

Similarities and Dissimilarities in Student Grades Distributions, Over Time and By Gender

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Abstract

The distribution pattern analysis of student grades, over time, for different subjects and by gender is the main focus of this article. More precisely, we will look at the last term grades that were given in all Portuguese public schools by upper secondary teachers to their students, in four subjects (Mathematics, Portuguese Language, Philosophy and Physical Education), from the academic year 2013-2014 until the academic year 2017-2018. Since last term grades summarise teacher's perception about the knowledge acquired by the students during all the academic year, some regularity in grades distributions was expected over time for a particular subject. It turned out that the similarity of the grades over time obtained in each subject was so impressive, that differences could hardly be noticed just by eye inspection. Due to the very large sample sizes (in the order of tens of thousands), the quantification of similarities and dissimilarities was done through distribution's proximity statistics and not by classic statistical methods, like Chi-Square or comparison of means tests. Additionally, we applied a methodology of multiple equivalence tests to globally compare the relative frequencies of each of the grades in pairs of independent samples. The similarity was proven whenever facing the same subject over the years and the differences between subjects and gender were also revealed.

Keywords: student grades, distribution's proximity statistics, equivalence testing, gender disparity