ANALYSIS OF TEACHING PATTERNS' MOTIVATIONAL VALUE FROM THE POINT OF VIEW OF ENGINEERING STUDENTS

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Abstract: One of the major problems of current concern of educational research in the field of higher education is the analysis of the characteristics of learning environments that facilitate motivation, self-regulation and academic performance. This issue is currently being studied from three perspectives. Researchers are trying to identify, first, the motivational value of each of the teachers' educational patterns that shape the classroom motivational climate; second, the effect on performance of the different "motivational climates" –or classroom goal structures- formed by different sets of teaching patterns; and, third, the effect that modifying some of the teaching patterns that shape such climates has on performance. This paper focuses on the first perspective. We ran a comparative study between Spanish and British engineering students in an attempt to identify whether there are differences in the motivational value attributed to the different teaching patterns and whether this perception is modulated by the motivational characteristics of students. The study methodology involved in-depth surveys, with Spanish students and students from Imperial College London. According to the results of this study, it seems clear that the quality and effectiveness of motivational teaching performance guidelines are not absolute; they can be influenced by cultural values and motivational orientations of students.

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1. INTRODUCTION AND THEORETICAL FRAMEWORK

It is usually accepted as a fact that teachers can configure different motivational climates, by the way they organise teaching, some of them being more effective than others (Paolini, 2009). Various authors have proposed different instructional models in order to create classroom environments which favour the students' motivation (Efklides, 2011; Huertas et al., 2008). These models are usually supported by evaluations of case studies where the author or others teachers have implemented the instructional model and then surveyed the students on their level of motivation, and there is an obvious reason for interventions which result in improved student motivation to be reported (Fernández et al., 2009 y 2014; Gibbs, 1999). However, empirical evidence on the effectiveness of interventions based on these models tends to take an approach of measuring student motivation before and after an intervention and, if the difference is positive, the intervention is considered effective. This empirical evidence has left unanswered questions concerning the scope and the reasons for such effectiveness, which can include questions such as: *What motivational value do students give to different teaching strategies? Do individual differences in students' motivational orientations modulate this increase in motivation? If so, how modulate it? To what extent may*

cultural differences between students from different countries influence the perception of the different motivational teaching patterns?

Answering these questions is important for improving the way we can make judgments about the efficacy of academic contexts and for adapting them to different types of students, since, according to the literature, it is not the situation itself which is decisive, but the significance to the students. There are several previous works of the Alonso-Tapia group (Alonso-Tapia, 1999; Alonso-Tapia y Pardo, 2006) which try to answer these questions and in which the instruments necessary to do so were developed. Nevertheless, most studies have been developed for non-university students or conducted outside the scope of engineering. Hence we carried out this new study about engineering students from Spain and the United Kingdom.

1.1 Motivational characteristics as potential mediators of teaching patterns' motivational effect.

The kind of motivation with which students face academic activity is a fundamental variable for explaining their academic effort. So, any learning model must rely on a theory on motivation. The achievement goal orientation theory posed by Dweck (1986) and Nicholls (1984) has been one of the most important motivational theories in academic research in the last thirty years. It has been the subject of an important review, from which a tri-dimensional framework has emerged (Senko et al. 2011): *Learning Orientation* (LO); *Performance Approach Orientation* (PO) and *Avoidance Orientation* (AO). As a synthesis of these orientations, it can be said first, that the higher the student's LO, the greater their focus on the development of competence and on mastering the task, and the higher their interest, persistence and deep process of information. Second, the higher the student's PO, the more their focus is on acquiring competence in relation to others with concomitant intent to outperform their peers or to obtain public recognition, though the relationship with academic performance in not always positive. Finally, the higher the student's AO, the higher their focus on avoiding incompetence in comparison with others, to avoid feelings of inferiority, failure and avoiding the possible negative judgements that would follow failure. Avoidance orientation usually is considered to be related with anxiety, unorganised/disorganised study habits, rejection of help from others and with low interest, little persistence and shallow processing of information.

Students' pursuit of different types of goals depends on both their individual differences and the conditions of the learning context (Ames, 1992; De la Fuente, 2004; Pintrich, 2000). From this perspective, the same situation may promote different orientation patterns in different students (Kaplan and Maher, 2002). Also, a student may pursue different goals in the same or diverse contexts, depending on the information perceived from the context (Paolini, 2009). Obviously, not all orientations are equally favourable to learning: the most efficacious is the Learning Orientation. Clearly, this is the one that teachers should, and would like to, activate in their classrooms (Alonso-Tapia & Pardo, 2006; Ames, 1992; Urdan and Turner, 2005) which begs the question as to the impact of the other variable, namely the learning environment (or the conditions of the learning context).

1.2 Learning environment: teaching patterns affecting students' motivation

To appreciate the background to the current research, it should be noted that Alonso-Tapia and Pardo (2006), following Ames (1992) synthesised a series of specific teaching patterns that help create a motivational climate oriented to learning. The effectiveness of such patterns

seems mainly based on three fundamental factors. The first one is the perception of autonomy and control by the students in relation to their own learning. The lecturer has to teach them how to "learn to learn", that is, to act independently to seek their own goals (Ryan & Deci, 2000). For that purpose, they should be given an active role during the learning process to draw up a plan, to choose, to transfer knowledge to other situations, to evaluate their progress and of their peers, etc. This implies to teach them to regulate themselves in a functional way. The second factor is the significance that academic activities have for the students (Assor y Kaplan, 2001; Spires et al., 2008). The lecturer has to propose tasks and activities that are close to the students' interests and that have a certain degree of challenge to activate their desire to excel (McClelland et al., 1992). University students usually seek to acquire useful and relevant knowledge to achieve their goals. If they do not have a clear vision of the utility of the knowledge they have to acquire, their feeling of doing things out of obligation increases, and this feeling affects negatively the learning (Spires et al., 2008). The third factor is the expectation of success (Ecles & Wigfield, 2002; Núñez, 2009): lecturers must ensure that students have a reasonable experience of progress towards their educational goal rather than facing the discouragement of a decreasing possibility of success (or an increasing possibility of failure).

However, the questions are, first, what is the motivational value of each of the teachers' educational patterns that shape the classroom motivational climate? Second, in what degree do students' motivational orientations moderate such perception? And third, does the fact of coming from different countries and cultures make a difference in how students value different teaching patterns? These are the questions answered in this study.

2. METHOD

2.1 Sample

The study was carried out, gathering data in the 2011-12 academic year over a total of 697 students in Spain and England. The sample included 201 females (28.84%) and 496 males (71.16%), aged between 18 and 24. The sub-sample of Universidad Politécnica de Madrid (UPM) (72%) is bigger than Imperial's (28%), but reflects UPM's much bigger population of students overall. Both are engineering-centric education establishments and both have similar engineering gender profiles of approximately 30:70 women:men. The sample from UPM is from a broader array of engineering disciplines than for Imperial, where the students were all drawn from the civil engineering student cohorts for years 1-3 of a 4 year degree. Limiting the Imperial sample to one department yielded the advantages of (a) enabling high participation levels from (b) an identified group whose exposure to teaching patterns was the same which enabled (c) better translation of the questionnaire materials from Spanish-to-English, because the translators could identify confusing words. For example, translating the word "tutorial", the discussion considered whether the students in the sample were likely to interpret that to mean a one-to-one tutorial or a small group discussion or large group homework sheet classes or a pastoral (non-academic) office-hours session or other variation of teaching pattern.

2.2 Materials

In order to carry out this study two questionnaires were used: "EMQ-B" and "LEMEX".

a) *Environment Motivational Quality Questionnaire (EMQ-B)* was developed from the questionnaire of same name previously elaborated by Alonso-Tapia (1999). It is made up of 98 items distributed in two groups. In the first group, students are asked to directly indicate, in a 5-point Likert scale, the degree to which certain educational activities affect their interest/desire to learn and affects the effort which they choose to put into academic activities. The second group of questionnaire items (questions) describes the potential

reactions of preference-or-rejection towards certain teaching practices, and students must indicate, also in a 5-point rating scale, their degree of agreement with the items. This questionnaire measures the motivational value that students assign to the different teaching patterns at three levels: a) at the level of specific pattern; b) at the level of group of patterns related to different facets of teaching such as the introduction of topics and activities, the promoting of participation, etc., (Scales A-H), and c) at the level of the teaching style, defined by the total set of patterns included in the questionnaire (Scale T). The teaching styles included in the materials by Alonso-Tapia were those identified in his literature review as favouring the learning of students. (In all cases, our results show the Cronbach's alpha value is equal or greater than 0.7, so it can be stated that their reliability is acceptable).

b) *Learning Motivation and Expectancy Questionnaire (LEMEX),* short form, developed by the author of the original questionnaire (Alonso-Tapia, Huertas y Ruíz, 2010). It is made up of 27 items and assesses the three classic motivational orientations: Learning orientation ($\alpha = 0.70$), outcome orientation ($\alpha = 0.69$), and avoidance orientation ($\alpha = 0.79$).

2.3 Procedure

Both questionnaires (applied together as if a single questionnaire) firstly were adapted to the current context of higher education. To ensure that the questionnaire made sense to students in both universities, this work was carried out jointly with a teacher of Imperial College London. At Imperial, data was gathered through in-class manual completion of forms around lunchtime, after a pep talk about the value of research. All students co-operated. At UPM the procedure was similar, the students filled in the questionnaire in class after an introductory talk as at Imperial in the 2011-12 year. Once the information was gathered, the followings analyses were carried out in order to answer the question asked:

1) *Descriptive analysis of the motivational value of teaching patterns assessed.* Mean and standard deviations of scores in the specific variables, in the scales of the EMQ and in the EMQ questionnaire as a whole, were calculated. In the two last cases, scores were transformed into a 5-point scale, similar to the one used by students when indicating their degree of agreement or disagreement with the questionnaire items (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree.) The aim of using the same scale is to facilitate comparison and interpretation of results. Thus, mean values show the degree to which students as a group, with independence of their particular motivations, consider that teaching patterns are motivating (or affect their motivation).

2) *Analysis of variance* examines whether the country of study (Spain or England) implies some difference in the motivational value that students attribute to different teachers' patterns, and in students' motivational orientations.

3) *Regression analysis* using scale factor scores (which define motivational orientations) as predictors and using outcomes in EMQ-B variables and scales as criteria, in order to see whether students' goal orientations moderate the motivational value they attribute to the different teaching patterns.

3. RESULTS

The most relevant results of the Spain-England comparison generally match the data obtained in previous Spain-centric studies (Alonso-Tapia, 1999; Alonso-Tapia et al., 2006, 2007, 2008 and 2009), and they are presented below.

3.1 Motivational value of teaching patterns assessed

Table 1 shows the results of the different scales. The overall picture is given by looking at the total scale for item (T), which informs us about "teaching style". Teaching style is aggregated

from the list of various assessed action patterns, (shown as A-H, in Table 1 below). The aggregated score that students give Teaching Style for its effect on motivation is an average score of 3.58 out of 5. In fact, all scales (or groups of strategies) related to certain aspects of teaching, obtain a value over three point: the highest-scoring strategy is academic tutorials as a motivational aspect (4.25) and the least valued are explicit messages by the teacher about applicability/relevance (3.13).

Table 1. Motivational value of teaching patterns by country of study: scores given by students for the overall teaching style (T) and to groups of teaching patterns (A-H) (Mean over maximum possible score of 5).

Groups of teaching patterns (Scales)	Spain	England	Total
(T) *TEACHING STYLE*	3.63	3.46	3.58
(A) Beginning of classes and activities	3.89	3.68	3.83
(B) Teacher´s messages showing its relevance/applicability	3.04	3.35	3.13
(C) Organisation of theoretical classes	3.95	3.61	3.85
(D) Promoting class participation	3.34	3.10	3.27
(E) Planning and development of practical classes	346	3.35	3.43
(F)) Approach to practical projects outside of class	3.25	3.43	3.30
(G) Support materials based on new technologies	3.78	3.45	3.69
(H) Academic tutorials	4.25	4.25	4.25

Table 2 shows specific teaching action patterns and shows a group of actions to which the majority of students, - irrespective of their motivational orientation or country of study – attribute a high motivational value.

Table 2 Motivational value attributed by students to some specific teaching patterns as a function of country of study (Mean over 5).

	Spain	England	Total
Teaching patterns rated with "Strongly motivational value"			
New or surprising information	4.10	3.89	**4.04**
Posing problems for activating curiosity	3.91	3.54	**3.81**
Lecturer explicit messages for facilitating concepts understanding	4.02	3.86	**3.97**
Using images and examples	4.38	4.20	**4.33**
Clarity of exposition	4.14	3.40	**3.93**
Usefulness of subject or activity	4.24	3.89	**4.14**
Students freely asking questions in class	3.92	3.75	**3.87**
Evaluation: Preference for mixed examinations including different types of tasks and formats	3.99	3.74	**3.91**
Teaching patterns rated with "low motivational value"			
Evaluation system: Rejection of only one examination	4.25	3.65	**4.08**
Evaluation system: Preference for time Limits	2.42	2.92	**2.56**
Teaching patterns rated with "sufficient motivational value"			
Teacher's asking students directly to answer questions in class	3.10	2.64	**2.97**
Providing Additional Sources of Information	3.33	3.05	**3.25**
Using technical vocabulary	3.17	2.78	**3.06**
Preference for practical classes working in groups	3.02	3.03	**3.02**

We observe, for example, that presenting new or surprising information, highlighting the practical use of the teaching material, or using images and examples, is highly valued by students, with an average surpassing the 4 points. There are also certain patterns which are clearly rejected, such as basing evaluation (assessment) on only one exam, or limiting time during exams. A third group appears, formed by those patterns to which students attribute some (sufficient but not high) motivational value: this group of teaching patterns includes proposing practical projects or having students work in groups. We highlight this fact, because those are fundamental strategies proposed by the European Higher Education Area to promote methodological change in education.

3.2 Regression analyses

Some of the most relevant results appear in Table 3. The Teaching Style Scale is a combination of teaching actions which previous literature studies had said 'favour learning'. The regression analysis in Table 3 shows that the teaching style scale obtains a positive multiple correlation (.581) which is highly significant; in other words, 33.7% of the variance in the scores awarded by students for the motivational value of the teaching action patterns is explained by the differences in the students' own motivational orientations.

Table 3 Regression Analysis: Motivational value attributed to different action patterns as a function of motivational orientations.

Criterion Variable	Predictors				
	R	P	Learning orientation	Outcome orientation	Avoidance orientation
(T) TEACHING STYLE	*0.581*	*0.000*	*0.478****	*-0.095***	*-0.214****
(A)Beginning of classes and activities	0.384	0.000	0.385***	0.017	0.023
(B)Teacher´s messages showing its relevance	0.384	0.000	0.406***	-0.090*	0.033
(C)Organisation of Theoretical Classes	0.362	0.000	0.367***	-0.007	0.012
(D)Promoting class participation	0.477	0.000	0.245***	-0.017	-0.342***
(E) Approach to Practical Classes (PC)	0.453	0.000	0.339***	-0.102**	-0.202***
(F) Approach to Practical Projects (PP)	0.381	0.000	0.260***	-0.203***	-0.139***
(G)Support material based on new technologies	0.192	0.000	0.066	-0.005	-0.161***
(H)Academic Tutorials	0.237	0.000	0.264***	-0.072	-0.079

*** Significant value to 1‰; ** Significant value to 1%;* Significant value to 5%

However, the analysis shows that not all motivational orientations have the same importance as predictors of how much motivational value the students will attribute to this learning-centric style of teaching. The Learning Orientation (LO) is the most influential predictor, having a positive relation (.478). This means that as Learning Orientation of students increases, the score they give for the motivational value of teaching action patterns which favour learning, also tends to grow. In high contrast, we find that the Avoidance Orientation

(AO) attracts a negative weight (-.214): this implies that the score given for the motivational value of the teaching action patterns that favour learning, tends to decrease as the avoidance orientation increases. Finally, the Outcome Orientation (OO), also has a negative relation (-.095) but less significant. The teaching style scale (T scale) is an aggregate of the rest of the other scales (Scales A-H), so it is not surprising that, generally, the predictive value of the Motivational Orientations is similar to that found in the aggregate total teaching scale. The patterns can be seen in table 3 below.

4.3 Analysis of variance
Just as we hypothesised, the Motivational Orientations of students seem to modulate the motivational impact perceived by students. Below, we see analysis of differences between English and Spanish students (Table 4). From the Variance Analysis we see that there are significant differences only in AO and LO. In order to discern which way these differences tend, we compare the values of the averages which appear on the left side of the table. These particular English students (who all belong to the same single department, studying the same degree comprising mostly compulsory subjects) seem to have a more developed avoidance orientation (an orientation to avoid failure), whereas these Spanish students have a greater learning orientation.

Table 4. ANOVA (ANalysis Of VAriance) of differences between students' motivational orientation as a function of *Country*.

Descriptive analysis					Analysis of variance			
Motivational Orientation	Country	N	Mean	Sd	gl	Quadratic mean	F	Sig.
Avoidance orientation (AO)	Spain	501	26.39	6.70	1	319.84	7.525	0.006
	UK	196	27.90	6.04	695	42.50		
Learning orientation (LO)	Spain	501	37.31	4.93	1	322.23	13.050	0.000
	UK	196	35.80	5.07	695	24.69		
Outcome orientation (OO)	Spain	501	26.07	4.68	1	14.23	0.665	0.415
	UK	196	26.39	4.49	695	21.41		

We now proceed to determine whether there are significant differences in the values assigned by English and Spanish students to the different action patterns assessed, and whether these differences are coherent with those found in the motivational characteristics. Since there are many variables, we have only chosen some of the most representative, among those that have been significant in the Variance Analysis. The values obtained in the initial descriptive analysis point to which way these differences are produced. On Table 5 we can see that in the total scale (which defines the teaching style as a whole), as well as in the rest of sub-scales (Scales A-H), the motivational value attributed by Spanish students is higher than the one attributed by the English students. This result matches our expectancies since the Spanish students have a bigger learning orientation. Looking down the table to the specific strategies (below Scale H), these repeat the prior result. It is worth noting that, regarding the promotion of participation, these particular British students consider it to be slightly demotivating when the professor addresses questions directly to students: this may relate to their bigger Avoidance Orientation. It can be observed that, at the time of completing the questionnaires, 2/3 of the British sample students were participating in project-based design class where a professor questions each student during daily progress reports, in front of their peers.

Table 5 Differences in the motivational value attributed to some teaching patterns as a function of the country.

Teaching patterns	Descriptive analysis				Analysis of variance			
	Country	N	Mean	Sd	gl	Quadratic mean	F	Sig.
(T) Teaching style	Spain	501	3.63	.36	1	3.79	30.40 3	0.000
	UK	196	3.46	.34	695	.12		
(A) Classes and activities commence	Spain	501	3.89	.57	1	6.01	17.62 3	0.000
	UK	196	3.68	.61	695	.34		
(B) Teacher´s explicit messages showing relevance/applicability	Spain	501	3.89	.69	1	3.12	6.515	0.011
	UK	196	3.74	.69	695	.48		
(C) Organisation of theoretical classes	Spain	501	3.95	.45	1	16.35	79.11 9	0.000
	UK	196	3.61	.47	695	.20		
(D) Promoting class participation	Spain	501	3.34	.61	1	7.90	23.55 0	0.000
	UK	196	3.10	.50	695	.33		
New or surprising information	Spain	501	4.10	.73	1	6.15	11.03	0.001
	UK	196	3.89	.79	695	.55		
Clarity of exposition	Spain	501	4.14	.74	1	77.21	135.5 5	0.000
	UK	196	3.40	.78	695	.57		
Using images and examples	Spain	501	4.38	.79	1	4.12	6.16	0.013
	UK	196	4.20	.88	695	.66		
Teachers' messages for some specific practical application	Spain	501	4.24	.71	1	17.57	31.84	0.000
	UK	196	3.89	.82	695	.55		
Teacher's asking students directly to answer questions in class	Spain	501	3.10	.93	1	30.47	35.36	0.000
	UK	196	2.64	.92	695	.86		

4. DISCUSSION AND CONCLUSIONS

In general, the results support the trend shown by prior studies where the same variables are assessed (Alonso-Tapia, 1999; Alonso-Tapia et al., 2006, 2007, 2008 and 2009), although this study provides new information related to differences between students who belong to different educational cultures:

(a) The motivational value assigned by students allows grouping of the teaching action patterns into three groups: teaching actions that students score as being strongly motivating, some that they find demotivating, and another group of actions that are slightly motivating. However, some of the most important results of this research should be examined in greater detail, trying to analyse the convergence points as well as the differences found regarding previous studies.

First, regardless of the origin, most of the strategies evaluated seem to act positively on the students' motivation. The positive effect is especially visible as strongly motivating in cases in which the lecturer begins the activity creating new or surprising situations; indicating the goals to achieve; explaining the importance and usefulness of what is learned; structuring the lessons, being clear in their presentations; using examples and diagrams; combining explanations on the board with technical support; making use of virtual classrooms; allowing freely asked questions; using tests in different formats and showing willingness to help students when they face difficulties. These results are similar to those found in the previously-cited studies of the group of Alonso-Tapia, supporting the positive significance of these particular actions of the lecturers. There is increase of the

student's expectation of success with these strongly motivating lecturer actions. It remains true that through these actions, the lecturer creates a classroom climate that furthers the students' own perception they may achieve their learning goals (Bandura, 1997).

Second, the slightly motivating lecturer actions includes actions such as the lecturer organising practical classes for the students to apply theoretical content; the lecturer suggesting practical work outside the classroom to contribute to the subject grade; carrying out tasks that have some complexity or require research to be performed; enhancing other ways to involve the students apart from asking questions of/from the lecturer; assigning tasks to be performed in groups; using technical vocabulary in their explanations and suggesting additional sources to consult or access to further information.

These findings as to what teaching actions students rate as 'slightly motivating' are new: this list differs from previous research findings which related to Secondary Education (high school) and Social Sciences. Thus, the use of technical vocabulary scores positively for the first time, as does the action of a lecturer proposing additional readings. These results seem in line with the researches carried out by authors such as Salmerón et al. (2011) and Smith, S., et al. (2005), who suggest the influence of discipline in the perception of classroom climate and the way students face the learning process.

Another new result is that our findings do not support some established theories of teaching actions which motivate students. For instance, the European Union has a policy for undergraduate training in skills as required by the new Higher Education scenario. The new EU policy requires that students should be able to work in groups, to communicate and defend their ideas with their peers, to find and select relevant information that enable them to work outside the classroom in an autonomous way, etc. but these strategies did not score as well as expected in our study. We suggest possible reasons for the students' reaction may include: the requirement of a greater effort from the students that is not adequately compensated; negative experiences of the unequal distribution of the work when performing activities in a group; that some students were accustomed to traditional learning in which their role is much more passive (and they dislike or do not understand the change to active learning); students' fear of appearing inadequate in the eyes of their peers and/or fear of teacher's negative grades. Some of these difficulties had already been identified by Salomon and Globerson (1989). Our study shows an onging need to change conditions so that students experience the benefits involved in active learning but our results showing a certain discrepancy between theory of engaging students and actually engaging students is not conclusive and more research is needed.

Third, some coincidences were also found in some teaching actions which had a demotivating value in our study. Students consider the following to be clearly demotivating: assessment through a single final examination; assessment which includes tasks different from those learned in the classroom and assessment which has a limitation on time for testing. The rejection of these teaching actions by students might suggest that avoiding such actions could make students feel more comfortable or more confident in their ability to progress which could help to improve their interest and effort to learn but assessment logistics are difficult to change, in practical terms and culturally. Nevertheless, this does not mean that its negative impact on motivation cannot be changed suggesting an assessment system that is less threatening to students. Some actions that could help in this regard would be to rehearse several exams and allow enough time to complete them. Furthermore, carrying out several tests could be used to provide positive

feedback, which allows learners to identify their progress, to learn from mistakes and correct them on time (Yorke, 2003)
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(b) There is a strong relationship between the prior level of students' GO (goal orientation) and the way they value the different teaching patterns. These results are parallel to those found previously by the Alonso-Tapia group, supporting the idea that students' previous motivations play a filter role which mediates in their individual perception of the real motivational climate of the class. This result move in the same direction as many other studies. (Senko et al., 2011; Urdan, 2005).

(c) There are also significant differences between the motivational characteristics of the British and Spanish samples of students. It is possible that the *cultural environment* can modulate the motivating effect of the different patterns. These are two totally different universities regarding the type of students they take in. At the University of Madrid almost all students are Spanish, whilst in the case of the sample from Imperial College London civil engineering, more than fifty percent are from overseas, especially Asian countries. As described above, in general, the differences in the motivational value assigned to teaching actions are more favourable from UPM students. Taking into account the modulator role of previous motivations, one might think that this is a result of a higher incidence of Learning Orientation shown by the Spanish students. But, it is also possible that cultural differences have a specific influence on the motivational value attributed by students to the teaching environment set up by the lecturer. There are no previous studies in this regard we are aware of. However, it is possible to find literature on the relationship between culture and motivation, on the influence of cultural values in the emotional adjustment and in the perception of subjective well-being (Basade et al., 2005; Hofstede, 2001). For Páez et al., (2002), the goals are determined in part by the dominant values in the culture. Students gradually internalise the values shared and institutionally predominant in the culture which become social standards which guide behaviour, making behaviour a function of culture. This begs the question as to which culture is dominant for Imperial's overseas students, who not only have to deal with the theoretical engineering science subjects, but with residential deep-immersion, project-based, role-play active learning weeks which are somewhat different from anything in their previous experience.

Thus, from this perspective, it would be interesting to carry out new research that could deliver evidence on the impact of cultural values on the goal orientation of students and to explore the interesting phenomenon of high-achieving, hard-working students who present as having an Avoidance Orientation. Also, the British data was collected from one department at one university: further work exploring the culture and motivation differences could usefully check more engineering disciplines in various universities (funding permitting). The new findings on teaching actions which are counterproductive for motivation also merit further exploration.

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