PLAYING WITH DIVERSITY AND CONFORMITY IN DESIGN-ORIENTED PROJECT MANAGEMENT EDUCATION

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ABSTRACT
Teaching in higher education has been facing a series of challenges, both in terms of the nature of the demands and dynamics of the market, and also with respect to the continuous expansion and diversification of student populations. Thus, universities have been developing their own combined teaching strategies in order to teach contents. Instead of focusing only on rote learning, which is characteristic of conformity education, diversity education has emphasised the importance of reflection and individual inquiry, as well as problem-solving, collaborative learning and mastery of key concepts. In this contemporary educational scenario, feedback is considered as a powerful educational tool for promotion of student engagement and deep learning. Feedback can contribute to the improvement of both students and teachers, because it enables processes of reflection which lead to a better understanding of the content and provide valuable information to assist in the design of clearer guidelines. This study aims to demonstrate the importance of using feedback as a catalyst for combined practices for design-oriented project management education. Through the analysis of the case of a project management course offered to undergraduate students of design in a Brazilian university, it was found that the use of various feedback mechanisms, as a means of improving the course, can facilitate the combination of the conformity and diversity teaching strategies.

Keywords: Blended-learning strategies, feedback, design-oriented project management, tabletop games

1 INTRODUCTION
Teaching in higher education has been facing a series of challenges, both in terms of the nature of the demands and dynamics of the market, and also with respect to the continuous expansion and diversification of student populations [7] [14]. Therefore, universities have been developing their own teaching strategies by using different approaches to teach contents [9]. These new strategies provide students with the opportunity to develop individual skills and talents for creation of innovative and effective solutions [9] [16]. In order for such strategies to be long-lasting, educational approaches should be developed whilst taking into account students' opinion about the themes, as well as their concepts and possible misunderstandings [9]. This integration (education/individuality) is necessary for the production of motivating high-quality teaching strategies, provided through a variety of methodologies and technologies [19] [16]. In this respect, when teaching strategies in the traditional method of teaching (conformity) are combined with various teaching methodologies (diversity), they have proved to be very effective [8]. This combination can facilitate the creation and use of instantaneous feedback, and it represents valuable learning opportunities for students and teachers [8] [10]. Thus, the aim of this study is to show the importance of using feedback as a catalyst for combined practices for design-oriented project management education.

2 FEEDBACK AS A CATALYST IN EDUCATION STRATEGIES
Instead of focusing only on rote learning, which is characteristic of conformity education, diversity education has emphasised the importance of reflection and individual inquiry, as well as problem-solving, collaborative learning and mastery of key concepts [13]. In this contemporary educational

scenario, feedback is considered as a powerful educational tool for promotion of student engagement and deep learning [7].

The use of feedback is not necessarily connected with a single instructional event, but rather with a corrective process that provides a new learning situation [4] [10]. This process is linked to summative and formative assessments. Summative assessment measures students' performance at the end of the instructional process by comparing it with some standard. By contrast, the aim of formative assessment is to improve students' learning and motivation through continuous feedback [7] [5]. Feedback resulting from types of evaluation can be divided into three general categories: 1- motivator: influences beliefs and encourages participation; 2- reinforcement: rewards or punishes specific behaviours; and 3- information: changes performance in a particular direction [15].

Progress that occurs in feedback-oriented teaching strategies is concatenated, i.e., feedback that is provided at any given moment is always influenced by previously taught content [10]. Thus, teachers who create differentiated teaching structures in the classroom, for example, by using teaching strategies that combine conformity and diversity approaches, or different forms of evaluation, and even different grouping structures, can influence students' motivation and learning patterns, as well as classroom environment [13]. Knowledge about such information may affect the relevance and choice of contents, and also the strategies employed by teachers.

It can be seen, thus, that feedback can help both students and teachers develop further, because it enables processes of reflection [16]. As a result of these reflections, students understand the content and learn better in the long term, and teachers have valuable information on the effectiveness of the process of instruction, which can help them offer clearer guidelines to students [16] [7]. A significant interaction is created between the needs and objectives of teachers and students.

3   METHODOLOGY

This is a descriptive qualitative study that seeks to analyse the case of a project management course offered to undergraduate students of design in a Brazilian university. The design programme lasts for ten semesters, and the course in question is mandatory and offered in the eighth academic semester. The period of data analysis covered the interval between the years of 2009 and 2017, in which the course was taught by one of the authors of this article.

The initial design of the course, in 2009, sought to take into consideration the need for students to develop their skills and competencies [9] for management of design projects. For such purpose, the strategy adopted was to divide the content into project management modules in accordance with the PMBOK knowledge areas [17]: integration, scope, schedule, cost, quality, risk, procurement, communications and human resources. PMBOK was chosen because it is widely used in project management courses and in the business environment.

One of the main challenges found when using in the first edition (2009) was attractiveness, i.e., how to make the course interesting to students. The initial teaching approach focused solely on a conformity education strategy, by means of theoretical classes only, with content geared towards the creation and design of graphic and industrial products. However, there was no formal contact with consolidated project management practices. To face this challenge, a decision was made, in the second half of 2009, to address a diversity education strategy, thus changing the course into a game in which students played the role of designers who worked in a product-developing enterprise, while the teacher played the role of CEO of the company [1].

The course follows the open systems model (Figure 1), where the input phase refers to the variables identified in the context of learning by means of previous data, information or knowledge. The operations phase transforms the inputs in order to encourage creative and divergent thinking by using procedures to interpret, explain, configure and show the existence of several possible approaches to the events that might occur in the learning environment. The outputs deliver the outcome of the process, and explicitly introduce the knowledge paths that are translated into action paths [18] [2]. Feedback represents the information about the performance of the system, which can be used to control its future operation; it indicates how well or not actions are performed [18] [2] [3].
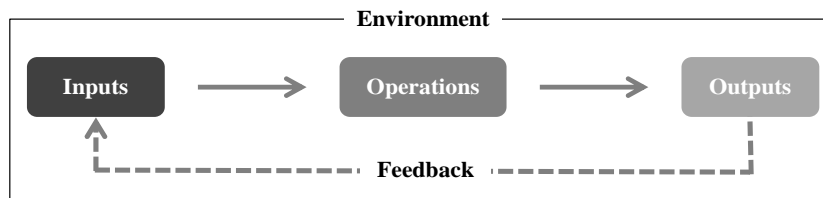
Figure 1. Open System Model [18]

To start the project, students are divided into groups of 4 to 5 components. In the first class, students are introduced to the context of the game: "A game company hired the teacher's company to develop a board game". These are the rules to develop the project: (1) The game should be played in up to one hour; (2) at the end of the course, you should deliver a high-fidelity prototype of the game and a project management folder containing all documents generated, monitored and reviewed for the development of the game; (3) there will be a "testing class" where the games will be played and tested by guest evaluators. This class is used as a source of market feedback from prospective consumers; (4) after the testing class, students will evaluate the lessons they have learned in the course and provide feedback on them.

Support for development of the game is provided through modules that contain theoretical classes about the content of the PMBOK guide, and practical lessons involving the application of the content of PMBOK guide. At the end of each module, a student from each group presents how they implemented the management project of the respective PMBOK area. Feedback is given by the teacher to the students during the presentations. Feedback from students and teachers is recorded in the teacher's field notes and serves as evidence of the analyses that are discussed later in this article.

4 STYLES OVERVIEW

The experience with the diversity strategy was replicated and improved throughout 12 semesters. In this period, 36 tabletop games were developed and the course was attended by 160 students. Also during this period, the teacher used the feedback from students and post-facto reflective analysis to understand and develop teaching approaches that are more appropriate for the different stages of the course [16] [13]. Figure 2 shows some examples of games developed previously.

Figure 2. Example of games developed previously in the course

During the development of the course, feedback was provided by means of the relationship between different actors at different stages. This relationship has allowed multiple correlations and a favourable development of the final object of the course. In this sense, it was found that different approaches to teaching (conformity or diversity) are more appropriate for certain stages of the course [8] and the choice of this approach depends on which variable is being worked on. For the purposes of research, feedback was classified into the following types:

- **Teacher-Student**: when a teacher analyses students' works and/or presentations, talks to them about the progress of the project and/or clarifies doubts during the presentation of theoretical and/or practical contents;
- **Student-teacher**: when a student asks the teacher about certain contents, clarifies specific points and/or makes suggestions to improve the course;
- **Student-student**: when a student makes suggestions to improve the work for another component of their own group or another group, or makes a self-assessment, in an attempt to improve their own work;
- **Teacher-teacher:** when a teacher makes a self-assessment on the teaching process that is being

developed, or when teachers of related areas make suggestions for possible improvements to be implemented.

For analyses and discussions about the feedback process developed in the course, feedback was associated with four variables of analysis:

1. Workload of theory and practice of the course during the semester
2. Complexity of the theory
3. Quality of the project to be developed
4. Practical applicability of the content

About **1. Workload of theory and practice of the course during the semester:** The course currently has 60h of instruction, divided into 20h of lectures and 40h of practical. In 2009, classroom hours were 30h for lectures and 30h for practical. Until 2011, students had to take two theoretical exams. In 2011, the teacher was questioned by a student: "[...] could you possibly assess students' performance differently? Theoretical exams are time-consuming and we could end up with a better project by the end of the semester if we did not have to worry about memorising theoretical content." The student stated that the quality of the project was being impacted by the workload and that he had difficulty in associating theory with practice. This feedback offers evidence that, in order to improve students 'learning performance, the teacher would have to combine teaching and assessment strategies with students' individual thinking styles [20] [16]. Ever since, the theoretical exams have replaced with the practical application of the theoretical contents during the lectures. This change was also driven by the teacher's self-assessment: in search of possible opportunities for improvement, he began to study the process of game developing more deeply and chose to gamify the course. Gamification has broadened feedback processes by providing greater agility and assertiveness in problem-solving. For example, when students report delays, the teacher asks if the project plan is being implemented and controlled, and he suggests ways to reduce the effects of uncertainties and make students anticipate contingencies. The results are positive: "[...] the course has helped me to carry out the project on time ..." or "... we should have had this course since the beginning of our undergraduate course.".

Another aspect that should be highlighted is variable **2. Complexity of the theory**: it was found that it results from the fact that some students essentially object to dealing with subjects whose content they had never been in contact with. The complexity of the content can be reduced if the teacher shows how it can be applied practically and how much such applicability can impact the quality of the project; i.e., if students can really understand the possibilities and implications in all related technical and non-technical courses, and if they have a good overview on strategies [6] for the purpose of project development. Furthermore, the process of reflection plays an important role in the learning process and helps students improve their performance [12]. Students will have a better understanding of the learning content if they can better reflect during the teaching process [16]. One relevant point in the development of the course is the decision about who would take the position of project manager. In the first semesters after gamification had been introduced, only one student assumed the role of project manager while the other team members worked as company employees. After the presentation of the framework [1] at the E & PDE 2015 conference, one participant suggested that students should take turns as project managers to allow all of them to experience the role. This change was important because the students who did not manage the project failed to have practical experience in management.

Feedback is based on reality, and the usefulness of this process lies in the fact that it is a direct and immediate intervention, stemming from continuous results [10]. Under this aspect, variable **3. Quality of the project to be developed**, presented positive results when students actively participated in the course and in the development of the project. This participation takes place by means of asking questions; sharing previous knowledge, opinions and criticisms that may positively impact and transform the development process of the project [11]. Therefore, the database of the academic system of the university was searched to check for data on evolution of the scores given by students to the course and to the teacher. Unfortunately, there were no records of assessment throughout the period of analysis. Figure 3 shows a trend, estimated by moving average, of two periods that show an increase in the score given to the course. It can be inferred that the actions taken with a view to improving the course have been effective. Scores vary on a scale from zero to five.
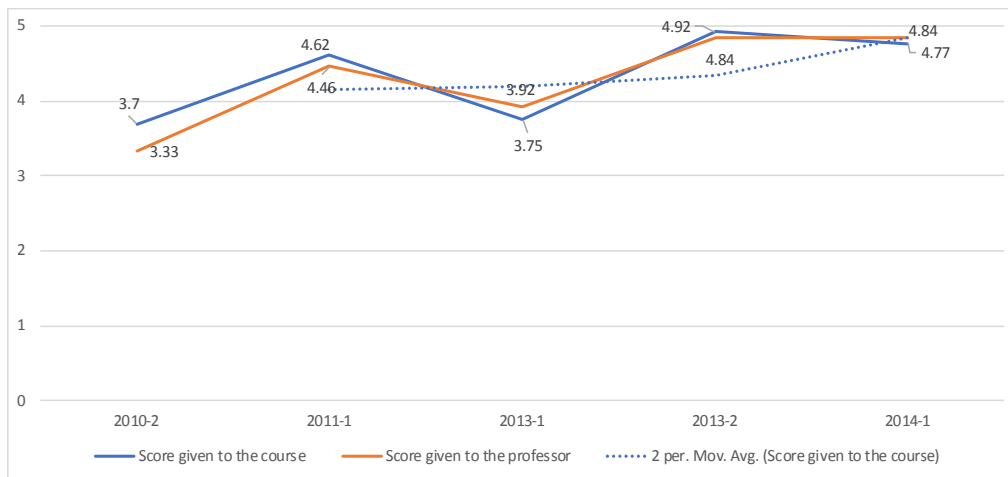
Figure 3. Assessments available between 2010 and 2014

And finally, for variable **4. The practical applicability of the content**, one example is the case of the risk of late delivery of the final prototype. The delay would be caused by the packaging of the game, if packaging were scheduled for the period between Christmas and New Year, because suppliers traditionally close and reopen in the second week of January. However, delivery of the prototype was scheduled for the first week of January. The groups detected the risk and adjusted a work plan to finish the task before Christmas. However, despite the risk, one group maintained its initial schedule and eventually faced the delay of the plotting company. As a consequence, they had a late delivery of their prototype. This was the feedback given by one of the students: "[...] we should have followed the suggestions made by the other groups and by the teacher about this.". This result shows that the presentation of the applicability of the theory should be included in the theoretical classes, and that students are more likely to be involved in a specific task when they expect to do it well and when the task is valuable to them. This is related to individual differences in motivation, which can be influenced by both the environment and education standards. In this respect, goal-based classroom strategies positively influence the behaviour and learning of students by shaping the type of personal goals that students adopt [13].

5 FINAL REMARKS

The aim of this study was to show the importance of using feedback as a catalyst for combined teaching practices in the field of design-oriented project management. Teaching strategies should combine moments of conformity and diversity approaches, thus providing students with differentiated learning experiences, when compared with classroom experiences focused only on the conformity strategy [8]. Through the analysis of the results, it was found that the workload of the course is a determining factor in the decision-making process, as regards the predominance of conformity or diversity approaches. It can be inferred that in courses with a higher workload of theoretical contents, it may be difficult to implement diversity approaches. In this case, a balance should be struck in the proposal of content and its practical applicability, because it was found that students adopt a more positive and adaptive approach to learning when the environment emphasises learning, understanding and improvement of skills and knowledge [13].

Learning is not a passive process, and students' commitment is one of the key success factors of the diversity approach. Allowing students to remain as passive recipient's leads to a minimally effective teaching process. This means that teachers should offer survey questions as well as exercises that allow students to actively show how much they know about the contents discussed in the classroom [10]. It was found that feedback can be highly motivating if it is designed and implemented in an interactive, timely and integrated manner. When teachers use objective and easily accessible criteria, apply clear principles, provide clear models and guidelines and make students familiar with giving and receiving feedback, they can enhance students' learning and performance in the classroom [7]. The four types of feedback present in the course allow the teacher to assess what, in fact, can be directly applied in the real world; this is essential to ensure the effective implementation of improvements to the content. These improvements require the teacher to update with market practices on a regular basis and make a critical analysis about the need to break paradigms. One cannot overlook the fact that

feedback is a mutual process, in which both parties, students and teachers, must exchange attention [10].

The experience gained in the course discussed in this article suggests that the better students understand the theoretical content, the less often the conformity approach is required. This opens up space for use of non-conventional teaching techniques. It seems that the use of various feedback mechanisms as a means of improving the course can facilitate the combination of conformity with diversity. According to students' performance, and based on the feedback used in the classroom, it is up to teachers to identify the most appropriate approaches to specific contexts.

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