

Assessing Entrepreneurship and Innovation in Higher Education Institutions: The 'HEInnovate' Initiative at the Universidade de Aveiro, Portugal

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Abstract HEInnovate is the name of a questionnaire-based self-assessment tool for higher education institutions, which has been used to evaluate their entrepreneurial and innovative activities. The method has been elaborated and disseminated by the OECD and the EU. This paper presents this self-assessment method and portrays its application at the Department of Mechanical Engineering (DME) of the University of Aveiro (UA), Portugal. The paper provides insight into how these results are utilized in designing and implementing activities that connect the university more deeply with wider Society.

Keywords: • HEInnovative • Portugal • universities • innovation • entrepreneurship

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1 Introduction

HEInnovate is the name of a questionnaire-based self-assessment tool for higher education institutions (HEIs), which has been used to evaluate their entrepreneurial and innovative activities. This paper presents this self-assessment method and portrays its application at the Department of Mechanical Engineering (DME) of the University of Aveiro (UA), Portugal.

The elaboration of the method and its international dissemination is an initiative of the European Commission, of the EU Commission's Directorate General (DG) Education, Youth, Sport and Culture,¹ and of the Local Economic and Employment Development Programme (LEED) of the Organisation for Economic Co-operation and Development (OECD). The HEInnovate Programme was launched in 2013 (OECD 2014). The participating institutions (universities, university colleges, polytechnics, etc.) have used this method in dozens of countries to assess their leadership and staff capabilities, together with links with business. The lessons learnt from the international application of the HEInnovate instrument have been summarized in a series of publications (e.g. OECD 2018).

HEInnovate was used twice at DME as a tool for positioning the department (Gabriel 2017). This exercise was fully supported by the leadership structure of UA. The current paper describes the setup, the implementation of the questionnaire-based tool within DME, and especially its results and related outcomes. In particular, the paper provides insight into how these results are utilized in designing and implementing activities that connect the university more deeply with wider society.

2 Project activities

HEInnovate – as a method – was applied in the self-assessment of the department twice – in 2015 and 2016. In 2013 the OECD originally introduced the method with only seven groups of evaluation questions, also called dimensions (OECD 2013). The extension of the evaluation questionnaire by an additional, eighth dimension, “Digital Transformation and Capability,” has occurred later on. Thus, users at the Department applied seven dimensions to analyse and diagnose their experience and to assess the extent of innovation- and entrepreneurship-friendliness of the University. During the questionnaire-based survey, respondents were asked to evaluate a series of relevant criteria/statements (see Table 1). The same process was followed during the interviews and group sessions.

Table 1: Structure of the HEInnovate questionnaire and selected criteria/statements

Dimension	Selected examples of criteria/statements for numerical evaluation
Leadership and Governance	Entrepreneurship is a major part of the university strategy.
	There is commitment at a high level to implement the entrepreneurial strategy.
Organisational Capacity: Funding, People and Incentives	The entrepreneurial agenda is supported by a wide variety of funding sources/investment, including investment by external stakeholders.
	The higher education institution has sustainable financing in place to sustain the entrepreneurial university strategy.
Entrepreneurial Teaching and Learning	The higher education institution is structured in such a way that it stimulates and supports the development of entrepreneurial mindsets and skills.
	Staff takes an entrepreneurial approach to teach in all departments, promoting diversity and innovation in teaching and learning.
Preparing and Supporting Entrepreneurs	The university raises awareness of the value/importance of developing entrepreneurial abilities amongst staff and students.
	The university actively encourages individuals to become entrepreneurial.
Knowledge Exchange and Collaboration	The university is committed to knowledge exchange with industry, society and the public sector.
	The university demonstrates active involvement in partnerships and relationships with a wide range of stakeholders.
The Internationalized Institution	Internationalization is a key part of the university's entrepreneurial strategy.
	The university explicitly supports the international mobility of its staff and students (including Ph.D. students).
Measuring Impact	The university assesses the impact of its strategy on entrepreneurship across the institution.

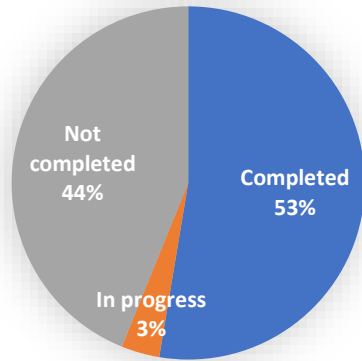
Source: OECD (2013).

During the first application of HEInnovate at the department in 2015, the sample of respondents consisted of one hundred and four persons, all of the members of the Research Unit 'Centre for Mechanical Technology and Automation' (TEMA) (Hetherington *et al.* 2015). The implementation of the HEInnovate instrument followed a consistent, systematic and practical approach, described as follows:

- A workshop² was organized about the potential, objectives, functionality and expected impact of the program, which was followed up by a preliminary study.
- The primary target audience was defined with the support of the Director of the DME. The target audience was selected in a way as to represent the wide range of visions and perceptions of different actors inside DME and UA, namely:
 - Scholars working on projects;
 - Post-Doctoral and Ph.D. students;
 - Researchers;
 - Professors.
- Personal invitations were sent to each person from the target groups, using official email communications through the HEInnovate Internet platform. To this end, a workgroup was created within HEInnovate on November 25th, 2014, entitled "Department of Mechanical Engineering, University of Aveiro, Portugal". The personal emails sent by the organizers of the present report also included a summary of the main ideas behind HEInnovate and its importance for the purpose of effectively raising awareness about the self-assessment tool.
- The time period for data collection for the assessment was defined as November 25th to December 31st, 2014.
- The analysis of the incoming data and the preparation of a preliminary report lasted from January 1st to February 28th, 2015.
- Personal invitations to personal discussion sessions were sent out using the official email communication channel, offered by the HEInnovate Internet platform.
- Personal discussions were held on March 3rd, 2015 in order to enrich the findings with individual feedback.

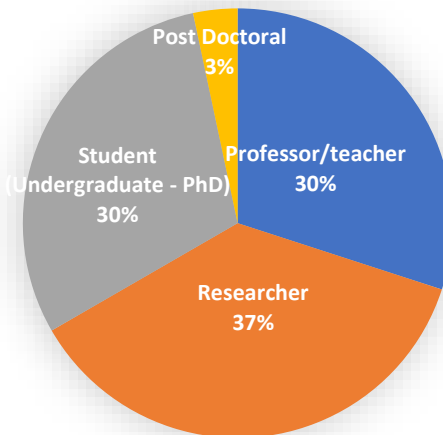
The questionnaire was completed online via the HEInnovate Internet platform. The data collection software ensured that the confidentiality of the users was automatically respected. One hundred and four invitations to complete the self-assessment were sent out. Only 40% of the former were invited to a personal discussion, being these individuals those who had completed the questionnaire and given permission for the recording of their personal data. Figure 1 shows the proportion of respondents that participated in each phase.

Figure 1: Proportions of sample invited to participate according to the participation activity



With regard to the completed questionnaires, the positions and professional categories of respondents within HEI were distributed across four main fields, as shown in Figure 2.

Figure 2: Proportions of respondents according to position/professional category



About 43% of respondents to the questionnaire decided to remain anonymous.

The results of the questionnaire-based survey were shared and debated in a personal discussion session which was devoted to the following topics:

- The usability and user-friendliness of the self-assessment tool, and personal experiences with HEInnovate;
- Did the application of HEInnovate contribute to any changes in the perception of entrepreneurship at the department?
- How can HEInnovate be used, in practice, to initiate long-term, sustainable institutional changes?
- Identifying the key stakeholders to be involved;
- Current challenges to making a real change in attitudes at the university;
- Feasibility or relevance of widening the application of the HEInnovate instrument to other levels of the institution.

During the personal discussions, the 'Entrepreneurship Development in Teaching & Learning' topic was the one debated at greatest length. The project highlighted that the stakeholders participating in the discussions had distinct perceptions and visions about how entrepreneurship should be present at the University (Heitor and Horta 2016). During the personal discussion, the opinions of students were also voiced, since the members of the Association of Mechanical Engineering Students (NEEMec)³ of UA was also contacted and invited to use HEInnovate.

On the occasion of the second application of HEInnovate at the University, in 2016, project managers ensured the deeper engagement of users based on lessons learnt from the first application of the HEInnovate instrument. For this purpose, among others, an additional personal discussion was organized prior to implementing the questionnaire-based survey.

During the personal meetings, HEInnovate was optimized as a communication instrument to foster the entrepreneurial and innovative spirit of the university. The meetings improved the applicability of the HEInnovate assessment method to the particular case of the Department of Mechanical Engineering and the Integrated Master course in Mechanical Engineering. At this point, the relevance of each of the seven topical areas (also called dimensions) was discussed, interpreted and contextualized for each of the targeted respondent groups, namely, for the students, for the staff of departments, and for the staff of the rectorate (Gabriel *et al.* 2016c).

3 Lessons learnt from the project

Respondents and other stakeholders who have participated in the project found that HEInnovate was a powerful tool for diagnosis, both for individuals and for the institution. There was a wide agreement that the findings/outputs are operationalizable; i.e., they can

be immediately converted into strategic actions. The responses to the questionnaires and the personal discussions revealed the following findings.

The Project contributed to the creation of the Science and Engineering Education (SEE) Group within the university in 2015. This is composed of a team of teachers from higher education and researchers from the Department of Mechanical Engineering. Initially, the group focused on the study and development of skills that are essential to the teaching of engineering-related fields, namely those most similar to mechanical engineering at the university level. The SEE Group is currently working on improving educational services and facilitating interaction with students to attract them to Science, Technology, Engineering and Mathematics subjects (STEM) and the respective careers. The university has developed innovative models of teaching entrepreneurship in classrooms and at summer academies. Several activities were carried out to improve the engagement of academic staff and students in studying entrepreneurship, innovation and STEM (Neto 2018; Gabriel 2015).

In 2016, the SEE Group organized the first National Engineering Education Forum, which attracted one hundred participants, to debate the future of engineering education (Gabriel *et al.* 2016b). The aim of the forum was to improve university leadership and governance with special respect to entrepreneurial teaching and learning, training, and supporting entrepreneurs, facilitating knowledge exchange and collaboration in an internationalized setting. The summary report of the forum (SEE Group 2016) reinforced the fact that the keys to better engineering education are improving the professional profiles of higher education teachers (EC 2017a), and introducing innovative models and methodologies for learning and teaching.

International connections in the field of entrepreneurship and innovation have proved to be fundamental to research, development and innovation (RD&I) activities.

- The academic staff of UA has attended training courses offered by a German think-tank of entrepreneurship research, Strascheg Center for Entrepreneurship (SCE), München. The courses were attended by the academic staff at the university and by teachers from other higher education institutions (HEInnovative 2017; EC 2017b; University of Aveiro 2016a; University of Aveiro 2016b; University of Aveiro 2016c).⁴
- Under the scope of the Erasmus+ Programme, students and teachers at UA participated in classes and workshops devoted to entrepreneurship research, presented by European experts.
- In 2018, the University of Aveiro, in a joint initiative with the Portuguese Society for Engineering Education (SPEE), organized the Third International Conference of the Portuguese Society for Engineering Education.

The SEE Group and the HEInnovate Project have contributed to more active research activities at the university, resulting in a wide range of scientific publications (Andrade-Campos *et al.* 2018a; Andrade-Campos *et al.* 2018b; Gabriel 2017; Gabriel *et al.* 2016a; Gabriel *et al.* 2016b; Gabriel *et al.* 2016c; Gabriel *et al.* 2017; Gabriel *et al.* 2018).

DME has participated in six European RD&I projects in collaboration with international partners under the scope of the Horizon 2020 EU Research and Innovation programme. Moreover, DME also participated in a national research and development project under the *Fundação Calouste Gulbenkian* program for innovation in Higher Education (Ashley 2018).

4 Impact

One of the goals of the SEE Group is to convert the results of its Research, Development and Innovation (RD&I) results into impacts on society that go beyond the boundaries of the scientific community and the university. HEInnovate has provided guidance on to how to improve inter-university communication, and how the graduates of UA can apply the results of RD&I in entrepreneurial projects and in start-up companies (Hofer and Kaffka 2018).

HEInnovate has improved awareness about entrepreneurship and innovation at the university, helped increase the quantity and quality of knowledge about important related areas, and improved both inter- and intra-departmental communication between colleagues, as well as with the central administration of the university. Particularly, the momentum generated by the HEInnovate Project has facilitated the collaboration of various departments of UA in various projects.

At the national level, the HEInnovate Project has facilitated the participation of UA in relevant professional networks and positioned UA as an active partner in different initiatives involving HEIs for entrepreneurship and innovation.

At the international level, the HEInnovate Project has increased the number of collaborative projects with international partners and facilitated the interactive dissemination of scientific knowledge.

5 Conclusions

The HEInnovate initiative has supported the members of the SEE Group to properly diagnose and understand the level of entrepreneurship and innovation within the Department of Mechanical Engineering of University of Aveiro, Portugal. It has also catalysed important debates about the entrepreneurial and innovative strategy of the university (Hofer and Kaffka 2018).

The project has also identified several barriers to innovation and entrepreneurship within HEI, such as:

- People's resistance to change.
- Doubt about the relevance of entrepreneurship as a tool for growth and knowledge.
- Mistrust associated with colleagues positioned lower in the hierarchy of HEIs.

The project highlighted the importance of teachers at HEIs having an entrepreneurship-friendly and innovative attitude and pointed out the overriding importance of international connections and networks, crucial for engaging in effective collaboration.

Notes:

¹ This DG was formerly called DG Education and Culture.

² 'HEInnovate workshop: Entrepreneurial University Good Practice Exchange'. November 18th, 2014, Lisbon.

³ In Portuguese: NEEMec = Núcleo de Estudantes de Engenharia Mecânica.

⁴ For further information please check:

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