SEEQ Questionnaire for validating the teaching improvement when introducing Digital Storytelling in Higher Education

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• Ability to understand, apply and manage the warranty services and insurance of computer systems (GIITI).

On the other hand, the assigned transversal competences are not less important. Thus, this module must develop the following ones:

• Effective communication (in oral expression and comprehension), knowledge, procedures, results and ideas related to ICT, with special emphasis in writing technical documentation.

• Motivation for enhancing quality and continuous improvement, behaving with strictness, responsibility and professional ethics.

Due to the active concern for teaching that the teaching team of this module has always had [2], they have been carrying out the questionnaire SEEQ (Student’s Evaluation of Educational Quality) [3] since the 2012-13 academic year, year by year until present day. Just the evolution of these results is what we show in this paper.

In addition, the University of Extremadura also carries out its own quality measurements and student satisfaction surveys every academic year, leaded by the Vice-chancellor for Teaching Quality. It is part of the ongoing strategic plan [4]. Student opinions about each teacher are collected and processed for the report that is provided to the College Board and University Managers. However, in spite of the fact that the university has already an official system as described before, this teaching team tries to have a summative and formative evaluation of the module unit [5], which allows to identify strengths and weaknesses of the teaching-learning process. This complementary assessment will enable us to reflect and take the necessary decisions to enhance the teaching programme, and thus we will be able to solve those detected deficiencies or insufficient aspects concerning the performed actions in the classroom.

II. OBJECTIVE

The primary objective is to ensure that students become active subjects of the teaching-learning process in which they are part from the first day of attendance to the module classes. To this end, in the present course 2016-17 the use of Digital Storytelling [6] [7] has been introduced for the development of ECTS activities [8], with the aim that the students improve the acquisition process of transversal competences of the subject.

III. USING DIGITAL STORYTELLING

It is known that there are many definitions of Digital Storytelling. However, there is not much controversy about what it really means. In summary, Digital Storytelling can be defined as storytelling with support for multimedia elements (images, audio, music, text, etc.) and their actions (transitions, accelerations, etc.) [9]. Nowadays, the possibilities offered by the new technologies should make us think of a new language or rather new forms of expression and communication. This can be evidenced in the current boom of products related to multimedia (animated Power Points, memes, videos, etc.). In fact, some author [10] defines it as a new genre, cited by [11].

This paper examines if this change in the teaching-learning process has been perceived as an enhancement by the students through the introduction use of Digital Storytelling, comparing to the perception of those students from previous courses, in which this technique was not used.

The use of this technique has been introduced as an initial test within the ECTS activities in the module named before. To this end, work groups of four has been made up of randomly selected students. All the groups have done the work on the same topic, specifically “Block cipher. As a final goal, they have shown the digital story that they have created in class among the rest of students.

Several methods have been used to assess the development and progress of students’ knowledge and the associated competencies with this technique throughout the whole module period. The used methods have been the following ones: the Associated Networks Pathfinder [12]; data collection in open format (through writing down brief texts about the topic) in each face-to-face ECTS tutoring session; then, a qualitative analysis of these texts has been carried out using WebQDA software [13]; the SEEQ questionnaire itself, which is being detailed in this paper; and finally a satisfaction questionnaire on the use of Digital Storytelling as a teaching-learning technique. All these methods has been applied for validating of this pilot teaching project to the fullest possible extent.

IV. SEEQ QUESTIONNAIRE

Students’ opinions collected through surveys are becoming one of the most common ways of evaluating teaching in higher education. However, the use of the results extracted from these questionnaires, used as an instrument for continuous improvement of teaching in a specific module during a continued period, perhaps has not yet been implemented properly. In such a way, this assessment method allows for introducing small changes into a stable structure of class activities and then measuring their involved effects through the surveys and, therefore, reviewing the whole teaching-learning process.

To verify the results, an adaptation of the SEEQ questionnaire, created by Hernert Marsh in 1970 and updated in 1982, will be used to analyze the effectiveness of teaching using a factor set, each of which consists of several items that must be scored on the 5-choice Likert scale (strongly disagree, disagree, agree or disagree, agree and strongly agree).

The choice of the SEEQ questionnaire has been founded on the advantages that [14] are described in its paper, which are: its psychometric properties [15], its wide use in universities around the world and the great amount of material available for further improvement of each analyzed items [14].

<table>
<thead>
<tr>
<th>Categorie</th>
<th>Name</th>
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<tbody>
<tr>
<td>C1</td>
<td>Learning</td>
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<tr>
<td>C2</td>
<td>Enthusiasm</td>
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<tr>
<td>C3</td>
<td>Organization</td>
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<td>C4</td>
<td>Group interaction</td>
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<td>C5</td>
<td>Personal attitude</td>
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<td>C6</td>
<td>Exams</td>
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<tr>
<td>C7</td>
<td>Bibliography</td>
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<tr>
<td>C8</td>
<td>General vision</td>
</tr>
</tbody>
</table>

In the adaptation of the SEEQ questionnaire, 8 categories have been used, as it is shown in Table 1, with a total of 35 questions. In the first seven categories, the Likert scale is used, and in the eighth category, named “Overview”, it is an open question with the aim that the students can express themselves openly and contribute those data that they believe that are not included in the previous questions. The analysis of this last category is not examined in this paper.

V. IMPLEMENTATION OF THE SEEQ QUESTIONNAIRE

Questionnaire application has always been carried out through anonymous surveys via “Google Forms” [16], which
allows students to answer at any moment when the questionnaire is available. Moreover, it has the obvious advantage of a quick feedback towards the teaching team. The questionnaire is available online through a direct link that can be accessed from the Moodle virtual classroom module. Thus, students can complete the questionnaires from the moment in which they have their final grades and diplomas until two weeks later approximately with the aim that their reflection on the questions are as aseptic as possible.

This questionnaire has been carried out since the academic year 2012-13 with the basic objective of maintaining a data evaluation history recorded in a file, but also, and more importantly, of being able to contrast students’ opinions from different academic year. Thus, in such a way, teaching team can check how methodological changes can be affecting the teaching-learning process, mainly in relation to the ECTS activities that students have realized, as described in different educational forums [17]. In this paper, we analyze the teacher improvement reflected on students´ opinions when introducing the use of Digital Storytelling [18] in the ECTS activities and content summaries gradually introduced by the teaching team in each topic. Therefore, at this time, there is a sample space of 81 answers collected along different courses.

VI. RESULTS ANALYSIS

For the results analysis, SPSS program [19] has been used, which allows an effective and very easy data analysis.

In this study we try to check if the students´ opinion mean score about the current course has changed compared to the previous courses one. A quick summary of such means comparison can be seen in Figure 1. But to determine whether these means changes are significant or not the performed statistical analysis is detailed in the following paragraphs.

First of all, we define the Null Hypothesis (H0), which represents the assertion that the use of Digital Storytelling technique does not improve the teaching-learning process, and the Alternative Hypothesis (H1) that states that there is any relationship or dependence between the use of Digital Storytelling technique and teaching-learning process improvement [20]. Next, we detail the variance homogeneity test and normality test, both previous to the statistical test.

A. Uniformity of variances

In order to perform the Levene test for equality of variances in SPSS it is necessary to perform the t-Student test [21]. T-Student test is applied for two independent samples [20] on the 7 categories of 5 point Likert questions from the evaluated questionnaire. The two independent samples are drawn from the means of the current course sample (2016-17) versus the means of the remaining courses samples, see Figure 1. The Levene test results of equal variance are shown in Figure 2.

Figure 2. Levene test of equal variances by category.

In order to achieve the requirement of homoscedasticity (equality of variances) in the Levene test, the significance level must be a value greater than 0.05. But, before that, you need to know if you must consider the values from the upper or lower row. The decision must be taken on the basis of the values that appear in the “Sig.” column, which will determine whether “Equal variances are assumed” is chosen or “Equal variances are not assumed” option is selected otherwise. Therefore, the Null Hypothesis (H0) would only be rejected in the case of “Learning” category, as shown in Figure 3.

Figure 3. Acceptance or rejection of the Null hypothesis for each category.

B. Normality.

In order to determine the statistical test to be applied, in addition to analyzing the equality of variances for dependent variables, it should also be analyzed if the values taken on by variables follow a normal distribution [20]. For this case, the Kolmogorov-Smirnov (K-S) test or Shapiro-Wilks (S-W) test, among others, may be applied depending on the sample size. In this analysis, the S-W test has been chosen due to the fact that the population is less than 50. The SW test results are shown in Figure 4. Those data sets that do not follow a normal distribution are highlighted, which should be eliminated from the study. Although there are several authors [22] that note that t-Student test is robust enough to apply even in the case that the normality assumption is not fulfilled, a nonparametric test will be applied in this study, in order to redress this data deficiency.

C. Non parametric tests

Since there are data sets that do not follow a normal distribution according to the S-W test results and some of categories do not meet the condition of equal variances, we must apply nonparametric tests. For this case, the Mann-Whitney U test proposed by Wilcoxon in the year 1945 [23] will be applied. In this test, the Null Hypothesis (H0) maintains that the mathematical expectations for both populations are equal(382,808),(569,838)
The obtained results are shown in Figure 5. From this test, we can conclude that the introduction of Digital Storytelling technique can help improve the teaching-learning process in some categories, specifically in those named “Enthusiasm”, “Organization “, “Personal Attitude “and “Exams “.

Analyzing each category individually, we can note that in the category of “Enthusiasm”, where there is a mean increase of 0.7 in absolute value; the item “8 - With its presentation of the subject, keep my interest during the whole class time” has the largest increase. Nowadays, no one doubts that the students must be motivated. Therefore, this technique will enhance students’ engagement. Consequently, we have contributed to improve students’ learning based on a methodological change achieved with the introduction of Digital Storytelling technique in ECTS.

The category named “Organization” is assessed by four items. That one that has a significant increase is the one referring to “12. The way this teacher has exposed the subject has facilitated the taking of notes.” followed by the item: “9. The teacher’s explanations have been clear.” In order to achieve an effective learning, it is very convenient that the teaching team has properly planned all the tasks to be carried out as well as established connections between new concepts and what the students have learned before.

In the “personal attitude” category, which has up to 8 items which are used to measure it for all the students, there is also an increase, though lower than that in other categories (0.5 in absolute value), probably because it is already graded in a high level 3.87 close to 4. However this category was not initially part of the ones to improve since the methodology change in the ECTS activities does not imply a change in the personal attitude of the teaching team. Same comment can be made about the “Exams” category, which has a slight increase (0.55 in absolute value). Again, this category is one of the highest mean grade in all courses.

Finally, in Figure 7 we show the means of all courses for the three categories in which the comparison of means increase or decrease cannot be made statistically. But it should be said that initially they have high values, well above core value 3. Among these categories, “Interaction with the group” stands out and within this category, the item named “14. Students have...
been invited to share their knowledge and ideas” is assigned the highest score (4,6).

VII. CONCLUSIONS

In this contribution we have analyzed the students’ opinion of the course period 2016-17 comparing to the students’ opinions from previous courses, beginning data collection in the course period 2012-13 in the Information Security module [1] through the validated questionnaire SEEQ [14]. Then, we have statistically analyzed each category means, differentiating those ones which could be statistically characterized by a significant increase in the current course mean. Then, we can conclude that it should be due to the introduction of the Digital Storytelling technique, as it is the only methodology change in the current course compared to the previous ones.

On the other hand, the introduction of this technique has been done as a pilot research test within the IRNET project [24] in which some of this paper authors take part in. From the obtained results, there are several ongoing experiments based on Digital Storytelling technique that are being implemented in different Engineering Degrees modules, such as Systems Interconnection and Computer Networks, in order to be able to measure the impact that this technique application has in higher education.

Consequently, as shown in Figure 6 and Figure 7, all the means are above the central value, and mostly around 4, which is a positive tendency toward a better teaching attitude when measured throughout the SEEQ questionnaire. This fact encourages the teaching team to continue progressing on this line of work in the coming courses.

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