QUALITY ENGINEERING: AN EXPERIENCE IN TEACHING STATISTICS FOR ENGINEERS

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INTRODUCTION

In quality engineering, statistics focuses on manufacturing and process control, analyzing variation and quality in products, seeking to track process stability. In this sense, the main applications deal with statistical quality control in the analysis of the measurement system, experiment design and the Six Sigma methodology. All these methods use standardized procedures for data collection and analysis in order to identify, treat and eliminate sources of error in pursuit of continuous improvement in the quality of products and processes. Industrial engineers have contact with quality engineering at the end of the undergraduate program and this article aims to present and analyze some pedagogical practices that are applied in a class in an engineering program. The main goal of the course is to enable students to understand and use the techniques of quality engineering. As for specific objectives, at the end of the course, the student should be able to understand the importance of statistics for quality engineering, the fundamental principles of statistical process control (SPC), the use of process capability indices, acceptance sampling and the philosophy of the Six Sigma methodology. He should also be able to evaluate criteria and measures of quality of a product, make reproducibility and repeatability studies and have notions of the design of experiments.

PEDAGOGICAL PRACTICES

This course is taught in the classroom as part of an engineering program that is offered at night. Thus, there are lectures in order to expose the concepts and theoretical background necessary at the beginning of each unit. The Moodle platform is used as a support tool for classes. In addition to the lectures, guided exercises in the classroom and also solving exercises in the computer lab are performed. It is noteworthy that the activity in the classroom is crucial because, as the course is nocturnal, students do not have much free time to study outside of class.

Activities in the laboratory require application of control charts, process capability analysis, reproducibility and repeatability studies and introduction to the design of experiments. Starting on the second week of school, activities in the laboratory often have a weekly meeting. Regarding the Six Sigma methodology, the students had to do reviews of recent scientific papers published in conference proceedings and journals in the area of production engineering.

We don't have criteria for the comparison of results yet, since it is the first time that the course is offered completely in this way, going beyond the lecture and grading only on tests and written assignments. We know, however, that there is much to be done. One problem is that some students have difficulties in basic statistics, not knowing how to interpret simple charts like histograms and boxplots, and difficulties in understanding the classic statistical tests. Thus, at the beginning of the semester, a review of basic statistics is still done. Another difficulty is that as the course is nocturnal, students have little time for studying outside of class, as most of them work during the day. Thus, the class had to be designed to provide room for many activities. However, this gives another character to the class, making it more dynamic, with greater interaction between the class and the teachers. And there is yet another particular aspect. Some students already work using the studied methods in their day job, thus bringing experiences, questions and even suggestions that enrich the teaching learning process

CONCLUSION

This article focused on some teaching practices with quality engineering classes. Although the activities have had positive aspects, this project, as part of the teaching learning process, does not end here. Above all, we want the students, future engineers, to see statistics as a science present in their daily work, and also as an important field for continuing education.

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