

## PSYCHOMETRIC PROPERTIES OF THE ActEval QUESTIONNAIRE ON UNIVERSITY TEACHERS' ASSESSMENT ACTIVITY

*[Propiedades psicométricas del cuestionario ActEval sobre la actividad  
evaluadora del profesorado universitario]*

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### Abstract

This article presents the results of the empirical validation of the questionnaire ActEval (Self-Report on the Evaluation Activity of university teachers). ActEval attempts to identify how important teachers consider a variety of assessment tasks, whether they feel competent, and to what extent they use them in their daily practice, in line with the new competences under the European Higher Education Area. Validation is studied using Non-Metric Multidimensional Scaling (PROXSCAL) and the reliability results show high levels of internal consistency. The data suggest that some items in the questionnaire should be reviewed in order to obtain an effective tool for the analysis of evaluation practice.

### Keywords

Competence assessment at University; perception of the teacher; construct validity; internal consistency.

### Resumen

El presente artículo tiene como objetivo presentar los resultados de la validación empírica del cuestionario ActEval (*Autoinforme sobre la Actividad Evaluadora del profesorado universitario*), que permite conocer en qué medida el profesorado universitario considera importante, se siente competente y utiliza una serie de tareas de *evaluación orientada al aprendizaje* en su práctica diaria, acordes con las nuevas competencias derivadas del Espacio Europeo de Educación Superior. Los resultados de fiabilidad muestran elevados índices de consistencia interna y la validación empírica mediante el procedimiento de Escalamiento Multidimensional No-Métrico (PROXSCAL) sugiere la revisión de algunos ítems del cuestionario para obtener un instrumento eficaz para el análisis de la práctica evaluadora.

### Descriptores

Evaluación de competencias en la universidad, percepción del profesor, validación de constructo, consistencia interna.

The profile of university teaching staff is changing and, to ensure high teaching standards that can keep up with new developments arising from the convergence of the European Higher Education Area (EHEA), a transferable, flexible and multi-purpose profile is required, one that is able to adapt to diversity and respond to continuous change (Bozu and Canto, 2009). The tasks associated with this new profile demand a range of skills and involvement from university teachers, some of which are already part of their role and others which need rethinking (Butcher *et al.*, 2006; Cano, 2005, 2008; Valcárcel, 2003; Zabalza, 2003). The latter includes assessment, which is no longer solely a process of grading and monitoring and has become a process for optimising learning (Allen, 2000; Bain, 2006; Dochy *et al.*, 2000; McDonald *et al.*, 2000; Padilla *et al.*, 2010), placing the emphasis on so-called *learning-oriented assessment*.

Carless, Joughin and Mok (2006) consider that for *learning-oriented assessment* to take place, three essential conditions are necessary: a) real assessment tasks that demand the application of “real” skills akin to students' field of professional development, b) effective feedback, with real opportunities for improvement and future change (*feedforward*), which will not only have an impact on how the tasks are carried out but also on student satisfaction, and c) students' involvement and participation in their own assessment process (Simon, 2010). Perhaps the last of these three is one of the most significant changes in the assessment process. This entails listening to students' input when designing indicators (sharing ideas with them or at least listening to their views) and enabling them to take part in actually carrying out the assessment process, using self-assessment and peer assessment as reference. A number of studies recommend that students play an active role in assessment (Boud and Falchikov, 2007; Boud, 2010; Chen, 2008; Ljungman and Silén, 2008; López Pastor, 2008; Rodríguez, Ibarra and Gómez, 2011) and stress the benefits for students in terms of their greater involvement, a more independent

learning process and an increased sense of confidence and responsibility (Falchikov, 2005; MacDonald, 2011; Pastor, 2008, 2011).

Although including ongoing assessment tasks is becoming more commonplace in the university environment, the predominant technique used in Spanish universities is still the end-of-year examination (Ibarra and Rodríguez, 2010). The EHEA marks a change in perspective for higher education that should produce changed procedures and updated assessment tools, considering assessment as a learning activity linked to improvement.

However, in the same way that any educational strategy has to be taught and learnt, self-assessment and shared or peer assessment procedures also need time and a learning process of their own, so practising *learning-oriented assessment* cannot be expected to become part of teaching practice with immediate and automatic effect. The slowness of the process and the problems associated with it are sometimes cited by teachers as arguments against such practice.

The reality is that any change made to the education system, and specifically to the higher education system, requires effective and willing input from teaching staff. For Prieto and Contreras (2008), teachers who understand assessment as a process for improving their own practice are the ones who seek input from their students, while for teachers who are only concerned with correct answers, assessment becomes a monitoring rather than an improvement process. Therefore, the beliefs that teachers have about assessment, its purpose and the intention behind the process first need to be ascertained.

Practices and actions carried out by the teacher, not only in terms of assessment but also of teaching in general, are bound to be closely linked to their beliefs about assessment. To quote Sanmartí (2007): “tell me what and how you assess and I'll tell you what and how you teach and what and how your students learn” (p. 19). This means that, together

with ideas about assessment, it seems important to find out what kind of assessment practices are being carried out in the classroom in order to change, document or introduce new assessment practices.

Consequently, it would be essential to know how teachers see their own assessment activity. The self-report is a tool for reflection that enables university teaching staff to check their usual assessment practice and judge the extent to which they regard introducing alternative procedures linked to *learning-oriented assessment* as important or relevant for day-to-day classroom dynamics. The aim of this article is to present the results of empirical validation of one tool, *Self-Report on the Evaluation Activity of university teachers* (ActEval questionnaire), designed to ascertain to what extent university teaching staff regard as important, feel competent with and use a series of assessment tasks in their everyday practice that are in line with new competencies arising from the EHEA.

## Method

### Participants

The overall sample completing the tool was comprised of 427 university teachers from 18 Spanish state universities. The gender distribution was practically even, with 49.4% male and 50.6% female.

In terms of the disciplines taught by participants, the highest percentage belonged to *Social and Legal Sciences* (44.3%), followed by *Health Sciences* (15.2%), *Arts and Humanities* (15.2%) and to a lesser extent, *Sciences* (13.1%) and *Engineering and Architecture* (12.2%).

In terms of the employment status of the teaching staff involved, the sample was balanced, as 49.6% of teachers were under contract, while 50.3% were classed as civil servants.

Lastly, 49.4% of teachers had more than 15 years' experience and only 7.7% had less than 3 years' experience, therefore the sample represented a high level of knowledge of the university system.

### Tool

The current version of the *Self-Report on the Evaluation Activity of university teachers (ActEval questionnaire)* has been validated both theoretically and by experts in a prior phase (Quesada, Rodríguez and Ibarra, 2013).

The ActEval questionnaire is a self report enabling information to be collected on university teachers' assessment practice as part of their professional duties. It consists of a total of 31 items divided into four aspects, corresponding to basic assessment activities, as described in Table 1.

Table 1. ActEval questionnaire dimensions and items.

DIMENSION	DESCRIPTION	ITEMS
Assessment design and planning	Procedures, tools and adapting criteria to subject skills.	1, 9, 18, 20, 25, 30, 31
Student monitoring	Conveying information to students on their learning at the start, during and at the end.	2, 3, 19, 21, 22, 23, 27, 28
Student participation in the assessment	Consensus and negotiating criteria, self-assessment, peer assessment and co-assessment.	4, 10, 11, 12, 13, 14, 15, 16, 17, 26, 29
Assessment monitoring, improvement and adjustment	Updates and innovations to the process following reflection.	5, 6, 7, 8, 24

Each of the items on the questionnaire is scored on a Lickert scale between 1 (strongly disagree) and 6 (strongly agree) for the following criteria:

a) *importance*, defined as the level of interest and relevance for university teachers of students playing a specific role in the learning assessment process;

b) *competence*, defined as the extent to which they feel prepared and with the skills for carrying out the task; and

c) *use*, defined as the extent to which they are in the habit of carrying out the task in their work as university teachers.

### Procedure

For the empirical validation of the ActEval questionnaire, a virtual online form was compiled using the *SurveyMonkey* tool and data was stored on an Excel spreadsheet in order to build a database using SPSS.

### Data Analysis

Statistical analysis was carried out using the SPSS package (version 19.0). Cronbach's Alpha was used to analyse the internal consistency of the tool, and the Non-metric Multidimensional Scaling (PROXSCAL) method was used for construct validity. Owing to the particular features of the data scale, the procedure followed for calculating dissimilarity is described in more detail in the results section.

## Results

### Internal consistency

The internal consistency of the complete tool analysed the 31 items comprised in it, analysing the three criteria (importance, competence and use) using Cronbach's Alpha and following the classic scale established by Nunnally (1978) for its interpretation. In all cases interpretation indicated excellent reliability, higher than 0.93. For the criterion of importance, reliability was 0.936, for the criterion of use, reliability was 0.935 and for the criterion of competence, reliability was 0.961.

The study of the tool's reliability by dimension indicated very good internal consistency in three of them, with excellent results for the dimension related to students' participation in the assessment process, as seen in Table 2 (for calculating reliability the data from the three analysis criteria were taken as a whole).

Tabla 2. Reliability of the tool by dimensions.

DIMENSION	Cronbach's Alpha	In each dimension	Item Number	Interpretation
Assessment design and planning	.890	7	21	Very good
Student monitoring	.896	8	24	Very good
Student participation in the assessment	.936	11	33	Excellent
Assessment monitoring, improvement and adjustment	.891	5	15	Very good

### Construct validity

To analyse the internal structure of the tool, we opted for the Non-metric Multidimensional Scaling (PROXSCAL) method as an alternative to Classic Factorial Analysis (CFA). The main reason for choosing this option was the unsuitability of CFA for the data collected. The Likert scale used had 6 ordered categories and therefore failed to fulfil the assumptions of CFA from the outset (López, Pérez and Ramos, 2011; Rivas and Martínez Arias, 1991).

Non-metric Multidimensional Scaling is the term used to describe procedures in which,

based on the "*distances*" (dissimilarities) between a set of points, the objective is to find the "*configurations*" of the points, preferably in a small number of dimensions. If  $d_{rs}$  is used to denote the associated measurement of individuals  $r$  and  $s$ , there is said to be a dissimilarity if:

- i)  $d_{ij} \geq 0$  for all  $i, j$
- ii)  $d_{ii} = 0$  for all  $i$
- iii)  $d_{ij} = d_{ji}$  for all  $i, j$ .

By configurations we mean a set of coordinates that can be shown on a "*map*". This can

be considered to be a generalisation of the idea of principal components. In fact, care should be taken with notation. Coordinates obtained from multidimensional scaling are sometimes called principal coordinates.

The most widely-used procedure for carrying out multidimensional scaling is probably the one known as ALSCAL, developed in the 1970s by Takane, Young and De Leeuw (1979) and implemented in several statistical programs, including SPSS.

However, this method presented problems of suboptimality, that is, the algorithm ended by detecting a local, not overall, minimal function. Later research resulted in the development of an alternative procedure: PROXSCAL. This algorithm was presented by Busing at the SOFSTAT'97 conference (Busing, 1997) as a more efficient alternative to ALS-CAL. The method uses De Leeuw and Heiser's algorithm (1980).

In our case, the main problem lies in the construction of the dissimilarity matrix between items based on original data. The decision was taken to follow the procedure set out in Cuadras (1996) based on results obtained by Gower (1971) when the original data are not to scale.

Specifically,  $R_{ij}$  is Spearman's correlation between items  $i$  and  $j$  calculated from data collected from the 427 subjects who took part. This correlation can clearly be understood as a

coefficient of similarity between the items, with values ranging from -1 (minimum similarity) to 1 (maximum similarity). As is already known,  $R_{ii}=1$ . The procedure put forward by Cuadras builds a dissimilarity defined by:

$$d_{ij} = \text{SQRT}(2 * (1 - R_{ij}))$$

It can be seen immediately that this is, in fact, a dissimilarity (properties i, ii and iii described above are fulfilled). This method of constructing dissimilarities has been put into practice in many applications, including by Arenas and Cuadras (2002) and Pavoine, Vallet, Dufour, Gachet and Daniel (2009).

Once the dissimilarity has been defined the multidimensional scaling is then applied using the PROXSCAL procedure.

For presenting the results, the internal structure of the complete tool was analysed by evaluation criteria, starting with the criterion defined as *importance*; followed by *competence*; and finally the criterion of *use*.

### Multidimensional Scaling: the criterion of IMPORTANCE

Measures of stress and fit show the effectiveness with which the solution distances come near to the original distances. The results obtained after analysis showed very good solution adjustment indicators (see Table 3).

Table 3. Measures of fit and stress for the importance criterion

Standardised raw stress (SRS)	.01140
Stress-I	.10675(a)
Stress-II	.29835(a)
S-Stress	.02671(b)
Explained dispersion (D.A.F.)	.98860
Tucker's Congruence Coefficient (TCC)	.99429

PROXSCAL minimises standardised raw stress.

a Factor for optimum scaling = 1.012.

b Factor for optimum scaling = .994.

Each of the four stress statistics measures the absence of fit of the data, while explained dis-

persion and Tucker's Congruence Coefficient measure fit. Stress measurements close to 0 ( $S_{bn}=0.01140$ ) and fit measures close to 1

(CCT=0.99429), indicate the best possible solutions, therefore we are seeing excellent solutions.

Figure 1 shows the first two main coordinates associated with the 31 items on the questionnaire. To make reading easier, the items belonging to each of the four blocks have been marked in different colours. As can be seen on the map, the items in the third block are clearly grouped together (participation of students in the assessment process, in red). This corresponds to the high internal consistency found when this block was studied. There are two

exceptions to this general trend: item 15, in the third block, appears separated, while item 21 in the second block (monitoring of students, in green) is positioned with those in the third block. Items in the second block also appear grouped together, with the exception of items 19 and 28. The other two blocks (first and fourth) do not present such a pronounced separation, making it necessary to move on to study the next main coordinates, third and fourth. Figure 2 shows the concentration of items in these two blocks; notice in particular the values on axis 4.

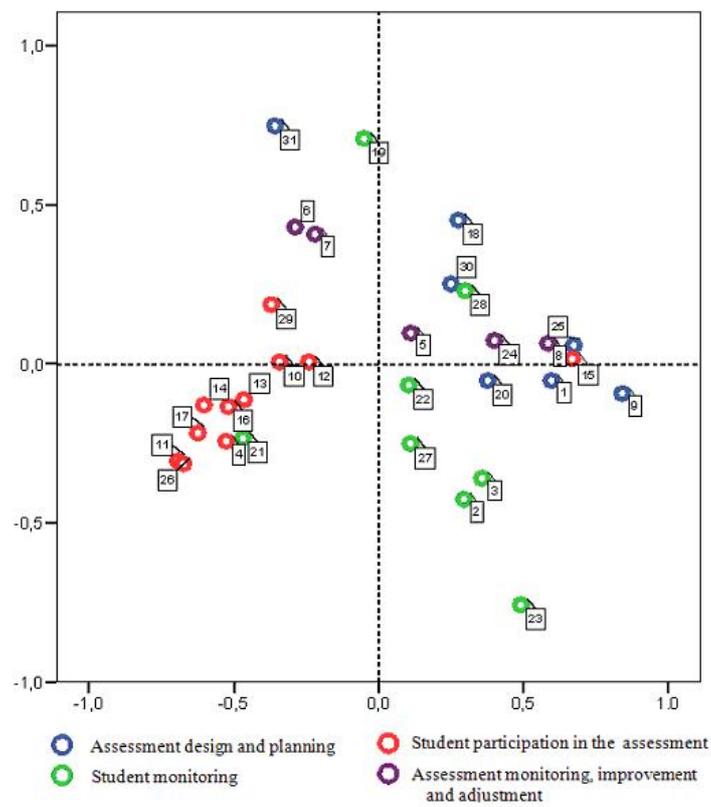


Figure 1. Coordinates 1 and 2

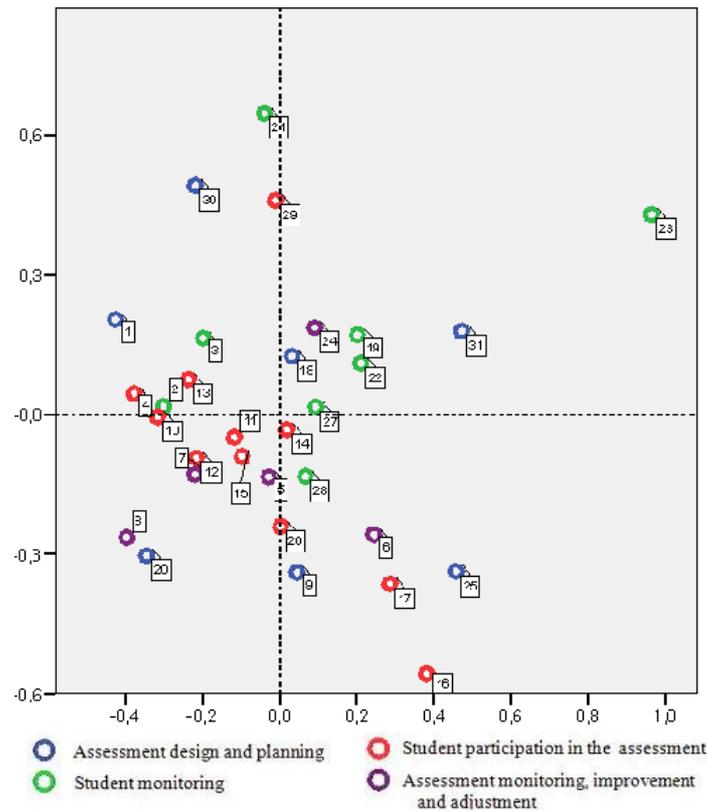


Figure 2. Coordinates 3 and 4.

### Multidimensional Scaling: criterion of COMPETENCE

The principal indicators to be interpreted in this second criterion give information about the high quality of the results. The stress indi-

cator had an excellent value ( $S_{bn}=0.010$ ) and the proportion of variance of the initial disparities explained by the distances between the items was 99.46% (CCT) (see table 4).

Table 4. Measures of fit and stress for the competence criterion.

Standardised raw stress (SRS)	.01062
Stress-I	.10307(a)
Stress-II	.30264(a)
S-Stress	.02564(b)
Explained dispersion (D.A.F.)	.98938
Tucker's Congruence Coefficient (TCC)	.99467

PROXSCAL minimises standardised raw stress.

a Factor for optimum scaling = 1.011.

b Factor for optimum scaling = .994.

In Figure 3, which shows the two principal coordinates, it can be seen clearly how all the items in block 3 except for item 15 are grouped together, as are all the items in block 2, except for items 19 and 28 (in green). In this

case the grouping together of the items in the remaining groups was very clear, except perhaps for items 18 and 20 in the first block, which tended to appear mixed with those in block four.

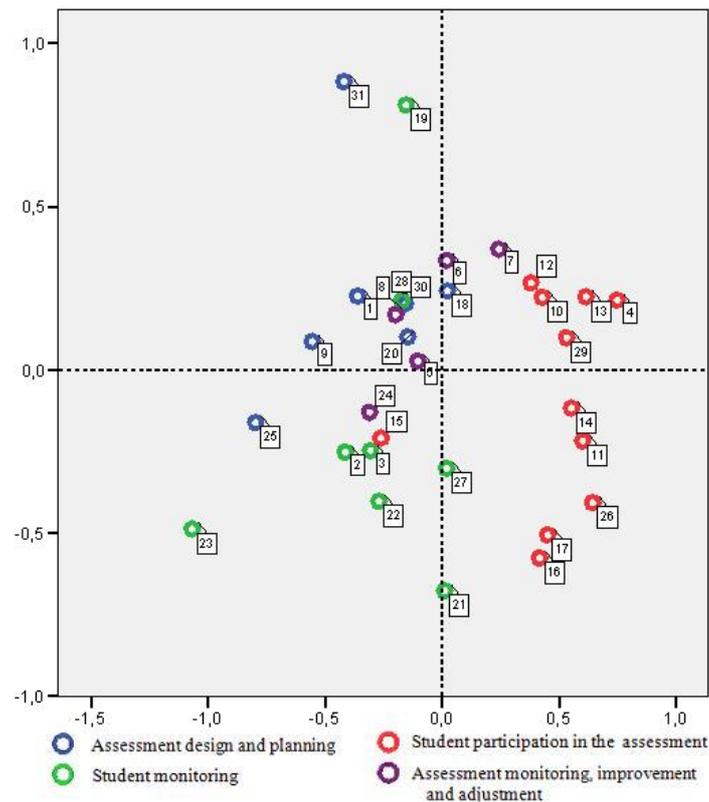


Figure 3. Coordinates 1 and 2

### Multidimensional Scaling: criterion of USE

For this last criterion, relating to *execution of the assessment task*, the stress indicator was 0.010 and Tucker's Congruence Coefficient (CCT) was 0.994, indicating that, like the pre-

vious cases, quality and goodness of fit values obtained can be said to be excellent (see Table 5).

Table 5. Measures of fit and stress for the use criterion.

Standardised raw stress	.01101
Stress-I	.10494(a)
Stress-II	.28931(a)
S-Stress	.02881(b)
Explained dispersion (D.A.F.)	.98899
Tucker's Congruence Coefficient	.99448

PROXSCAL minimises standardised raw stress.

a Factor for optimum scaling = 1.011.

b Factor for optimum scaling = .993.

Figure 4, showing the two first principal coordinates, the patterns seen in Figure 1 were repeated. The items in block 3, except for item 15, were clearly grouped together, while item 21 in the second block was positioned with

those in the third block. Items in the second block were also grouped together, with the exception of items 19 and 28. Unlike Figure 1, items in the first block were now clearly grouped together, except for item 20, as were items in block four, except for item 24.

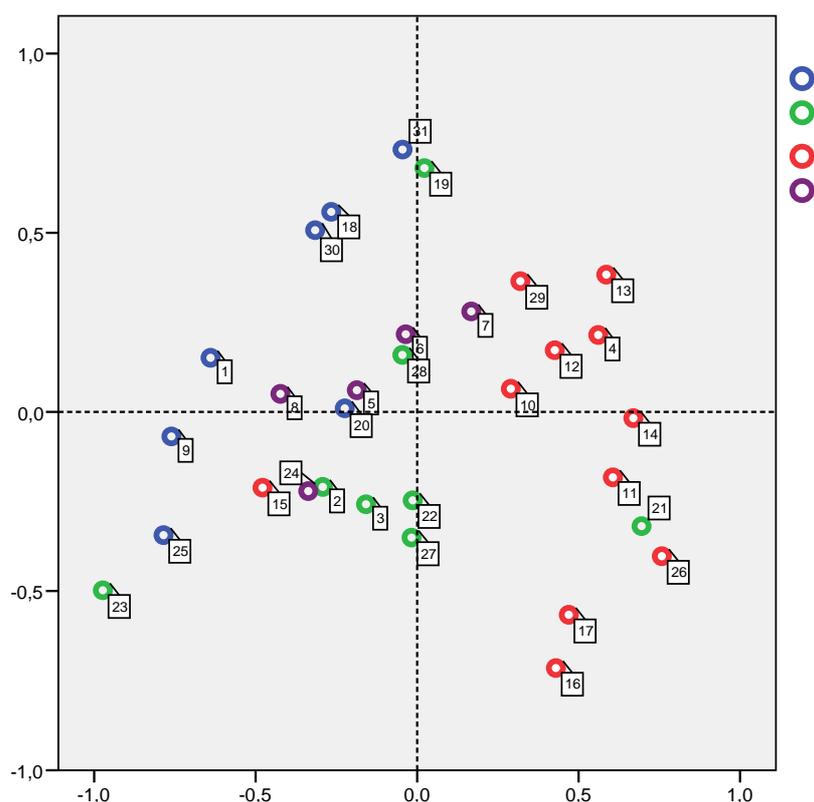


Figure 4. Coordinates 1 and 2.

Thus the results obtained in the three aspects, referring to the criteria of importance, competence and use, ratified the existence of the blocks put forward in the items structure. However, we found a greater concentration in certain blocks (always the second and third, and to a lesser extent the first and the fourth) together with a continued presence of some items distanced from what would theoretically be their related items, that is, belonging to the same block (items 15, 21, 19 and 28).

### Conclusions and discussion

The aim of this study was to analyse the psychometric properties of the *Self-Report on the Evaluation Activity of university teachers (ActEval questionnaire)* to confirm its usefulness as a means for finding out the importance teaching staff attach to each assessment action and task, and to what extent they feel prepared to tackle them, plus how much they use them in their everyday teaching practice. University teachers individually completing the *Self-Report*, a tool that has remarkably good psy-

chometric properties, enables information to be obtained about their perception and actions in respect of assessments carried out as part of the education process.

The scale has a high internal consistency, both in the analysis of evaluation criteria and in its theoretical aspects. Although the tool had already been theoretically validated by expert judgement (Quesada, Rodríguez and Ibarra, 2013), empirical results obtained by Non-metric Multidimensional Scaling indicated that some items need to be reviewed, mainly in the dimension of *Student Monitoring* (19, 21 and 28) and *Participation* (item 5), as they are not near their theoretically related items.

The results on the technical characteristics of the tool suggest that it has useful practical applications for improving university practice and aligning it with the EHEA. The availability of a tool that collects information not only on how university teaching staff perceive assessment activities but also their perceived

competence to perform these tasks and their real use enables an overall understanding of the thoughts and actions of teaching staff in relation to one of their essential functions. This knowledge will enable an analysis of whether current assessment practices in universities are coherent, or at least indicate a trend, with the new challenges posed by some experts to university teaching staff (Boud, 2010; JISC, 2010).

*Learning-oriented assessment*, in line with new educational approaches, proposes that the assessment process should be effective to the extent that it is at the centre of the learning process, giving students the opportunity of taking part in it and receiving full information about how it is carried out, thus enabling them to learn and improve, as well as trying to collect objective information about their errors, omissions or mistakes (Boud, 2010).

In any case, and particularly in the teaching context, it is essential to critically reflect on professional practice. Analyses frequently refer to the teaching process, with less coverage given to improving assessment procedures, when in fact it is the latter that act as drivers of the student learning process. Analysing education practice, using real procedures carried out in the classroom, enables teaching staff to have a better view of it and also improves and fosters good teaching practice.

Although making changes to assessment procedures, tools and concepts certainly requires changing teachers' beliefs, this process also involves a parallel process of changing the way students view them. Possible resistance, passive attitudes or less involvement and responsibility could put a halt to processes of *learning-oriented assessment*.

Actions should therefore be aimed towards a focus on implementing in-depth assessment. While this is not without its difficulties and obstacles, mainly work overload, lack of experience and perceptions and beliefs held by the education community, this can be done by laying the foundations of coherent, coordi-

nated and responsible action (Sánchez, 2011) enabling improvements to be made to the education process.

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