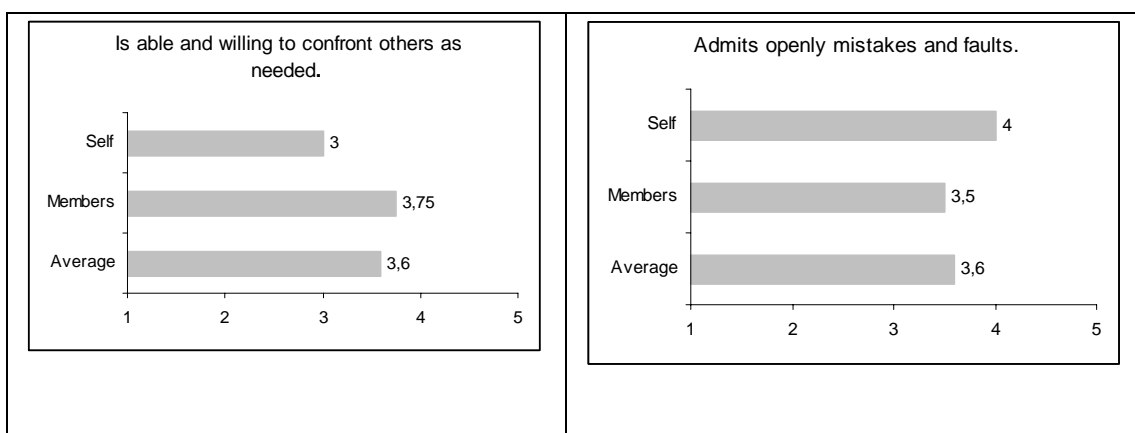


FIGURE 3b: Bar charts illustrating the ratings of two exemplary behavioural dimensions that make up the competency “integrity”

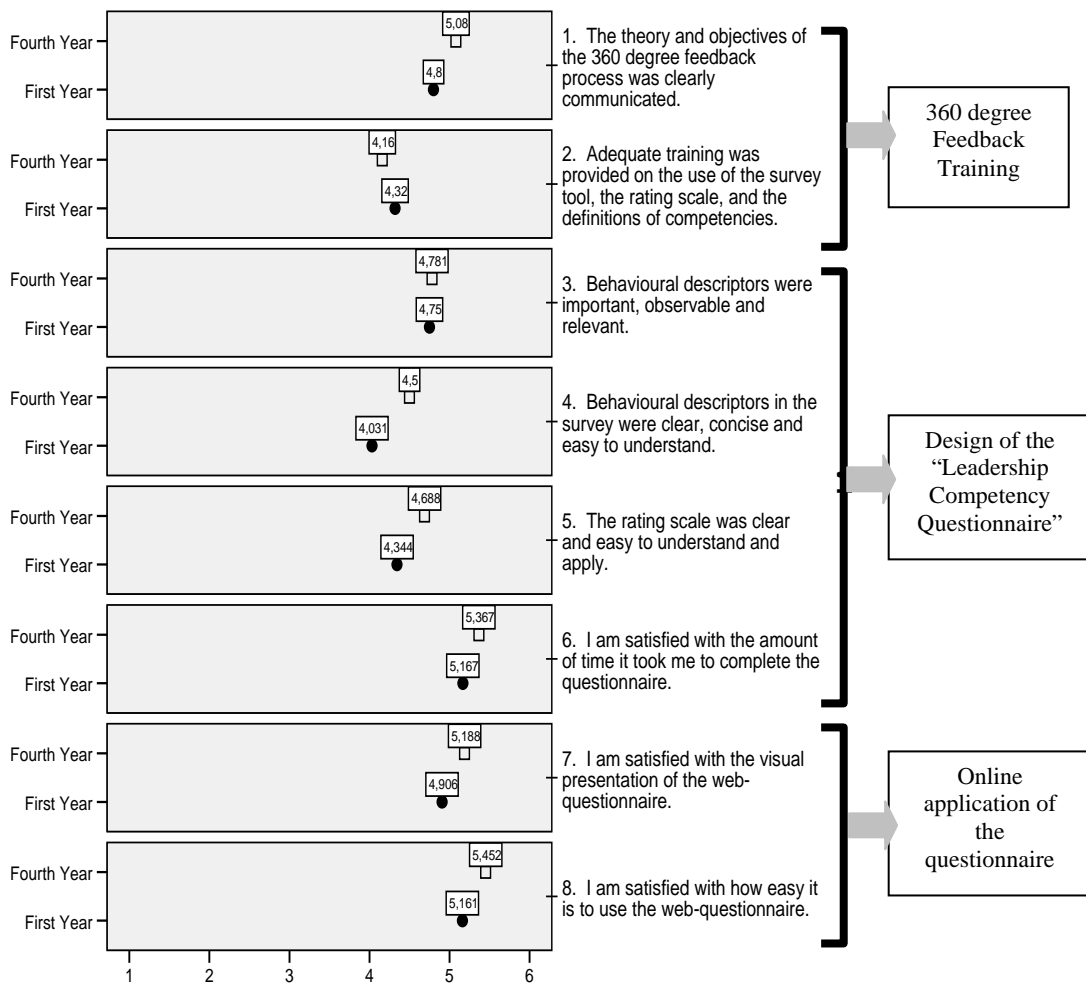
(d) Evaluation of the effectiveness of the 360 degree feedback process implementation

A mini-survey was devised to obtain students reactions and perceptions about the effectiveness of the 360 feedback process implementation using the following three criteria:

- 360 degree feedback training (two questions)
- Design of the “Leadership Competency Questionnaire” (four questions)
- Online application of the questionnaire (two questions)

The mini-survey contained a total of eight items and the students (first and fourth year) were asked to rate each item on a 6-point Likert-type scale, where 1=Very strongly disagree and 6= Very strongly agree.

The mean scores regarding students’ level of agreement with the mini-survey items are summarized in Figure 4. Generally, students’ reactions to the implementation of 360 degree feedback process were very positive. Student report high levels of agreement with the mini-survey items (mean scores > 4).



1=Very Strongly Disagree, 2=Strongly Disagree, 3=Disagree, 4=Agree, 5=Strongly Agree, 6=Very Strongly Agree

FIGURE 4: Students’ level of agreement with the mini-survey items

Students agreed that the objectives of the 360 process were communicated clearly and that adequate training was provided on the use of survey tool and rating scale.

Students agreed that the behavioural descriptors in the Leadership Competency Questionnaire were important, observable. They also agreed that those descriptors were also clear, concise and easy to understand. Likewise, the rating scale was reported to be easy to understand and apply and the time required for the completion of the questionnaire was found to be satisfactory by the students.

Students highly agreed that it was easy to use the questionnaire online. Students were satisfied with the visual presentation (i.e. readability of text on screen, colour) of the online questionnaire.

5. CONCLUSIONS:

This paper has explained the implementation of a 360 degree feedback process to assist engineering students in their leadership development. As a part of the study, a “Leadership Competency Questionnaire” was developed and applied as an online questionnaire. In general the students demonstrated positive reactions to 360 degree feedback process and its implementation. The implementation of this process to the PMP course was found efficient in terms of the design of the questionnaire, its online application and students training about the process.

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