COMPARISON OF TOOLS TO EVALUATE THE QUALITY OF UNIVERSITY TEACHING

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Abstract

The evaluation of the quality of teaching is a challenging task since, apart from objective learning results, it should take into account the opinion of the students, and it is not easy to find a continued and easy way to know it throughout the course. Likewise, it is also difficult to work on, and particularly assess, the basic and general competences.

The educational innovation project PIE17-021 funded by the Universidad de Málaga (UMA) is focused on the design and comparison of tools to evaluate the quality of university teaching. This study also includes assessment of basic and general competences of undergraduate students of the School of Telecommunications Engineering (ETSIT). The developed tools will be evaluated with the students enrolled in the different degrees of the ETSIT.

With these goals, the main activities of this project are:

• Designing of tools to evaluate the quality of the university teaching and the perception that students have about how basic and general competences are developed. Two types of tools have been designed:
  o Classical evaluation tools, based on paper systems (evaluation surveys, notebooks, voting by show of hands, etc.)
  o Tools based on computer applications (Virtual Campus, Mobile applications, web pages, etc.)
• Comparison of the validity and effectiveness of the designed tools by applying them in different subjects.
• Organizing the sixth edition of the educational activity named “Technological Challenge”. The slogan of this edition has been “How to evaluate the quality of the university teaching?”. This challenge has been open to all students with the only condition to be enrolled in a course at the Universidad de Málaga.

After two years, this paper describes the designed tools, the comparative results and the interests of teachers and student in this project. The results show that the students are very satisfied with the idea of assessing the quality of teaching, but even so, unfortunately, they do not take an active role proposing and/or discussing new ideas.

Keywords: Teaching quality, Evaluation tools, Technological challenge.

1 INTRODUCTION

Currently, all the degrees are involved in quality accreditation processes. These accreditation processes include the evaluation of the quality of university teaching. The evaluation of the quality of the teaching involves certain difficulties and it is very focused on the opinion of the students as well as on quality indicators based on success rates of the subjects. The opinion of the students is usually collected in two basic ways:

  - Teachers’ quality surveys, conducted every semester by the UMA for each of the subjects.
  - Interviews with students.
Although these are standard systems for evaluating the quality of teaching, it does not allow teachers to obtain dynamically the opinion of the students about the development of the classes. This fact keeps off a continuous quality improvement in the classroom.

Likewise, an important part of the quality accreditation process is the review of how each competence is obtained and how it is evaluated [1], [2]. However, the assessment of basic and general competences is often unclear. These competences are included in all the grades’ subjects, but it is not determined how they should be worked and evaluated.

The educational innovation project PIE17-021 funded by the Universidad de Málaga (UMA) is focused on the design and comparison of tools to evaluate the quality of university teaching. This study also includes assessment of basic and general competences of undergraduate students of the School of Telecommunications Engineering (ETSIT). The developed tools will be evaluated with the students enrolled in the different degrees of the ETSIT.

The basic and general competences of the undergraduate and master students of the School of Telecommunications Engineering at the Universidad de Málaga, to be reinforced are [3]:

- CB-3: Students have to get the ability to gather and interpret data (usually related to the field of study) to make judgments that include a reflection on social, scientific and/or ethical aspects.
- CB-4: Students have to get the ability of transmitting information, ideas, problems and solutions to both expert and non-expert audiences.
- G-01: Ability to assume a respectful attitude towards fundamental rights and gender equality.
- G-12: Ability to solve problems, decision-making, creativity and to communicate knowledge and skills understanding ethical and professional responsibility of the Telecommunication Engineer.
- G-17: Ability to work in a multidisciplinary group and in a multilingual environment as well as communicate, both in writing and orally, knowledge, procedures, results and ideas related to telecommunications and electronics.

In order to work these competences, the concrete activities that will be carried out in all the subjects involved in this project are:

- Design of tools to evaluate the quality of the university teaching and the perception that students have about how basic and general competences are worked.
- Comparison of the validity and effectiveness of the designed tools by applying them in different subjects.
- Organizing the sixth edition of the educational activity named “Technological Challenge”. The slogan of this edition has been “How to evaluate the quality of the university teaching?”. This challenge has been open to all students with the only condition to be enrolled in a course at the Universidad de Málaga.

1.1 Objectives

The objectives to be achieved by this project are:

- Design of tools to evaluate the quality of the university teaching and the perception that students have about how basic and general competences are worked. Two types of tools have been designed:
  - Classical evaluation tools, based on paper systems (evaluation surveys, notebooks, voting by show of hands, etc.)
  - Tools based on computer applications (Virtual Campus, Mobile applications, web pages, etc.)
- Comparison of the validity and effectiveness of the designed tools by applying them in different subjects.
- Organizing the sixth edition of the educational activity named “Technological Challenge”. The slogan of this edition has been “How to evaluate the quality of the university teaching?”. This challenge has been open to all students with the only condition to be enrolled in a course at the Universidad de Málaga.
1.2 Overview

The paper is structured as follows: section 2 explains the context in which the research is carried out. Section 3 describes the experience. Section 4 presents some results obtained. Finally, section 5 outlines the main conclusions.

2 CONTEXT

Student involved in this research, are enrolled in the lectures of the Superior Technical School of Telecommunication Engineering (ETSIT), during 2017-2018 and 2018-2019 courses. The students belong to Graduado en Ingeniería de Sonido e Imagen (GISI), which is a four-year degree. The selected subjects are included in the framework of Signal Theory and Communications taught by the Department of Communication Engineering of the University of Malaga.

This paper presents the results of applying the strategies above mentioned on 3 subjects corresponding to 6 different groups of students (3 groups each course). The total number of students considered in this study rises to 201 enrolled.

Table 1 details the characteristics of the subjects under study in Graduado en Ingeniería de Sonido e Imagen.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Audio Basics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year / Semester</td>
<td>3º Year / 1º Semester</td>
</tr>
<tr>
<td>Type / Amount of credits</td>
<td>Compulsory / 6</td>
</tr>
<tr>
<td>Enrolled 2017-18 / 2018-19</td>
<td>39 / 40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>Audio Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year / Semester</td>
<td>3º Year / 2º Semester</td>
</tr>
<tr>
<td>Type / Amount of credits</td>
<td>Compulsory / 6</td>
</tr>
<tr>
<td>Enrolled 2017-18 / 2018-19</td>
<td>46 / 45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>Musical Acoustics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year / Semester</td>
<td>4º Year / 1º Semester</td>
</tr>
<tr>
<td>Type / Amount of credits</td>
<td>Elective / 6</td>
</tr>
<tr>
<td>Enrolled 2017-18 / 2018-19</td>
<td>12 / 19</td>
</tr>
</tbody>
</table>

3 EXPERIENCE DESCRIPTION

3.1 General aspects of the experience

The aspects involved in this study are focused on the following:

- Obtain dynamically the opinion of the students about the development of the classes.
- Reinforce basic and general competences of the undergraduate students of the School of Telecommunications Engineering at the Universidad de Málaga.

The activities developed to strengthening the aspects involved in this study are:

- Design of dynamic tools to evaluate the quality of the university teaching and the perception that students have about how basic and general competences are worked.
- Organizing the sixth edition of the educational activity named “Technological Challenge”.

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3.2 Experience organization

Each teacher, according to the characteristics of the corresponding lecture, has planned the kind and number of tools, presented in Section 3.4 to obtain dynamically the opinion of the students about the development of the classes. The experience has been developed during the academic years 2017-2018 and 2018-2019.

During the semester, the teacher presents the technological challenge, explained in Section 3.3., in each subject to encourage students to participate.

3.3 Technological Challenge organization

The experience has been developed during the academic year 2017-2018. The tasks performed as well as its temporary organization is presented in Table 2.

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preparation of the challenge</td>
<td>September-October</td>
</tr>
<tr>
<td>1.a Challenge Definition</td>
<td></td>
</tr>
<tr>
<td>1.b Strategy of information dissemination in collaboration with ETSIT and Servicio de Publicaciones y Divulgación Científica of the UMA</td>
<td></td>
</tr>
<tr>
<td>2. Challenge presentation</td>
<td>October-April</td>
</tr>
<tr>
<td>2.a Information dissemination</td>
<td></td>
</tr>
<tr>
<td>2.b Submitted proposal monitoring</td>
<td></td>
</tr>
<tr>
<td>3. Awards and evaluation of the challenge</td>
<td>May-June</td>
</tr>
<tr>
<td>3.a Review submitted proposal and select the finalists</td>
<td></td>
</tr>
<tr>
<td>3.b Prepare awards ceremony</td>
<td></td>
</tr>
<tr>
<td>3.c Surveys and interviews with the students and teachers involved.</td>
<td></td>
</tr>
<tr>
<td>3.d Analysis of the information and final conclusions</td>
<td></td>
</tr>
</tbody>
</table>

The sixth edition of the educational activity “Technological Challenge” has slogan: “How to evaluate the quality of the university teaching?”. This challenge has been open to all students with the only condition to be enrolled in a course at the Universidad de Málaga [2], [4]. Fig. 1, shows the call for activity “Technological challenge”.

![Figure 1. Call for activity “Technological Challenge.”](image)
opinion of the students about the development of the classes, so that the continuous improvement in the classroom was faster and more efficient.

### 3.4 Collecting data tools

The collecting data tools designed was:

- **Notebook.** This notebook is given to the student at the end of each class to write, in an anonymous way, the opinion of the teaching given or any other questions.

- **Questionnaire.** A questionnaire has been designed in order to evaluate the opinion of each class. The questions are presented in Table 3. This questionnaire has been used in three different ways:
  - **Paper.** The teacher at the end of each class distributes the questionnaire in paper.
  - **On line in Campus Virtual.** The questionnaire is available to the student through the online platform Campus Virtual at UMA. Thus only the students enrolled at each subject have had access to the questionnaire.
  - **On line in Google Docs.** The questionnaire is available to the student through a Google Docs form. The teacher distributes a QR code with the link of the questionnaire at the end of each class.

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How would you rate the class that has been taught today?</td>
<td>1</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
</tr>
<tr>
<td>2. Assessment of the content of the class</td>
<td>1</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
</tr>
<tr>
<td>3. Assessment of the way the class is taught</td>
<td>1</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
</tr>
<tr>
<td>4. How would you improve the content? Things to include and exclude.</td>
<td></td>
</tr>
<tr>
<td>5. How would you improve the way you teach? Things to include and exclude.</td>
<td></td>
</tr>
</tbody>
</table>
4 RESULTS

4.1 Comparison of the collecting data tools

The results discussed in this section are collecting by comparing the participation of the student with the different data tools and by the conclusions stated in the meeting of this educational project.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Year 2017-2018</th>
<th>Year 2018-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Notebook</td>
<td>Paper</td>
</tr>
<tr>
<td>Audio Basics</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Audio Equipment</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>Musical Acoustic</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shows the collecting data tools used in each subject for each academic year and the average percentage of student's participation with respect to enrolled in each class. It can be seen how Audio Basics used both year paper questionnaire, Audio Equipment used one year paper and another online with google docs form and Musical Acoustic, one year use a Notebook and the other paper and online questionnaire in Campus Virtual.

The results show that the online questionnaire in Campus Virtual is the least used by the students, because they do not have clear the anonymity of the answers. But nevertheless the online with google doc form, get good results. This is because, the QR code is given at the end of the class and the students use their mobile phone to answer at the same time.

The best results are paper questionnaire. It is clear that student take notes in class so it is very easy to answer a paper questionnaire. However, notebook has very poor results, because students do not know what to write on a black paper.

4.2 Results of the technological challenge

In this edition, among all the participants, the challenge jury selected three proposals. The proposals, despite being very interesting, were all based on questionnaires of questions. So, the tools used in this educational project based on questionnaire are the ideas of the student.

On the other hand, the challenge objective was reinforcement of basic and general competences of the undergraduate students of the School of Telecommunications Engineering at the Universidad de Málaga. To evaluate this, the participating students were asking about the strengthening of the basic and general competences by means of the participation in the technological challenge. The capabilities that they had to assess were:

a) To gather and interpret data to make judgments that includes a reflection on social, scientific and/or ethical aspects.

b) To transmit information, ideas, problems and solutions to both expert and non-expert audiences.

c) To assume a respectful attitude towards fundamental rights and gender equality.

d) To work in a multilingual environment as well as communicate, both in writing and orally, knowledge, procedures, results and ideas related to telecommunications and electronics.

e) To strengthen the knowledge and evolution of current technologies and developments.
Figure 2. Average assessment of the capacities worked in the technological challenge (0- No work has been done, 5- It has worked totally):

a) To gather and interpret data to make judgments that includes a reflection on social, scientific and/or ethical aspects.

b) To transmit information, ideas, problems and solutions to both expert and non-expert audiences.

c) To assume a respectful attitude towards fundamental rights and gender equality.

d) To work in a multilingual environment as well as communicate, both in writing and orally, knowledge, procedures, results and ideas related to telecommunications and electronics.

e) To strengthen the knowledge and evolution of current technologies and developments.

Fig. 2., shows that the most valued capacities are a) and b). This is because students relate the challenge directly to the ability to gather and interpret data to make judgements, as well as in the end, the ability to transmit information to both specialized and non-specialized audiences. However, capacities c) and d) are poorly valued. This shows that since the challenge is posed in Spanish, students do not look for information to document their technical ideas in a language other than Spanish. In addition, when putting their ideas, do not take into account issues related to gender equality, unless explicitly put as a challenge.

5 CONCLUSIONS

In this paper, the educational innovation project PIE17-021 funded by the Universidad de Málaga (UMA) and the results obtained, are presented. This project is focused on the design and comparison of tools to evaluate the quality of university teaching. This study also includes assessment of basic and general competences of undergraduate students of the School of Telecommunications Engineering (ETSIT). The developed tools will be evaluated with the students enrolled in the different degrees of the ETSIT.

The main conclusions of this study are:

- The most useful collecting tool is the paper questionnaire. It is the simplest answering tool for students. However, it is the worst for the teacher in order to perform the data processing.
- Use a notebook for students to write their opinions are not very useful. Students do not have clear about what to write.
- On-line form, using google and QR codes for student have good acceptance although a little worse than paper questionnaire.
• The proposed ideas in the “Technological Challenge”, about “How to evaluate the quality of the university teaching?”, are online questionnaires. So, the students ideas about how to evaluate the quality of university teaching are the same ones selected in this innovation project.

• Related to the assessment of capacities worked in the technological challenge, the most valued capacities are to gather and interpret data to make judgments that include a reflection on social, scientific and/or ethical aspects and to transmit information, ideas, problems and solutions to both expert and non-expert audiences. This is because students relate the challenge directly to the ability to gather and interpret data to make judgements, as well as in the end, the ability to transmit information to both specialized and non-specialized audiences.

• Generally, students are very satisfied with the innovation project because the proposed activities are novel and with practical relevance.

ACKNOWLEDGEMENTS

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