

Comparison of face-to-face and online teaching in engineering degrees: a case of study at U-tad university

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EXTENDED ABSTRACT

1. INTRODUCTION

In recent years, the teaching of engineering degrees has undergone significant changes. These changes are mainly focused on the incorporation of new technologies to support teaching, possibilities of studying the degrees in English as well as the on-line option, which is highly valued by students who combine work and study. The possibility of studying engineering degrees in English has been available at most Spanish universities since 2007 when Spain joined the European Higher Education Area. When Spanish universities joined this new area, they followed the lines of work of European universities and, at present, most institutions offer courses taught in English with the aim of increasing competences in this field, attracting foreign students and teaching staff and obtaining better results in higher education rankings [1], [2]. On the other hand, on-line training in Spanish universities is another booming phenomenon. This growth was very relevant during the Covid-19 pandemic and is currently a growing option in our country, together with the option in English [3]. The incorporation of modalities in English and online covers a very interesting area for university students from the point of view that skills are applied, and, on the other hand, they improve access to university studies, especially for those who need to combine work with university education. These teaching models are not new in our country since there are even universities that have been born with the purpose of specializing in this specific training modalities. Universities such as the UNED or the UDIMA are already born as universities for distance/online training [4], [5]. Other universities, especially those based on a private operating model, include the possibility of studying engineering degrees in English as another common option. These new modalities require adaptations in teaching methodologies in order to achieve a similar quality regardless of the mode of study chosen by the student. The aim of this work is to analyze the methodologies applied to B. S. computer science degree courses at the U-tad university center. This university combines the three modalities described in this work, i.e. face-to-face mode in Spanish and English, while offering the same degrees in online mode. In this context, the aim is to describe the methodologies applied in each of the modalities and to analyze the results obtained in the 2023-2024 academic year. In this context, the main purpose of the study is to be able to apply the methodology developed, to incorporate improvements over the next academic years and to measure the effectiveness of the whole process.

2. METHODOLOGY

The methods to be applied are based on statistical analysis using boxes and whiskers for the academic results and grouping of representative categories in the case of the surveys. The study focuses on the degree in Computer Science taught at the U-tad university center for the 2023-2024 academic year, specifically on the subject of computer networks, given that it is a representative case of the teaching given at this center. After describing the three modalities of study available, two face-to-face (Spanish and English) and one online, both academic data and surveys carried out by students are analyzed. After this step, different improvement actions are proposed to improve both the academic results and the levels of satisfaction analyzed. The proposed methodology follows an iterative model, in such a way that, each academic year that is analyzed, the measures applied in the previous year can be validated or new ones can be proposed to continue improving the academic and satisfaction indicators.

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3. RESULTS AND CONCLUSIONS

3.1 Lesson learned

- The online modality is the one that has the best academic performance and is also the most highly valued by students.
- It has better academic performance in the face-to-face mode in Spanish than in English, although students are more satisfied in the English mode.
- Although in the face-to-face mode the final exam carries little weight in the overall grade, there is a high correlation between the final exam grade and the overall grade for the course. This implies that both assessment methods, face-to-face and online, are similar.
- The face-to-face modality uses more traditional methods of evaluation such as practical projects and exams. On the other hand, the online modality incorporates new forms of evaluation such as theoretical tests and discussions, obtaining better academic results and student satisfaction.

3.2 Proposals for improvements

- Given that the online modality obtains better academic results, it is proposed to include in the face-to-face modality debates that are the best academic response obtained.
- The face-to-face modality in English obtains worse academic results than the Spanish modality, if with the previous measure, including discussions, does not improve, technological tests could also be included as an additional option.
- The online modality is the best accepted by students, given that the two measures previously exposed incorporate elements of the online modality to the face-to-face one, it is expected that the surveys will present better results once these measures are incorporated.

After analyzing the three study modalities available at the center, face-to-face in Spanish, face-to-face in English and online, interesting correlations can be found between the methodologies applied and the results obtained. With this knowledge, this work proposes actions for improvement in the different modalities in order to continue improving both academic results and student satisfaction. As a relevant point of this work, apart from proposing the aforementioned actions, a framework is proposed that facilitates the analysis of academic results and student surveys in order to identify possible actions for improvement. On the other hand, it is important to emphasise that the proposed methodology follows an iterative model, so that each academic year that is analyzed can validate the measures applied in the previous year or propose new ones. This is due to the fact that the proposed framework is sensitive to both the sample of students analysed and their profile can vary considerably from one academic year to the next.

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