



# Updating of contents in university teaching

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## HIGHLIGHTS

- The contents receive little attention in research in university teaching.
- The evolution of society makes it necessary to update the contents.
- Students show how they perceive the contents they receive.
- There are contents that need to be updated to better respond to the current moment.
- There is a reflection and learning about what is transmitted in the classroom.

## ABSTRACT

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As a result of the integration of the university system in the European Higher Education Area in 2010, competences, methodology and evaluation have attracted the attention of researchers in the field of university teaching, while the contents have been relegated to a background. The present research aims to find out whether the contents that are taught respond to the changing demands of society or, otherwise, remain static and may become obsolete. The compulsory subject "Facilities Project" of the Degree in Fundamentals of Architecture at the Polytechnic University of Madrid is chosen as a case study. For this, an open survey is carried out to the students who take it in two successive years. As it is an open survey, students are offered a greater opportunity to express freely, both their answers and the reasons they have for giving them. It is detected that they positively value much of the content and that they also value, to a lesser extent, other content negatively. Different evaluations are collected for each of the topics that make up the subject and also the reasons that, together with the suggestions, allow measures to be taken to improve the content offered. It is concluded that the contact with the opinion of the students allows obtaining a valuable point of view when keeping the contents updated.

**Keywords:** *Content update; Open surveys; Didactic dimensions; Didactic coordination; Educate professionals.*

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## 1. INTRODUCTION

University education offers students content that was established when the curricula were set, and its updating is not always carried out with the agility that society demands. The evolution of the construction sector in Spain has caused during the last decade the loss of contact and relationship between the professional and university fields [1]. Additionally, the teacher, once a syllabus has been prepared to teach a subject for the first time, may be tempted to perpetrate during the successive courses those contents that at first could be updated but that, with the passage of time, lose the freshness of responding to what the profession needs from the future technicians who are being trained. That, when the sources of preparation of a subject could drink from the professional field and not exclusively from the manuals to use, which implies an increase in the gap that exists between what happens in the street and what is taught in university classrooms.

University teachers are the only ones who do not receive specific initial training to be teachers

[2]. Of all the didactic dimensions: objectives, competences, contents, methodology and evaluation, this research focuses on the contents.

Perhaps it is the aspect in which university teachers without pedagogical training, we can feel better prepared, and this makes it become the aspect that less attention is paid to when training and when developing educational innovation projects.

It is also the aspect that is least affected because of the integration of the university system into the European Higher Education Area in 2010 [3]. Competencies [4], methodology [5, 6] and evaluation [7] have attracted more attention, relegating content to the background.

The professional contents and practice of university education are intimately related to the socio-historical context in which they are developed [8]. They are created in a specific historical moment and are transformed through socially shared processes that configure the

collective knowledge of the subject and that each teacher makes his own through the interpretation and personal understanding he exercises [9]. In this way, the professional knowledge of the teacher has a marked dynamic character and varies over time and space [10]. This marked dynamic character is the result of the transformation that the teacher undergoes in his professional development [11, 12].

The objective of university education is high comprehensive and meaningful training for professional practice [13]. If the contents that are intended to be understood in a meaningful way are far from professional practice, the learning that is carried out will not meet that objective. Therefore, the need to update the contents offered is raised, especially in a context of speed in technological innovation, overabundance of information [14] and expiration of knowledge [15].

Considering the situation exposed, and given the importance detected of the subject in question, it is proposed as an objective of the following research to inquire about whether university students perceive what contents that are taught in a specific subject of the university respond to what they expect to learn or if, on the contrary, these contents have remained, at least in part, obsolete.

Research is understood as an invaluable opportunity for reflection and learning about what is being transmitted in the university classroom.

## **2. METHODOLOGY**

### **2.1 Reasons for proposing a case study**

To develop this research, a subject is chosen as a case study. It is considered that the interest of

the research consists in the application of the proposed methodology to a case study and to be able to see how it is carried out through a concrete example. Developing additional case studies would not add clarity to the method used. Not developing any case study would imply a theoretical approach to the proposed methodology. It would remain unvalidated if, with its application, the set objectives are achieved. So, even though there is a prejudice about the limited nature of a single case study in research, in this case it is considered appropriate that the case study be carried out in a single subject.

The results and discussion that are carried out, may be of interest in terms of their specific content to those people involved in subjects with similar content. However, it is considered that the interest of showing these results and discussing them may also be of interest to people involved in education who deal with totally different contents. The reason is that each one can more easily transfer the proposed method to their field when it is shown how it has been carried out and where it has led, than if the proposed methodology is only described abstractly, without specifying in a case study. . The details can be clarifying and each one has in his hand the ability to transfer it, with the corresponding adaptation, to his specific field.

### **2.2 Subject case study**

This research is carried out in the subject Project of facilities that is taught in the 5th year of the Degree in Fundamentals of Architecture, at the Higher Technical School of Architecture of the Polytechnic University of Madrid.

The course is divided into three deliveries. In the first installment, each student must choose their own project carried out in previous years in the Projects subject and adapt it in three

different aspects: relationship between architecture and facilities so that the latter can have a place and be properly integrated into the project, improvement of the measures passive so that your project is more sustainable and requires less energy use to allow reaching reasonable comfort conditions and, finally, compliance with fire protection regulations.

Once the project has been adapted from the previous approaches, in the second installment the student develops the air conditioning installations: ventilation, heating and cooling. In the third installment, finally, he completes the hydraulic facilities that his project needs: evacuation of used water, water supply and preparation of domestic hot water.

### 2.3 Methodology

Numerical surveys have the advantage that their results can be treated very easily and that they offer quantifiable results [16]. However, an open-response survey is chosen even though processing the information collected is more laborious.

The survey consists of three questions:

1. Indicate the contents of the subject that have been most interesting to you and indicate the reasons.
2. Indicate the contents of the subject that you have found less interesting and indicate the reasons.
3. Suggest those aspects that you consider should be improved in the contents of the subject.

It is considered that this offers a greater opportunity for expression to the students, who, in addition to pointing out the contents that are most and least interesting to them, can express

their reasons. There is no list of variables to choose from, which also makes it possible to analyze which content arouses the greatest interest and which goes unnoticed. In addition, this methodology allows the collection of responses not imagined by teachers, as they are open responses without space limitations.

All students are required to take the Facilities Project subject during the 2019-2020 academic year in the spring semester and during the 2020-2021 academic year in the autumn semester.

The answers collected are processed to obtain quantitative results, in addition to the qualitative results that can be extracted from their reading.

In the first place, the different topics in which the answers can be classified are established. Next, from each text written by each student to answer each question, the different ideas are extracted and quantified in the corresponding box. In this way, some text may be responding to the question posed in another question, to the same question in which it is found, or to neither of them. It may also have been left blank.

Once the answers received have been classified and numbered, the results obtained are analyzed and discussed.

Finally, a seminar is established with all the teachers of the subject in which the results are presented, discussed and agreements are adopted to update the contents taught in the subject.

## 3. RESULTS AND DISCUSSION

Of the 212 students enrolled in the spring semester of the 2019-2020 academic year, 70 responded to the survey, which represents 33%. While of the 156 students enrolled in the

fall semester of the 2020-2021 academic year, 38 respond to the survey, which represents 24%. In total, 29% of the students who have taken the subject in both semesters responded to the survey.

As it is an open survey, the first thing to analyze is the number of responses collected, as shown in figure 1, since it does not coincide with the number of surveys that have been received. There are students who offer more than one answer while there are other students who do not respond.

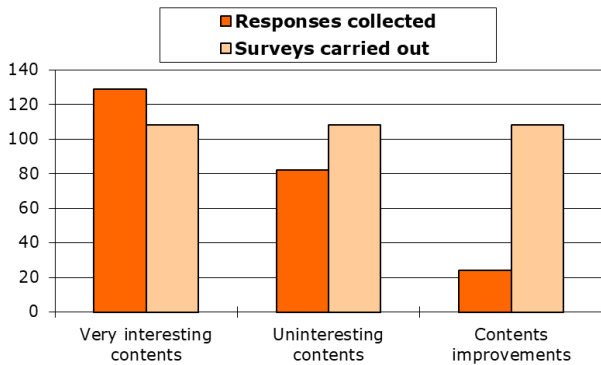


Fig. 1: Number of responses collected and surveys carried out.

The number of contents considered interesting by students accounts for 119% of the surveys received, while the number of contents considered uninteresting accounts for 76%. The difference between interesting and uninteresting content is 43%. This means that students consider that there is more interesting than uninteresting content in that proportion.

Only 22% of the students propose improvements in the contents. It may be because they have not detected alternative content on which they would like to learn or because they consider content to be something immovable.

The answers collected have been grouped in figure 2 according to the different topics present

in the subject. In addition, a significant number of responses have been detected that refer to calculation; as its development is carried out throughout the course, it has been considered as an independent item.

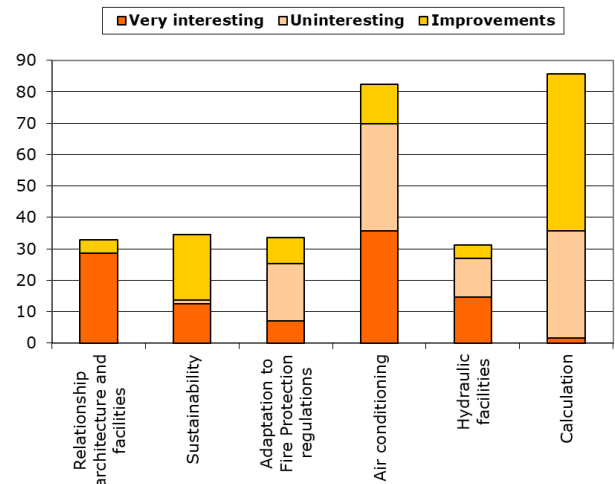


Fig. 2: Percentage of responses collected grouped by topic.

The most interesting topics for the students have been air conditioning and the relationship between architecture and facilities, while the topics that have seemed interesting to the least students are calculation and adaptation to PCI regulations.

The least interesting topics for the students have been air conditioning and calculation, while there have hardly been any students who considered the relationship between architecture and facilities and sustainability to be uninteresting.

The topics that received the most proposals for improvement are calculation, with 50% of the responses, followed by sustainability and air conditioning.

The relationship between architecture and facilities is the topic that generates the most consensus among students, in terms of a

significant percentage of positive assessments and an absence of negative assessments.

Surely it is the most typical and specific topic of the teaching of facilities to future architects.

Air conditioning is the subject that arouses the most likes and dislikes, almost in the same amount. The feeling of fear in the face of its complexity is transformed into a positive assessment when learning is achieved, while it generates frustration when the difficulties in understanding continue without disappearing after studying the subject. The significant number of suggestions received for its improvement show that it is a subject that does not leave students indifferent.

The calculation, however, does not receive hardly any positive evaluations from the students, while the negative evaluations are important and the proposals for improvement account for half of the proposals received. These results invite us to rethink this part of the subject taught.

Sustainability, being a highly valued topic and with hardly any negative evaluation, receives a significant number of proposals for improvement, which means that it arouses a high interest on the part of the students in delving deeper into it.

The remaining two topics keep a low profile. Adaptation to fire protection regulations is less valued than hydraulic facilities. The low number of proposals for improvement received shows that they are topics that arouse less interest.

To further analyze the results, in addition to the quantitative results, a summary of the most outstanding qualitative aspects contained in the responses collected is offered.

The issue of the relationship of architecture with the facilities receives positive evaluations, because when designing the building integrating its facilities, it is understood as an organism that works thanks to the relationship of the different systems and the facilities have just been understood, not as something abstract detached from the building where they are located, but as something concrete that helps its definition. The project becomes more real by incorporating the facilities. Students ask that this approach be more present throughout the course. The contents related to the spatial occupation and arrangement of the facilities in the building also receive numerous positive evaluations. Sustainability is well valued by the students, not only the contents developed in the first installment of the course related to the passive design measures of the building, but also the students ask for a greater development of the contents related to renewable energies, efficient air conditioning systems and water saving and reuse systems. A greater transversality of the sustainability contents is requested throughout the subject.

The adaptation to the fire protection regulations receives positive evaluations from students who discover the important influence it has on architectural design, while students who pour negative opinions rate the contents as difficult and boring or consider that they are also taught in other construction subjects.

Air conditioning receives positive evaluations when students understand it for the first time, when students discover that it is essential to make spaces habitable, not only beautiful, and when they are aware of the important volume they occupy, which leads them to consider it essential to develop the installation of air conditioning in parallel with the development of the architectural project. The part of the choice of air conditioning systems also receives

positive evaluations, when combined with the possibility it offers to incorporate efficiency and sustainability criteria in its choice.

The negative evaluations received by the air conditioning contents have to do with the limitation of developing a single system in your project, since choosing implies rejecting. They feel less prepared in the rest of the systems that they have not developed. They also criticize ventilation systems because they require less decision-making, so they find them less interesting. Finally, the lack of time to develop such broad content also causes students to show negative evaluations.

Students ask that more emphasis be placed on the criteria to be taken into account when choosing the air conditioning system to use in their project.

Hydraulic facilities are positively valued for their simplicity compared to the air conditioning part and for the interest aroused using renewable energies for the preparation of domestic hot water. The negative evaluations have to do with the repetition of contents with respect to the subject taught the previous year, in which the facilities are introduced at a theoretical level, since the students consider that the hydraulic facilities have less impact on the architectural project. Finally, when dealing with these contents at the end of the course, it is done in a hastier way with less time available.

The calculation receives negative evaluations because it is considered excessively exhaustive, repetitive, occupies a lot of time and is not carried out with computer programs, as in the professional world. The proposals for improvement received are related to the adjustment of the time requested to the calculation, so that the subject implies a time of dedication by the students adjusted to the

credits of the subject, as well as an approach to the professional world of the calculation tools used.

#### **4. CONCLUSIONS**

The fact of investigating about the vision that students have of the contents they receive helps to realize that, although they consider most of them interesting, there is also a significant amount of content that does not receive such a good valuation.

Although the involvement of students when proposing improvements in the contents is scarce, it is surely not their job; the clues they offer are undoubtedly valuable information for those teachers who want to update the contents they offer to what society is always demanding.

It is easy to ask students and be open to their assessments, often helping to perceive aspects that would otherwise remain hidden from teachers, who have a different look.

Once the process of listening to the students and analyzing the data collected has been developed, there is the part of implementing those possible improvements to, once again taught the teaching of the next course, return to carry out the process again with the intention of maintaining live content.

What might seem like a repetition of the myth of Sisyphus is surely a way to renew oneself like the phoenix.

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