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2-4 March, 2020 - Valencia (Spain)

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ETHICAL DILEMMAS AND DEBATES AS TEACHING METHODOLOGIES TO DEVELOP CRITICAL THINKING COMPETENCE

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Abstract

The creation of the European Higher Education Area (EHEA) has generated important changes in the teaching and learning processes. Students have become the protagonists of their own learning process and the task of the teachers has become that of guiding and tutoring the student in that process. As for the curricula, these should have as a primary objective the acquisition of Competences by students, expanding, without excluding, the traditional approach based on content and teaching hours. Emphasis should be placed on the methods to be used for the learning of these Competences, as well as on the procedures to evaluate their acquisition.

Within the framework of EHEA, the Universitat Politècnica de València (UPV) has developed an institutional project in which 13 Transversal Competences have been defined. All students must work on these Competences and be evaluated for their acquisition throughout their studies. One of the 13 Transversal Competencies of the UPV is "Critical Thinking". Some of the formative activities that can be used for the development of this Competence in students are case studies, ethical dilemmas, oral presentations, forums, debates, etc. In order to assess the degree of development achieved by the students, the most frequent procedures are exercises or open written tests and oral presentations. As evaluation instruments, the checklists and rubrics stand out.

This work shows examples of application of teaching methodologies called ethical dilemmas and debates in a subject of the Degree in Engineering in Industrial Design and Product Development taught at the UPV. The method chosen to evaluate the degree of acquisition of this Competence is oral presentations. Therefore, an example of the rubric used for the evaluation by the teacher and among peers of these oral presentations is also presented in this work.

Keywords: Transversal Competences, learning, critical thinking, ethical dilemmas, debates, evaluation, rubrics.

1 INTRODUCTION

The creation of the European Higher Education Area (EHEA) has generated important changes in the teaching and learning processes. These changes include the shift in focus from the classical model: from a teacher-centred teaching and learning process to the proposed model, which focuses learning on the student [1]. In this new model, the student takes an active role, acquiring information processing competences, while the teacher is the one who facilitates learning.

One of the problems associated with the classical model is that it too often encourages learning knowledge by heart. But this does not ensure that the student will be able to apply that knowledge in real life. In contrast to this classical or traditional model, the EHEA emphasizes learning by competences.

With regard to competence formation in Spain, the Real Decreto 1393/2007 [2] establishes the following: << The curricula leading to a degree should therefore have at the center of its objectives the acquisition of competences by the students, extending, without excluding, the traditional approach based on contents and teaching hours. Emphasis should be placed on the methods of learning these competences, as well as on the procedures for assessing their acquisition >>.

In this context, the Universitat Politècnica de València (UPV) has developed an institutional project in which 13 Transversal Competences have been defined that all students must work on and be evaluated in throughout their studies. One of the 13 Transversal Competencies of the UPV is "Critical Thinking". The UPV defines it as follows [3]:

<< Critical thinking goes beyond the skills of logical analysis, since it involves questioning the underlying assumptions in our habitual ways of thinking and acting and, on the basis of that critical questioning, being prepared to think and do differently. >>

<< Critical thinking is the thinking of the questions: why are things like this, why can't things be otherwise, why do you think they are like this, etc. Consequently, we will say that a person has developed it to the extent that he or she questions things and is interested in the foundations on which ideas, actions, evaluations and judgments, both his or her own and those of others, are based. >>

In order to help its teachers, the UPV offers a whole series of formative activities that can be used to develop these Transversal Competences in students. It also presents a set of tools and procedures with which to assess the degree of development achieved by students in these competences.

In relation to the Transversal Competence called "Critical Thinking", this paper shows examples of the application of teaching methodologies, ethical dilemmas and debates used for its development. The experience is presented for the subject Packaging that is taught in the Degree in Engineering in Industrial Design and Product Development of the UPV. The method chosen to evaluate the degree of acquisition of this Competence is oral presentations. Therefore, an example of a rubric used for teacher and peer evaluation of such oral presentations is also presented in this paper.

2 METHODOLOGY

The subject Packaging is taught in the third year, second term, of the Degree in Engineering in Industrial Design and Product Development. It has an assignment of 4.5 credits. The average number of students enrolled in the last 9 years is around 60.

For the "Critical Thinking" Transversal Competence, the UPV has established three levels of mastery [3]:

- Level 1: the student shows a critical attitude towards reality, being able to analyze and question information, results, conclusions and other points of view.
- Level 2: the student analyses whether there is coherence between his/her own and other people's judgements, assessing their practical implications.
- Level 3: the student argues the relevance of the judgements made and acts consistently.

For the development of this competence some of the following formative activities can be carried out [3]:

- Case studies.
- Ethical dilemmas.
- Oral presentations.
- Forums and debates.
- Game and simulation.
- Report writing.
- Readings.
- Questions.
- Projects.

The most frequent evaluation procedures to assess the degree of development of the competence are open written exercises or tests and oral presentations. Checklists and rubrics for evaluation are the most common assessment tools [3].

2.1 Examples of application of teaching methodologies for the development of the "Critical Thinking" Competence

The following are some examples of the application of the teaching methodologies called ethical dilemmas and debates with the aim of developing in students the Transversal Competence "Critical Thinking". These are just a few examples, since over time, for the mentioned subject, more topics of debate and more ethical dilemmas have been prepared, as well as teaching materials to help and support the activities.

2.1.1 Debates

Example 1:

The aim is for students to consider the benefits, disadvantages and alternatives of using wood in the Packaging sector. To this end, the teacher gives the students a series of popular and/or scientific articles related to wood, its use in various sectors, the dangers of deforestation versus sustainable forests, etc. Some of these articles will advocate the use of wood and others will criticize it. Students will be formed into groups and for 30 minutes will read and reflect on the content of these articles. After that time, the teacher will assign which groups should be in favour of the use of wood in packaging, and which groups should be against it. Even though the group, or some of its members, may not agree with the position to be defended, during the following 30 minutes a debate will be held, moderated by the teacher, in which the students will have to defend the position assigned to them, using solid arguments. The estimated time for this activity is 1 hour.

Example 2:

Based on the reading of the teaching article "Encouraging reflection and critical thinking in students in relation to the Carbon Footprint" [4], students are divided into groups in order to prepare a debate on the carbon footprint as an indicator of environmental impact and responsibility for climate change in a short period of time. Some groups will argue that it is an appropriate indicator and others that it is not, after which the subject will be discussed. The estimated time for this activity is 1 hour.

2.1.2 Ethical dilemmas

Example 1. Students are faced with the following dilemma:

<< As you know, it is already possible to obtain bio-synthesized plastics from corn starch, for example. This not only helps to stop or prevent the depletion of petroleum, but this type of plastic also has a lower environmental impact than petroleum products. Nevertheless, while in developed countries we use corn starch to make plastics, for example for packaging, in certain areas of our planet people are starving. While we spend possible food to wrap a doll, there are children who will not only never have the doll, but will starve to death, but we must also think about the increasing pollution of our planet that leads to its destruction. You must take a stand for or against it and reason your response. You have a maximum of 5 minutes to seriously argue that response in public. >>

The estimated time for students to search for information and prepare their arguments is 2 hours.

2.2 Example of the evaluation method chosen to assess the degree of acquisition of the "Critical Thinking" Competence

The evaluation method chosen to assess the degree of acquisition of this Competence by the students is oral presentations. Specifically, in relation to the ethical dilemma that has been explained in the previous section, students and teacher evaluate the arguments that each of the students make through an oral presentation. To this end, the rubric shown in Table 1 has been prepared as an evaluation tool, based on various other rubrics provided by the UPV:

Table 1. Evaluation rubric defense of the ethical dilemma.

<i>INDICATORS</i>	<i>Excellent / exemplary (4)</i>	<i>Good / adequate (3)</i>	<i>In development (2)</i>	<i>Not reached (1)</i>
He/She shows a critical attitude towards reality: he/she asks himself why things happen.	He/She reflects on and investigates the why of things, and is able to find answers and argue them objectively.	He/She asks himself why things happen and investigates to get answers on his own. But he/she allows himself to be influenced by his/her own judgments and assessments.	It questions certain situations of the reality in which it lives. But he/she is incapable of making their own judgments and assessments. It needs the help of others to get answers.	It does not manifest any kind of critical spirit: it never questions the situation or the reality in which it lives. It assumes as true any information it receives.

It delves into a subject with logic and impartiality, contrasting information from reliable sources.	It consults reliable sources, contrasts the information and gives their personal assessment.	Consult different sources and compare their information to verify their reliability.	It uses various sources, but does not verify their reliability.	It is not capable of deepening a subject. It relies on a single source and does not contrast information.
Identifies the implications (pros/cons) of different alternatives or solutions	It reconsiders the alternatives on the basis of reflection and assesses their implications.	It identifies pros and cons of different solutions.	It is able to compare different solutions, but does not know how to identify their implications.	There is no evidence to identify the advantages and disadvantages of different solutions.
It assesses the implications of a proposal in a given context.	It identifies the implications of a proposal in different contexts and/or from different perspectives.	It assesses the implications of a proposal in a certain context or from a certain perspective.	It is able to assess some of the implications of a proposal.	It is not able to determine the implications associated with a given proposal.

3 RESULTS

Figure 1 shows the average of all the results of the evaluation of the "Critical Thinking" Transversal Competence, by the teacher and among peers, of the oral presentations of all the students. The results obtained in the last four academic years are shown. In all the evaluations the rubric presented in Table 1 has been used.

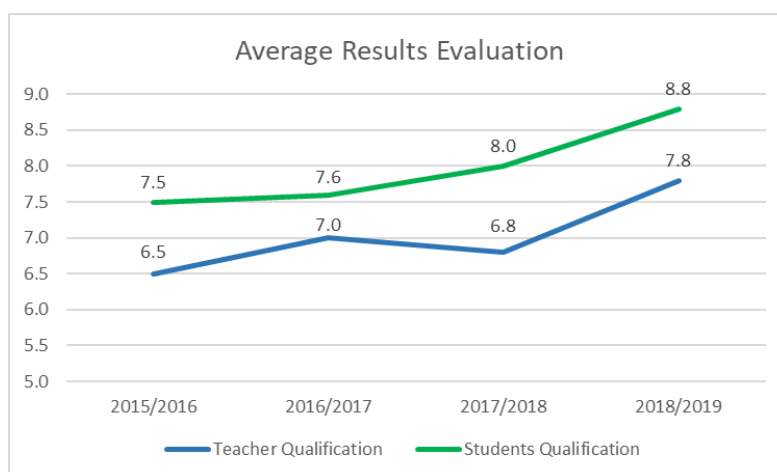


Figure 1. Average of the results of the evaluation of the Transversal Competence "Critical Thinking".

It is worth commenting that students' evaluations of their own peer presentations are, in most cases, somewhat higher than those of the teacher, although it should be kept in mind that the results presented are average values.

On the other hand, it seems that the trend in the acquisition of the "Critical Thinking" Competence throughout the courses is upwards. This may be due to the fact that, over time, for the mentioned subject, more topics of debate and more ethical dilemmas have been prepared, also developing teaching materials to help and support the activities, which may be favoring a better development of the Competence in the students.

4 CONCLUSIONS

In the present work, examples of the application of the teaching methodologies called ethical dilemmas and debates have been shown with the aim of developing in the students of the subject Packaging the Transversal Competence of the UPV "Critical Thinking".

Through the rubric presented, the teacher and peers evaluate the degree of acquisition of this competence. For this purpose, the students make an oral presentation in which they must defend their

arguments against a proposed ethical dilemma. An upward trend in the acquisition of this Competence has been observed throughout the courses. This may be due to a greater intensification of the activities shown in this work, which encourage the development of this Competence.

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