Assessment of Competences in the EHEA: Postgraduate Students’ Entrepreneur Profile

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Abstract
The construction of the European Higher Education Area (EHEA) has brought in several profound changes in the university environment. Skills learning methodologies are one of the central issues of this new educational paradigm. Spanish universities have been very careful in defining the competencies that students must achieve on the new degrees and postgraduate courses. However, they have paid less attention to the question of how these competencies should be measured. The present study addresses this issue by examining the implementation of a competency assessment tool. Specifically, we analyze the status and evolution of soft skills among students on the Official Master’s programme “Creating and Managing Innovative Technology-Based Companies” at the University of Barcelona, using the Evolute system developed by the Tampere University of Technology (Finland).

The results show the Evolute methodology to be an appropriate tool for data collection and analysis. The system is ideal for helping managers of higher education to analyze and evaluate their students’ skills acquisition.

Keywords: Competency assessment, ICT, European Higher Education Area (EHEA).

1. INTRODUCTION
The construction of the European Higher Education Area (EHEA) has brought with it several profound changes in the university environment and the process of design, evaluation and implementation of new curricula. The reshaping of degree courses, the introduction of a new credit accounting system focused on student workload (ECTS, European Credit Transfer System) and skills learning methodologies, are three central features of this new educational paradigm. In fact, Spanish universities have been very careful in defining the competencies that students must achieve within the new degrees and postgraduate courses. However, they have paid less attention to the question of how these competencies should be measured. In many cases, student skills cannot be evaluated by the traditional assessment methods used in education today [1]. A recent analysis of several degree syllabuses in Spain highlighted the deficiencies of these traditional methods [2]. In general, the process of competency assessment has been somewhat neglected in Spanish higher education.

The present study addresses this issue by exploring the implementation of a tool for assessing competencies. Broad competencies were assessed using the methodology of the Evolute project, developed by the Tampere University of Technology in Finland [3-6]. This is an ICT-based digital platform designed for the self-assessment of personal and social competencies, and it uses different models of competencies for a range of student profiles. Here we chose the application known as Tricuspid – Entrepreneurs’ competencies, due to its compatibility with both the objectives of the syllabus and the broad competencies to be achieved by students in the Master’s degree under consideration, i.e. Creating and Managing Innovative Technology-Based Companies.

At the level of teaching, the Tricuspid tool enables educators to assess an individual student’s competencies in specific areas of interest, the results being produced immediately. The analysis is performed automatically by the system [1] and provides teachers with additional information about the effects of their input on student competencies, doing so at a negligible cost (in terms of time and effort). It also complements other assessment instruments or methods that teachers might use to evaluate the outcomes of competency-based teaching/learning. At the individual level the Tricuspid application should be considered
as a tool for students’ personal development, since it enables them to identify their strong and weak points and to develop personal strategies for improvement that can have an impact on their entrepreneurial profile and academic performance. Finally, at the institutional level the tool provides an opportunity for continuous improvement, since it can detect trends in the training needs of new students and help to foster the development of the competencies required by tailoring the academic programme accordingly.

This latter aspect is important in the context of Master’s degrees, whose close links with professional careers mean that particular attention is paid to quality, not only by universities or the certification and accreditation agencies, but also by various key players in the business community. Among other things this has led to an increasing emphasis being placed on the competencies required for the professional career toward which the training and qualifications are geared.

Being able to match training to the needs of the labour market is important not only for those who are charged with designing academic programmes in different fields, but also for educators who wish to become more efficient in their teaching activity. In order to achieve such a match it is necessary to determine the initial level of students’ competencies at the start of a given academic programme, compare this with what is required by the career they are seeking, and tailor the teaching/learning process accordingly. However, these skills and competencies are not readily captured through traditional assessment methods [1], and their analysis becomes even more difficult in the context of new postgraduate courses, due to the wide range of backgrounds from which students come. In this context the use of ICT-based tools provides a cost-effective and quick way of assessing the competencies of individual students and of monitoring them throughout the course.

The overall aim of the paper is to increase our understanding of ways of assessing competencies and illustrate how these can benefit the university community. More specifically, the focus is on improving not only the work of teachers and the learning achieved by students, but also the strategic management of higher education institutions. The three broad objectives are as follows:

1. To validate instruments for data collection and methods of analysis that can help teaching staff to analyse and evaluate the acquisition and mastery of competencies among their students.
2. To examine the utility of self-assessment of competencies and the use of an ICT-based tool for providing feedback about students’ progress.
3. To determine the extent to which the tool Tricuspoid provides useful information for the quality management of Master’s programmes.

This paper describes our experience of applying the digital platform Evolute and, specifically, the tool Tricuspoid in order to evaluate broad competencies among students enrolled in the Master’s programme Creating and Managing Innovative Technology-Based Companies. The analysis was carried out during the 2009/2010 academic year, shortly after the programme was set up, the aim being to assess the extent to which the course content matched the needs of society and, where necessary, to make any improvements required.

2. THEORETICAL FRAMEWORK: THE LITERATURE ON COMPETENCIES

The term ‘competency’ has taken on great importance within the current educational paradigm, although there seems to be no consensus over its definition. This is perhaps unsurprising given the wide range of fields involved and the diversity of approaches used in the study of competencies [7]. Nevertheless, notable efforts have been made to describe and clarify the different approaches to the concept, good examples being the work of Winterton et al. [8], Delamare-Le Deist and Winterton [9], and Mulder et al. [10]. These and other studies point out that a distinction has traditionally been made between three main approaches: the behavioural, the functional and the holistic.

The behavioural approach, as proposed by McClelland [11], is based on the evaluation of demonstrable and observable behaviour. Authors who adopt this perspective consider competencies as those attributes of a person which are related to the effective execution of a task, and to performance that is notably better than that of other individuals carrying out the same activity [9-13]. Consequently, it is an approach that focuses on those personal attributes which are readily applicable to other work contexts.

The functional approach is given particular emphasis in the United Kingdom, due to the government’s efforts to implement a nationally-harmonized competency-based system of training in the workplace. In the functional approach, competency refers to those attributes that enable a set of tasks to be successfully carried out (functions that are more or less permanent), these taking precedence over the personal attributes of the individual who performs the task [14]. Therefore, this approach centres on work outcomes, in accordance with a number of parameters that have previously been established in relation to a specific activity.

The holistic approach seeks to integrate the above two perspectives. Thus, it considers competencies as those attributes required to perform a task in accordance with a set of specified parameters. In sum, it links the analysis of individual attributes (the behavioural approach) with the study of the characteristics needed in a given workplace (the functional approach). This approach is traditionally associated with the system of training used in France and Germany.

The holistic approach provides the conceptual framework of competency adopted in the present study, drawing upon the definition of Bikfalvi et al. [15], who state that “competencies refer to the attributes, knowledge, skills, experience and values that an individual needs to carry out his/her tasks”. This definition links the general attribute approach with the context in which such attributes are put into practice.

3. MODELS OF COMPETENCIES

A model of competencies is a descriptive tool that serves to identify the skills, knowledge and personal attributes required to achieve effectively a set of objectives, whether in terms of student learning or workers’ ability to fulfill their role within an organization. In other words, it is a description of the competencies needed to function in a specific job or workplace [16-18] and serves to evaluate individual competencies in relation to a given profile [19]. These competencies are often presented in the form of hierarchical and categorized maps [20].
In the present study the assessment of competencies in relation to entrepreneurial profiles was based on the tool known as Tricuspoid – Entrepreneurs’ competencies, which is described in detail by Palonen [21]. This model is shown in Figure 1.

4. METHODOLOGY

To carry out the competency evaluation in the Master’s programme Creating and Managing Innovative Technology-Based Companies we chose a tool named Tricuspoid developed by the Tampere University of Technology (Finland). This University, as part of the project known as Evolute, has developed a new method and new tools for assessing competencies.

The various applications offered by Evolute have been designed to evaluate the desirable competencies in a range of professional roles (for example, project managers or those in charge of health and safety at work) and organizational processes (knowledge creation, innovative culture, managing the value chain, etc.). It should be noted that these applications are distinct and tailored to each professional role and organizational process. One of such applications is Tricuspoid – Entrepreneurs’ competencies, an ICT-based tool that enables the self-assessment of an individual’s entrepreneurial skills.

The methodology followed in this paper to apply the Tricuspoid tool has been adapted by Bikfalvi et al. [15] and Makatsoris [6] for similar projects. Thus, it can be broken down into three stages: a pre-evaluation, evaluation and post-evaluation stages.

In the pre-evaluation stage, students are provided with information and documentation about the objectives, content and functioning of the tool. They are also given all the necessary instructions to ensure they can use the tool successfully, along with the username and password required to access the system.

The evaluation stage of the Tricuspoid tool is based on the indirect self-assessment of broad competencies. Thus, students are asked to respond to a series of statements related to their daily work, but in such a way that their impression is that they are assessing their attitudes, perceptions and feelings, etc. rather than their performance. For each statement they are asked to identify their current level of competency and indicate the level they would like to achieve. Statements are graded using a fuzzy scale, with labels such as always, often, sometimes or never. The difference between the two levels (current and desired) is referred to as the creative tension, on the basis of which it is possible to identify competencies for which the student perceives the need to learn. In other words, one can identify those areas on which further training could usefully be focused.

The Tricuspoid questionnaire contains 132 items relating to daily work activities. The scores derived from the responses given, for both the current and desired levels, provide an

Fig. 1. TRICUSPOID Competencies’ model – Entrepreneurs’ competencies

Font: Palonen [21]
immediate evaluation of 33 broad competencies (personal and social) (see Figure 1).

After completing the self-evaluation, we carry out the post-evaluation stage, which consists of giving the participants a post-evaluation questionnaire in order to gather information about how they perceived various aspects such as the importance of the competencies assessed, the subjective validity of the tool, and their opinion about the extent to which their studies have helped them to develop their competencies.

The competency evaluation and the Tricuspid application was implemented during the 2009/2010 academic year to eighteen students, who participated voluntarily in the project, enrolled in the Master’s programme Creating and Managing Innovative Technology-Based Companies held in the Faculty of Economics and Business of the University of Barcelona. As regards the profile of these students, 50% were male, 50% were Spanish (the rest were from different foreign countries), 62% were between 25 and 30 years old, and 55% had prior entrepreneurial knowledge.

5. RESULTS

The results for the evaluation of the broad competencies using the Tricuspid tool according to the entrepreneurial profile of students are shown in Figure 2. The aggregate results for the 33 competencies considered by the model are ordered by creative tension. This form of presentation is that used by the Evolute platform to indicate the current level of competencies (blue bars), the desired levels (red bars) and the creative tension (the distance between the two levels).

It can be seen that the competencies with the greatest creative tension are, in this order: Stress tolerance, Understanding others, Metacognitive skills, Innovativeness and Self-assessment. It is on these five competencies that students believe they have to improve the most, since it is here that there is the greatest distance between the current and desired levels of competency.

Conversely, the competencies on which students regard themselves as well-prepared, i.e. those with the least creative tension, are, in this order: Self-capacity, Emotional awareness, Flow, Adventurism and Self-confidence. These competencies can therefore be considered as those on which students feel better equipped, and in the case of Self-capacity, Flow and Emotional awareness they even regarded their current level as being superior to what is required (desired level). These last three competencies therefore show a negative creative tension.

As regards the two main groups of competencies (personal and social) Figure 4 shows that the perceived difference between students’ current and desired level of competency is greater for social than for personal competencies.

Table 1 shows results, measured on a seven-point Likert scale, about students’ perceptions regarding the importance of the competencies assessed, the validity of the Tricuspid tool for evaluating these competencies, and their opinions about the extent to which their studies have helped them to develop their competency as regards entrepreneurship and innovativeness.

As regards the evaluation of each of the six competency groups, it can be seen on table 2, that students ascribe considerable importance to the social and personal competencies described by the model, the scores given being above 5.5 out of 7. Also the results obtained from the evaluation of each of the six competency groups illustrate that students regard the tool as an adequate and valid measure of their competencies, with scores out of 7 being 3.7 or higher. Finally, the students believe that the Master’s programme makes a considerable contribution to the development of their broad competencies. The competency which they regarded as being most developed wasMotivating oneself (score of 5.94), and even the competency which they felt was least influenced by their studies, i.e. Cognitive capability, still achieved a high score (5.44).

All these results, together with the others obtained during the project described in this paper, provide valuable information that can be used to develop strategies for improving the quality of the University of Barcelona’s Master’s programme Creating and Managing Innovative Technology-Based Companies.

6. CONCLUSIONS

Managers of university academic programmes must be able to assess the initial skill level of students embarking on degrees and to compare it with the level required for their future professional development. An efficient assessment system is needed to enable managers to develop teaching-learning processes tailored to students’ needs.

This paper presents the results obtained with the Tricuspid tool for assessing cross-disciplinary skills in relation to the entrepreneurial profile of students on the Official Master's Programme Creating and Managing Innovative Technology-Based Companies at the University of Barcelona in the academic year 2009-2010. The results suggest that the five skills that students felt they needed to improve most (the skills with the largest gap between the current and the desired levels) were stress tolerance, understanding others, metacognitive skills, innovativeness, and self-assessment. The Master’s programme should therefore explore ways of helping students to improve these skills. The skills that students felt they mastered were self-capacity, emotional awareness, flow, adventurism and self-confidence. These skills were identified by students as their strengths, and so these are areas that the Master’s programme...
does not need to prioritize. The research results also showed that students have a very high opinion of the contribution of the Master’s programme to their cross-disciplinary skill development.

This study highlights areas to which the Master’s programme should pay particular attention in order to encourage the acquisition of skills among its students. We propose specific measures that managers of the programme should consider in their ongoing attempts to achieve excellence.

Fig. 2. Competencies of the Master’s programme students as a whole (average between October 2009 and July/September 2010, ordered by creative tension)

Fig. 3. Groups of competencies for the Master’s programme students as a whole (average between October 2009 and July/September 2010, ordered by creative tension)

Fig. 4. The two main groups of competencies for the Master’s programme students as a whole (average between October 2009 and July/September 2010, ordered by creative tension)

Table 1. Students’ evaluation of broad competencies and the Tricuspoid tool

<table>
<thead>
<tr>
<th>Importance to the student of the social and personal competencies</th>
<th>Groups of competencies</th>
<th>Mean score on a scale of 1 to 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-knowledge</td>
<td>6.44</td>
<td></td>
</tr>
<tr>
<td>Self-control</td>
<td>6.00</td>
<td></td>
</tr>
<tr>
<td>Cognitive capability</td>
<td>5.67</td>
<td></td>
</tr>
<tr>
<td>Motivating oneself</td>
<td>5.61</td>
<td></td>
</tr>
<tr>
<td>Empathy</td>
<td>5.72</td>
<td></td>
</tr>
<tr>
<td>Social Skills</td>
<td>6.28</td>
<td></td>
</tr>
<tr>
<td>Students’ evaluation regarding the suitability of the tool for assessing broad competencies</td>
<td>Groups of competencies</td>
<td>Mean score on a scale of 1 to 7</td>
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<tr>
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<tr>
<td>Self-knowledge</td>
<td>4.61</td>
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</tr>
<tr>
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<td>3.72</td>
<td></td>
</tr>
<tr>
<td>Cognitive capability</td>
<td>5.44</td>
<td></td>
</tr>
<tr>
<td>Motivating oneself</td>
<td>5.50</td>
<td></td>
</tr>
<tr>
<td>Empathy</td>
<td>5.11</td>
<td></td>
</tr>
<tr>
<td>Social Skills</td>
<td>5.28</td>
<td></td>
</tr>
</tbody>
</table>
Students’ evaluation regarding the contribution of the Master’s programme to the development of broad competencies

<table>
<thead>
<tr>
<th>Competency</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-knowledge</td>
<td>5.78</td>
</tr>
<tr>
<td>Self-control</td>
<td>5.50</td>
</tr>
<tr>
<td>Cognitive capability</td>
<td>5.44</td>
</tr>
<tr>
<td>Motivating oneself</td>
<td>5.94</td>
</tr>
<tr>
<td>Empathy</td>
<td>5.83</td>
</tr>
<tr>
<td>Social Skills</td>
<td>5.61</td>
</tr>
</tbody>
</table>

Source: Present authors

7. REFERENCES


