

# Teaching Six Sigma Quality with R

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*Abstract: In this work, we show how we are joining Six Sigma and R software with applications in teaching Decision Sciences and Technologies, allowing the inclusion of emerging trends as open access and active learning using new technologies and explaining innovative methods of teaching and assessment, such as automatic generation of exams or reproducible results materials. We also describe our experience in implementing it within a course of Quality Six Sigma of the VRTUOSI project.*

*Keywords: Six Sigma, Software R, Teaching, E-learning, Open Source.*

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## 1 Introduction

Decision Sciences and Technologies entail a wide set of methodologies and tools suitable for many disciplines, including politics, research or business management among others. Statistics appear during the application of decision making one way or another.

In this work, we show how we are joining the Six Sigma methodology [3] and the R software [4] with applications in teaching Decision Sciences and Technologies using innovative methods of teaching and assessment.

## 2 The Six Sigma Paradigm

Six Sigma is a quality methodology for process improvement, whose main strength is its ability for translating the complicated scientific terminology into an easy way to apply science to quality improvement within organisations. As it implies the use of statistics and science, we consider it is one of the Decision Sciences and Technologies fields of application. Moreover, it can be used in corporate environments (for both production and services) and in public services, including education or healthcare. The basis of the Six Sigma methodology is the DMAIC Cycle (Define, Measure, Analyze, Improve and Control). The DMAIC cycle and other Six Sigma key concepts are introduced in the paper.

### 3 The R Choice

R is a system for statistical computing and graphing. It comprises a language, and a software environment. The R system has been increasingly used in academia and research from its beginning, and it is becoming a real alternative to commercial software in corporate environments. The R system is open source, and it is available for a number of platforms and configurations. The advantages of using R for teaching Decision Sciences and Technologies are reviewed in the paper, along with its reproducible research capabilities.

### 4 Teaching Resources

Some teaching resources are referred to in the paper from the author's successful experience. The "Six Sigma with R" book [2] contains a Use Case and a number of reproducible examples to enhance active learning. The SixSigma R package [1] available at CRAN<sup>1</sup> comprises functions and data sets for both learning and applying Six Sigma using R. Finally, a guide for preparing homogeneous and coherent materials, assignments and exams mixing R and LaTeX is outlined.

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<sup>1</sup> The Comprehensive R Archive Network (<http://cran.r-project.org>)