Chapter 4
Evaluating E-Assessment:
A Practical Application Using Statistical Methods

José Azevedo
Polytechnic of Porto, Portugal

Patrícia Damas Beites
Universidade da Beira Interior, Portugal

Ema Patrícia Oliveira
Universidade da Beira Interior, Portugal

ABSTRACT

Assessment is an important phase of the teaching and learning processes. Assessment generates a big amount of data, which in the case of summative assessment is in the form of students' grades. In e-assessment application, these grades are easily collected and stored. The analysis of the grades is very important to directly evaluate e-assessment and thus indirectly evaluate the teaching and learning processes. This chapter presents a practical example of analysis of grades obtained during an e-assessment process implementation using statistical methods. Important tips on how to correctly use these statistical methods are presented throughout the chapter. The analysis concerns seven years, and a positive evolution of the grades is verified.

INTRODUCTION AND BACKGROUND

The term e-assessment includes the entire assessment process, covering a wide range of activities from the design of the task to be assigned, to the storage of the results, going through the delivery of assessments, classifications and all the reporting processes, storage and data transfer associated with both the internal and the external assessments, using Information and Communication Technologies in any of these activities (JISC, 2006, 2007; Stödberg, 2012). With the stored data, Leaning Analytics and some classical statistics can be applied to extract information. Thus information can be used to test improvements, or to do some changes in the following years in the planning of the courses that we are teaching. It

DOI: 10.4018/978-1-5225-5936-8.ch004

can also be used to implement some changes in the teaching and learning processes. Thus, e-assessment can be used as a measure of the progress of the teaching and learning processes (Wong, 2007).

One of the advantages of e-assessment is that it is easier to collect data, to calculate statistical analysis and test results (Bible, Simkin, & Kuechler, 2008; Brown, 2001; Burton, Sudweeks, Merrill, & Wood, 1991; Camilo & Silva, 2008; Douglas, Wilson, & Ennis, 2012; Green & Mitchell, 2009; Guo, Palmer-Brown, Lee, & Cai, 2014; Haladyna, 2004).

This present chapter describes the analysis of the evolution of students' classifications over seven years in two different Curricular Units. During these seven years, a new assessment strategy based on e-assessment was implemented. For both the Curricular Units, three different periods of implementation were considered and compared over time. These periods have been considered in view of the changes that were introduced and grouped according to the profound differences between them. This chapter presents to those who apply e-assessment a robust way of analyzing the evolution of students' classifications.

We intend also to show how useful is ANOVA in the context of e-assessment and, in addition, show how to choose some statistics tests according to the characteristics of the samples.

METHOD

The evolution of the final grades (the scale of the grades ranges from 1 to 20) of the college students in two curricular units throughout seven years was analyzed, considering the average of grades and the proportion of positive grades, in three clearly distinct periods of implementation of an e-assessment strategy.

All the data referring to the grades of the students presented in this chapter were collected from the database of the Institution, and with the proper authorization of the Dean of the school.

After being collected, the data were later processed, as they had some coded information that needed to be corrected, for example, students with grade "88" were students who had in the meantime given up. These students were removed from the database. Another situation that was corrected was that many students had more than one grade in the same curricular unit and the same year, because the database contained the grades of the several exams that the student had carried out during that year (continuous assessment, second examination period, etc.). The repetitions were eliminated leaving only the higher grade, since this is the grade that will be assigned to the student.

In order to analyze and interpret the data, we made use of descriptive statistics and statistical inference, using MS Excel™ as the main working tool. Within the scope of the descriptive statistics, tables and graphs were constructed, and the calculation of some localization and dispersion measurements were performed, which essentially summarize and describe the data. In the scope of the statistical inference, among other tools, we used several hypothesis tests, in particular applying the variance analysis (one-way ANOVA), which allowed us to draw conclusions on the data.

As previously mentioned, the MS Excel™ was the main tool used to analyze the data. However, its add-in "Data Analysis" does not have most of the required statistical tests or they are not sufficiently complete to allow their application in this context. Accordingly, it was decided to install the free distribution add-in Real Statistics[1] (Zaiontz, 2015). Therefore, the data analysis for this chapter was performed using the add-in Real Statistics Resource Pack software (Release 4.3) Copyright (2013 - 2015). It does not contain the *Marascuillo* Method, the *Chi-Square* test for proportions of more than two variables, or the Bartlett test. To use these last methods and tests we have made the calculations with the appropriate MS Excel™ formulas.

Antecedents of Instructor Intention to Continue Using E-Learning Systems in Higher Learning Institutions in Tanzania: The Influence of System Quality and Service Quality

Deogratius Mathew Lashayoand Julius Raphael Athman Mhina (2021). *International Journal of Technology-Enabled Student Support Services (pp. 1-16).*

www.irma-international.org/article/antecedents-of-instructor-intention-to-continue-using-e-learning-systems-in-higher-learning-institutions-in-tanzania/308461