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Social network tools and procedures for developing entrepreneurial skills in PhD programmes

D2.1 (WP2): Needs and requirements analysis

Responsible Partner: UC3M

Contributor(s): IPAG, WEGEMT

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EXECUTIVE SUMMARY

Introduction: The prodPhD project aims to address the challenging problem of introducing entrepreneurship training in PhD programmes regardless of discipline. The prodPhD project will create the necessary teaching methodologies and the platform for applying them. The project consists of a consortium of four organizations from across Europe.

The main objective of the prodPhD project is to implement innovative social network-based methodologies for teaching and learning entrepreneurship in PhD programmes. The multidisciplinary teaching and learning methodologies will enable entrepreneurship education to be introduced into any PhD programme, providing students with the knowledge, skills, and motivation to engage in entrepreneurial activities. The methodology will be conceived to develop experiential knowledge, involving academics, entrepreneurship experts, and mentors in its development and implementation. Besides, the exchange of experience, competences, and approaches facilitated by social networking will pave the way to crowdsourcing new ideas, improving training methodologies, and stimulating academics' entrepreneurial skills.

Aims and scope: The main aim of this work package was to study and identify the needs and requirements of the target groups and to carry out a state-of-the-art analysis with a particular focus on offering entrepreneurship courses to PhD students. The target groups were sorted into two subgroups: PhD students and faculty. Both subgroups were deemed to have valuable insights that would help in the endeavour to build a comprehensive multidisciplinary approach to entrepreneurship training courses.

Methodology: Two surveys directed at PhD students and faculty were carried out. Both surveys were reviewed by a panel of experts and pre-tested by a small sample of participants. After feedback from subject matter experts and the pre-test were incorporated, the surveys were distributed.

Analysis: The analysis of the data collected through the student and faculty surveys was conducted using primarily descriptive statistics in order to infer the learning and teaching needs and interests of the participants. Deliverable D2.1 focuses mainly on measures of central tendency, means, totals, percentages, and frequencies.

Results: The survey results revealed some interesting findings. The descriptives from the student survey show that 64% of doctoral students had not received any entrepreneurship training, and 70% were interested in attending additional entrepreneurship courses. The results from the faculty survey, meanwhile, indicate that 91% of the respondents had never taught courses related to entrepreneurship, although 41% were interested in doing so if they had the opportunity. Those not

interested cited their main reasons as lack of the proper skills to teach entrepreneurship and lack of time.

Conclusion: The needs and requirements of the target groups - i.e., doctoral students and faculty - were identified using two distinct surveys. The results gleaned from the literature and the survey findings complement each other. The literature on entrepreneurship highlights the importance of and need for innovative methods to teach entrepreneurship in higher education, while the survey findings confirm the arguments laid out in the literature and reveal a need for entrepreneurship training. This has important policy implications for the creation and introduction of the methodologies and outcomes of the prodPhD project.

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1. INTRODUCTION

This report describes the organization and internal procedures implemented in Work Package 2 (Deliverable 2.1). The document outlines the actions taken to identify the information needed to define the specific characteristics that training courses, materials, and platform tools must meet.

In particular, prodPhD will use different pilot actions to deliver and demonstrate a social network-based training methodology that will include the necessary teaching guidelines and specific 'learning by doing' materials for entrepreneurship training, as well as the required prodPhD Online Training Environment, integrating customized collaborative work and social network solutions. The outcome of the prodPhD project will be openly offered to the higher education community.

The project is built on the basis of collaboration with four running ERASMUS+ and MSCA-ITN projects involving 20 higher education institutions from nine EU countries and more than 25 companies and research centres. Four running H2020 projects and 16 other European associations and organizations will also collaborate with the project by becoming members of the prodPhD Expert Advisory Board. This collaboration will be fundamental for the analysis of specific requirements and for the development and assessment of the demonstration actions, in which all the collaborating institutions will be invited to participate.

In this deliverable, UC3M and its partners IPAG and WEGEMT embarked on the journey to design the research framework. This framework provided the foundation for characterization, analysis, and transfer of good practices, according to the identified target needs. Collaboration among the partners and the sharing of results from collaborating projects and EAB experts were crucial for the achievement of this deliverable.

This analysis was completed during the preparatory stage of the project's implementation. Within WP2, a thorough analysis of the needs and requirements of the target groups (university faculty and PhD students) was carried out in order to clearly define PhD programmes' actual entrepreneurship training needs and to identify the requirements training activities must meet to facilitate their integration into current PhD programme curricula. With that aim, separate surveys were developed for each of the two target groups. Thus, within this WP, a package of entrepreneurship-related skills was also identified to be specifically addressed by the training modules. Furthermore, the skills the academic staff require to guide the training modules were also analysed. The needs and requirements analysis included examining how transversal/entrepreneurial skills can be developed at the international level and collecting the best practices for unlocking the target groups' potential in that direction.

The objective of Work Package 2 was to identify the needs and requirements of PhD students and faculty. However, prior to the identification of the needs and requirements, the target groups were identified and described clearly as follows:

- PhD students: this includes PhD students in any academic discipline regardless of their age and gender.
- Faculty: this includes teaching staff, programme directors, and thesis supervisors who have taught entrepreneurship previously or are willing to do so in the future.

Identifying the target groups' needs and requirements was of paramount importance for the creation of the teaching methodologies and the set-up of the social networking tools.

Needs and requirements were identified through a traditional comprehensive literature review, followed by a survey of both target groups.

2. STATE-OF-THE-ART ANALYSIS

This chapter outlines and describes the state-of-the-art analysis that will support the methodologies used in this project. The main activities are 1) literature review of the key factors, drivers, and barriers in entrepreneurship, identifying and collecting initiatives, best practices, etc., and 2) creation of a shared bibliographic database of the subject (entrepreneurship in PhD programmes) and methodologies (information about surveys, interviews, and focus groups).

2.1. LITERATURE REVIEW

The scientific literature review aimed to gather information on the key factors of entrepreneurship and entrepreneurship education (drivers and barriers), especially in higher education and in the European environment, by identifying and compiling initiatives, best practices, and methodological aspects. The bibliography includes research articles, project reports, books, book chapters, conference presentations, etc.

The different stages of the process for gathering and selecting the bibliography are specified below.

1. Selection of information sources:

- The databases of the Web of Science (WoS) core collection were used to retrieve scientific literature published on the subject (mainly articles). The objective of the WoS database search was to find recent peer-reviewed documents on entrepreneurship education.
- A second search was done using Google Scholar. The objective was to supplement the literature selected from the WoS database with valuable information from reports, guidelines, manuals, project reports, presentations, books, book chapters, and other materials that were not available in WoS.
- Further valuable information was drawn from reviewing the bibliography referenced in documents of interest related to the subject and documents citing them.
- Bibliographies included in European research projects (H2020), based on their location in the EU CORDIS database (https://cordis.europa.eu/es), such as H2020-EU.5.a. projects and parent programmes, were reviewed also.
- Lastly, EUR-Lex, an online publication service for European Union legislative texts with an official website at europa.eu (https://eur-lex.europa.eu/homepage.html), was used to locate legislation related to the project's objective.

2. Design of search strategies for the retrieval of the documents of interest in WoS and Google Scholar: The search strategy included the terms 'entrepreneurship' + 'education or training' + 'high education or universit*'. Given the large number of documents obtained, we filtered by date and by number of citations. The decision to include or exclude a publication was based on the title and

abstract of the article as indicators of whether the article provided sufficient information for the project.

3. Design of a spreadsheet template to establish a protocol for reviewing the readings carried out by the members of the research group: The complete guide for filling in the spreadsheet can be consulted in Appendix 1. The main fields were:

- ⇒ Document type
- ⇒ Document title
- ⇒ Author(s)
- ⇒ Year of publication
- ⇒ Publication name: journal, book (for book chapters), conference/meeting
- ⇒ Topic
- ⇒ Abstract
- ⇒ Objective
- ⇒ Usefulness
- ⇒ DOI

4. Entry of documents in the template and annotated reading: This task will continue throughout the project, adding new references that the partners consider to be of interest to the project. The next step is to include the bibliography in a repository in SCIPEDIA created to self-archive the selected documents, research reports, monographs, etc.

2.2. BIBLIOGRAPHIC DATABASE

Of the 169 documents collected so far (27-Apr-2021), the majority come from Google Scholar (73.96%/n=125), followed by documents retrieved from WoS (19.53%/n=33) and EUR-Lex (5.92%/n=10). The largest group of documents by type is articles published in scientific journals (78.11%/n=132). This is followed by books (7.10%/n=12), regulations (5.92%/n=10), and book chapters (5.32%/n=9). Reports and conferences together add up to less than 5% of the documents.

Almost half of the documents (46.15%) correspond to the last six years, as one of the selection criteria is the topicality of studies dealing with the different aspects of entrepreneurship education. However, some older documents have been collected due to their relevance. Thus, the earliest document in the database dates from 1983 [1]. It is a journal article that explores the concept of stakeholders in an organization. Altogether 20.12% of the documents collected were published before 2001.

In the 'Topic' field, the conceptual content of the documents is classified into several thematic categories: methodology, survey, indicators, stakeholders, etc. These categories are reviewed and discussed after the documents are read.

2.3. THEORETICAL FRAMEWORK

The following is a summary of the information on the characteristics of entrepreneurship training drawn from the literature review described in sections 2.1. and 2.2.

Regulations

In relation to the recognition of entrepreneurship as a driver of economic growth and job creation, the European Commission's Entrepreneurship 2020 Action Plan, adopted in 2013, states that EU economies need more entrepreneurs with higher levels of technical education to become more competitive and innovative [2] . The Action Plan identifies entrepreneurship as an important driver of social cohesion and sustainability that can boost the economy while alleviating deprivation, social exclusion, and other societal problems. It recognizes that universities need to be more active in entrepreneurship education and includes a list of measures specifically targeting higher education in Europe. The 'Council Conclusions on Entrepreneurship in Education and Training' adopted by the Council of the European Union in December 2014 [3] also deal with these same points.

More recently, in September 2015, the European Parliament adopted a resolution on 'promoting youth entrepreneurship through education and training', which 'emphasizes the need to develop more participatory and learner-centred innovative pedagogies in order to foster the acquisition of a set of transversal competences necessary for the development of entrepreneurial mindsets' [4]. In its resolution of 8 September 2015 on promoting youth entrepreneurship through education and training, the European Parliament calls on the Council and Commission to apply a gender perspective in respect of methodology, communication, and financial tools, in order to encourage greater engagement in entrepreneurship by girls and young women.

The New Skills Agenda [5] meanwhile focuses on 'Improving the quality and relevance of skills training' (such as 'Building resilience: key competences and higher and more complex skills' and 'Getting connected: focusing on digital skills') and 'Enhancing learning'.

The Modernization Agenda [6], includes among its priorities 'Addressing skills mismatches and promoting excellence in skills development' and 'Ensuring that higher education institutions contribute to innovation'.

Entrepreneurship training

There is an ongoing debate about whether students can be taught to be entrepreneurs. Many authors argue that entrepreneurship can and should be taught on the basis of an understanding of its changing and environment-related nature. Appropriate entrepreneurship education requires a thorough understanding of the aims and objectives of entrepreneurship education interventions, the alternative forms such interventions can take, and the need to train the trainers [7].

In addition, pressures for greater international competitiveness mean that Europe regards entrepreneurship education as a political imperative. Entrepreneurship education involves many social actors and universities, which, as a whole, are better positioned than other actors, including business schools [8].

Thus, universities, in addition to evolving their teaching and research mission, are striving to develop strategies to fulfil this third mission, 'fostering an entrepreneurial culture to thrive in an entrepreneurial society' [9]. Universities play an important role as spaces for both formal and non-formal entrepreneurial learning and must dedicate resources to enable the design of appropriate educational programmes and the creation of new avenues for research into entrepreneurship, and they must facilitate interaction with the different agents that contribute to learning [10].

The literature on university entrepreneurship is growing considerably in both the United States and Europe, albeit in a somewhat fragmented way. Based on a review of the literature, Rothaermel, Agung and Jiang [11] categorise four correlates of research: university entrepreneurship research, transfer office productivity, new venture creation, and the environmental context, including innovation networks.

Educational concerns in higher education about entrepreneurship focus on the social and economic role entrepreneurship can play for both individuals and society, the systematisation of entrepreneurship education, the content to be taught and how it should be taught, and the individual needs of students [12]. Integrating entrepreneurship education within other disciplines is also a challenge [13].

Universities contribute to the development of entrepreneurship through education, which works to foster entrepreneurial attitudes in young people [14]. To do so, universities must provide entrepreneurship awareness, education, and training. The authors identify three main functions: developing entrepreneurial teaching and learning practices, involving stakeholders inside and outside the university (students, teachers, student societies, academic positions, entrepreneurs, and businesses), and creating an enabling institutional environment.

Students in entrepreneurship programmes increase their competences and strengthen their intention of self-employment. Entrepreneurship programmes have a significant positive impact on the likelihood of graduates' setting up businesses in the future [15].

3. METHODOLOGY

In this section, the needs and requirements analysis is explained. Prior to the analysis, the target groups were identified. The primary target group consisted of PhD students regardless of academic

discipline. The secondary target group was the faculty of higher education institutions. The goal of this work package is to understand how entrepreneurial skills can be better taught and transferred to students. Thus, the survey, interviews, and focus groups were designed to understand the target groups' needs and requirements regarding entrepreneurship skills and training.

In order to identify the needs and requirements of the target groups, the consortium has embarked on a three-step journey shown in Figure 1.

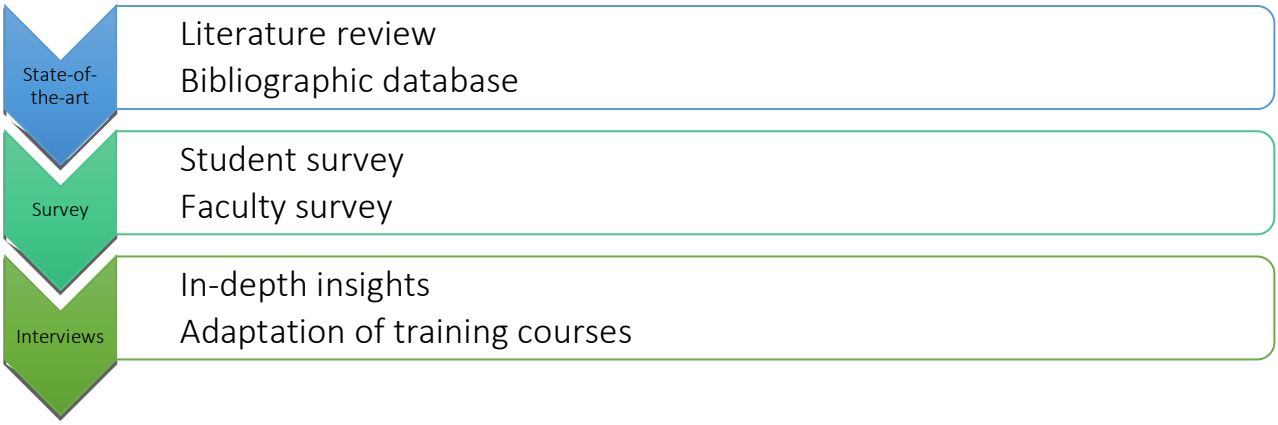


Figure 1 – Illustration of the three-step method used for the needs and requirements analysis

As shown in Figure 1, the first step was to perform a comprehensive literature review and state-of-the-art analysis to find the relevant literature and reference projects that prodPhD can build on. The second step was to carry out two surveys, one addressing students and the other, faculty members. The final step was to interview students and faculty members to gather in-depth information on the next step of the project, which is to adapt the training courses for inclusion in PhD curricula.

3.1. TARGET GROUPS

The prodPhD project aims to introduce entrepreneurship courses for PhD students in all disciplines through innovative teaching methods. To this end the target population was predefined by level of engagement with the prodPhD project. There were two primary target groups: PhD students and faculty (Figure 2).

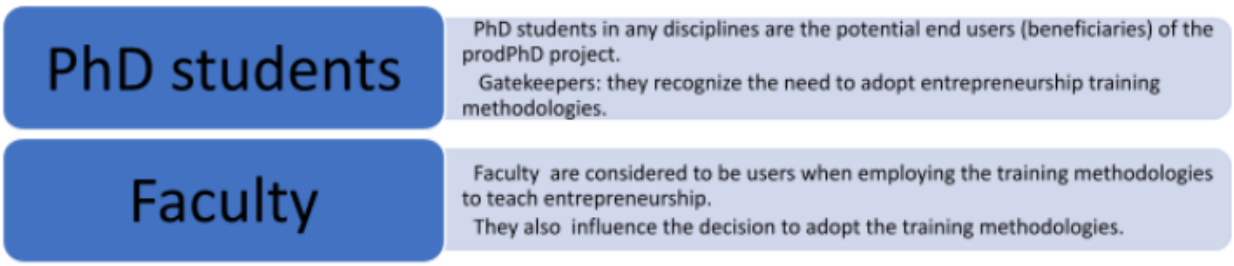


Figure 2 – Target groups

The prodPhD project will be targeting these two groups. The target groups identified here form part of a wider entity, universities. Sixty universities were initially identified. They are shown in Table 1.

University	Country	University	Country
Ghent University	Belgium	Newcastle University	United Kingdom
University of Liege	Belgium	University of Plymouth	United Kingdom
Technical University of Denmark	Denmark	University College of London	United Kingdom
Ecole Nationale des Sciences et Techniques Avancees de Bretagne	France	Vienna University of Economics and Business	Austria
Ecole Nationale Superieure de Techniques Avancees	France	University of Zagreb	Croatia
Ecole Centrale de Nantes	France	University of Southern Denmark	Denmark
Universitat Rostock	Germany	Lappeenranta University of Technology	Finland
Hochschule Bremen	Germany	Fachhochschule Heilbronn	Germany
University of Duisburg-Essen	Germany	Corvinus University of Budapest	Hungary
Technische Universitat Hamburg-Harburg	Germany	Politecnico de Torino	Italy
National Technical University of Athens	Greece	Universita di Bologna	Italy
University of Piraeus	Greece	University of Business, Arts and Technology	Latvia
University of West Attica	Greece	Wroclaw University of Economics	Poland
Universita di Genova	Italy	Plekhanov Russian University of Economy	Russia
Universita Federico II Napoli	Italy	Universidad Complutense de Madrid	Spain

Universita degli Studi di Trieste	Italy	University of Saint Gallen	Switzerland
Delft University of Technology	Netherlands	Manchester Salford University	United Kingdom
Norwegian University of Science and Technology	Norway	Edinburgh - Napier University	United Kingdom
Technical University of Gdansk	Poland	Nottingham Trent University	United Kingdom
Universidade de Lisboa	Portugal	Sheffield Hallam University	United Kingdom
Dunarea de Jos University of Galati	Romania	University of South Wales	United Kingdom
Universidad Politecnica de Catalunya	Spain	University of Hertfordshire	United Kingdom
Universidad de la Coruna	Spain	Technical University of Istanbul	Turkey
Universidad Politecnica de Madrid	Spain	Universidad Autonoma de Madrid	Spain
Royal Institute of Technology	Sweden	Universidad Carlos III de Madrid	Spain
Chalmers University of Technology	Sweden	Universidad Rey Juan Carlos	Spain
World Maritime University	Sweden	Universidad de Cordoba	Spain
Technical University of Istanbul	Turkey	Universidad de Santiago de Compostela	Spain
University of Southampton	United Kingdom	Universidad de País Vasco	Spain
Universidade do Porto	Portugal		

Table 1 – Initial target universities

3.1.1 SAMPLE

The primary target group consisted of PhD students regardless of academic discipline. Faculty members of higher education institutions were identified as the secondary target group.

3.1.1.1 SAMPLE SIZE

The survey was conducted using network sampling. The questionnaire was sent to the universities in Table 1, which then emailed it to their PhD students and also shared the link on their social media platforms and websites. Altogether the survey was sent to 61 universities, and it was completed by 111 students from 20 universities in 13 countries.

The same technique was employed for the faculty survey. In this case, the number of responses was 32, which included participants from 15 universities in 11 countries.

3.2. DATA COLLECTION

The goal of both the student survey and the faculty survey was to provide the foundation for the characterization, analysis, and examination of the participants' needs and requirements for learning and teaching entrepreneurship skills. The surveys particularly aimed to obtain information needed to define the specific characteristics and features that the training courses, materials, and prodPhD platform must meet. Therefore, the two surveys were sent online via Google Forms to the contact persons of the universities shown in Table 1, who subsequently distributed them to their PhD students, teaching staff, researchers, PhD supervisors, and programme coordinators.

3.2.1 STUDENT SURVEY DESIGN

The survey was drafted after a thorough literature review and state-of-the-art analysis, as well as an examination of current teaching methodologies used in existing projects. The first version of the survey was shared among the consortium partners and experts on entrepreneurship to gather their feedback. Once the comments and suggestions were incorporated, the survey was sent out to students of various universities for a pre-test. The students who responded belonged to the Universidad Carlos III, the Universidad de Córdoba and the Universidad de País Vasco. The complete outline of the process is shown in Figure 3.

Figure 3 – Stepwise illustration of student survey design

Finally, the student survey was made up of ten sections. The first and last section included practical information, whereas the other eight sections included information questions and/or statements related to the target group's intentions, experiences, background, and future perspectives on entrepreneurship. The sections of the student survey are shown in Table 2. The complete questionnaire is also available in Appendix 2.

Section number	Content	Number of questions per section
Section 1	Introduction: aim, duration, consent, and instructions	N/A
Section 2	Demographic information: age, gender, university, year of PhD, discipline, and name of the PhD programme	6 questions
Section 3	Career intentions: intention to start a business, motivation for being an entrepreneur, and post-PhD plans	3 questions
Section 4	Business prospects and background: business ownership, support received for setting up a company, the kind of support received, rating of a prospective job as an entrepreneur	4 questions
Section 5	Entrepreneurship course information: previous participation in entrepreneurship courses, source of previous entrepreneurship training, interest in attending optional entrepreneurship training during PhD studies, amount of time respondent would be willing to spend on entrepreneurship training	4 questions
Section 6	Alternative entrepreneurship training: participation in previous initiatives, university initiatives and services, incentives received	10 questions
Section 7	Entrepreneurship competences: rating of their entrepreneurship skills, rating of importance of entrepreneurial skills	2 questions
Section 8	Importance of entrepreneurship training: awareness and perceived importance of entrepreneurship training	1 question
Section 9	Evaluation of entrepreneurship courses: where the focus of entrepreneurship courses should be, description of how entrepreneurship courses can stimulate their entrepreneurship initiatives	2 questions
Section 10	Contact details for follow-up interviews: willingness to participate in a follow-up interview	N/A
	Total number of questions	32 questions

Table 2 – Final structure of student survey

The final questionnaire for the student needs and requirements analysis was sent to the universities shown in Table 1.

3.2.3 FACULTY SURVEY DESIGN AND DISTRIBUTION

The faculty survey was carried out similarly to the student survey. It was drafted based on an extensive review of literature analysing key factors, drivers, and barriers in entrepreneurship,

identifying and collecting initiatives, best practices, and methods. It was then shared among the consortium partners and experts in the field, who contributed new comments and suggestions. After the partner feedback was incorporated, the survey was sent for a pre-test.

The faculty survey pre-test was sent to various Spanish and Portuguese universities. Eleven responses were obtained. The faculty members who responded belonged to the Universidad Autónoma de Madrid, Universidad Carlos III de Madrid, Universidade do Porto, Universidad de Barcelona, Universidad de Córdoba, Universidad de Zaragoza and Universidade Nova de Lisboa. Some of the suggestions from the pre-test were used to improve the survey. These improvements included the clarification of some questions, elimination of others and addition of new questions. The outline of the whole design process is shown in Figure 4.

Figure 4 – Stepwise illustration of faculty survey design

Finally, the faculty survey consisted of five sections. The first and last section included practical information, whereas the other three sections included information questions and statements related to the target group's demographics, entrepreneurship courses and experiential training, and evaluation of entrepreneurship courses. The sections of the faculty survey are shown in the table below in more detail.

Section number	Content	Number of questions per section
Section 1	Introduction: aim, duration, consent, and instructions	
Section 2	Demographic information: gender, university, discipline, and name of the PhD programme	N/A
Section 3	Entrepreneurship courses and experiential training: participation in entrepreneurship courses as teacher, topics, aims, interest in teaching entrepreneurship courses in the future, reasons why they would not teach, participation in a technology-based company or at least the transfer of research results to a company, involvement and coordination of different disciplines in entrepreneurship courses, and experience in teaching entrepreneurship courses	16 questions
Section 4	Evaluation of entrepreneurship courses: where the focus of entrepreneurship courses should be, description of how	2 questions

	entrepreneurship courses can stimulate students' entrepreneurship initiatives	
Section 5	Contact details for follow-up interviews: willingness to participate in a follow-up interview	N/A
	Total number of questions:	18 questions

Table 3 – Final structure of faculty survey

The final step was the launch of the final version of the survey. The surveys were distributed online via Google Forms. The survey was sent to the partners' networks, which comprise the universities shown in Table 1.

4. RESULTS

The survey was answered by 111 students and 32 faculty members. The main results obtained from the analysis of the responses are presented below.

4.1. STUDENTS

4.1.1 DEMOGRAPHIC INFORMATION

Most of the students were in the 26-30 and 31-35 age ranges, with the extended 26-35 age range accounting for 66% of the respondents.

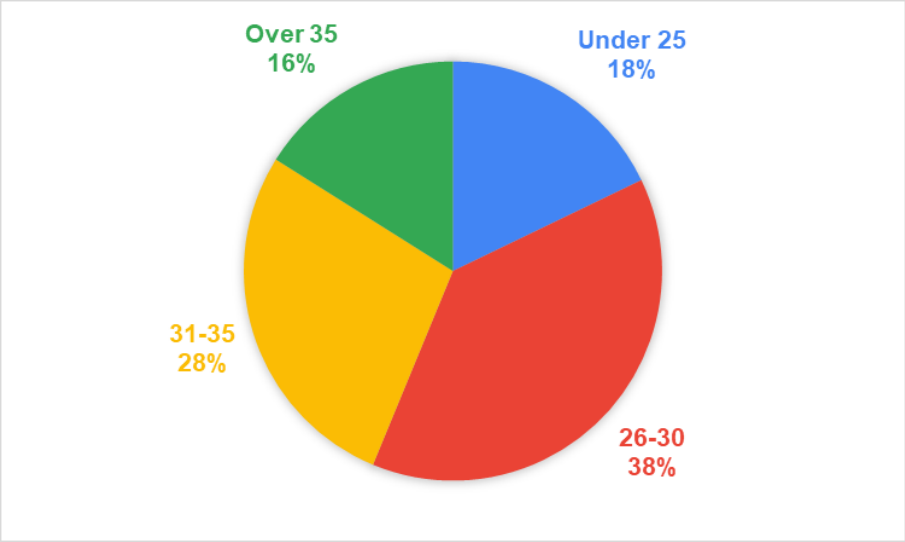


Figure 5 – Age groups

As can be seen, the proportion between men and women is fairly equal, with 54% men and 46% women.

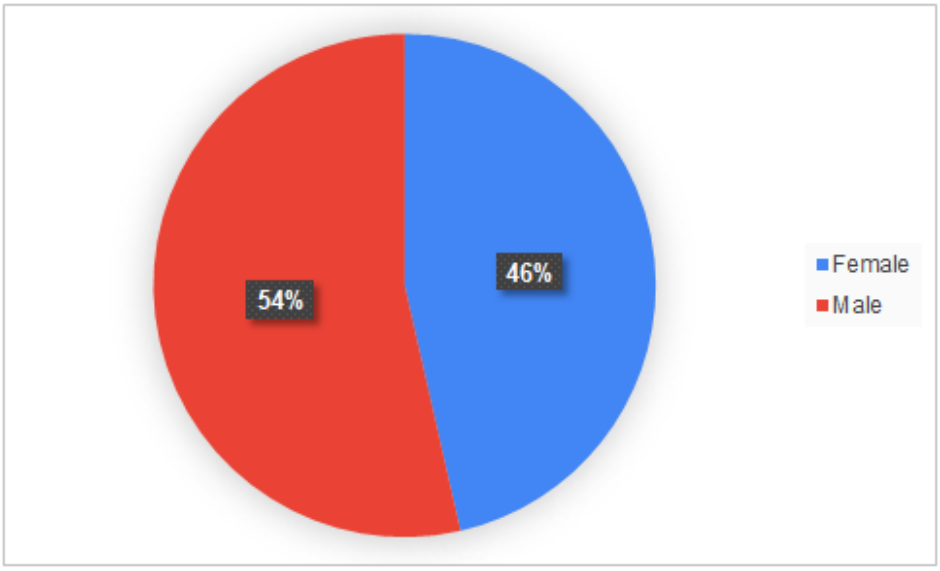


Figure 6 – Respondent gender

However, when the age ranges are compared by gender, a notable difference appears between men and women: a much lower proportion of women were engaged in doctoral studies in the 26-30 age range, while in the over-35 age range the proportion of women was twice that of men. This could be due to the need for women to break the glass ceiling as they advance in their professional careers.

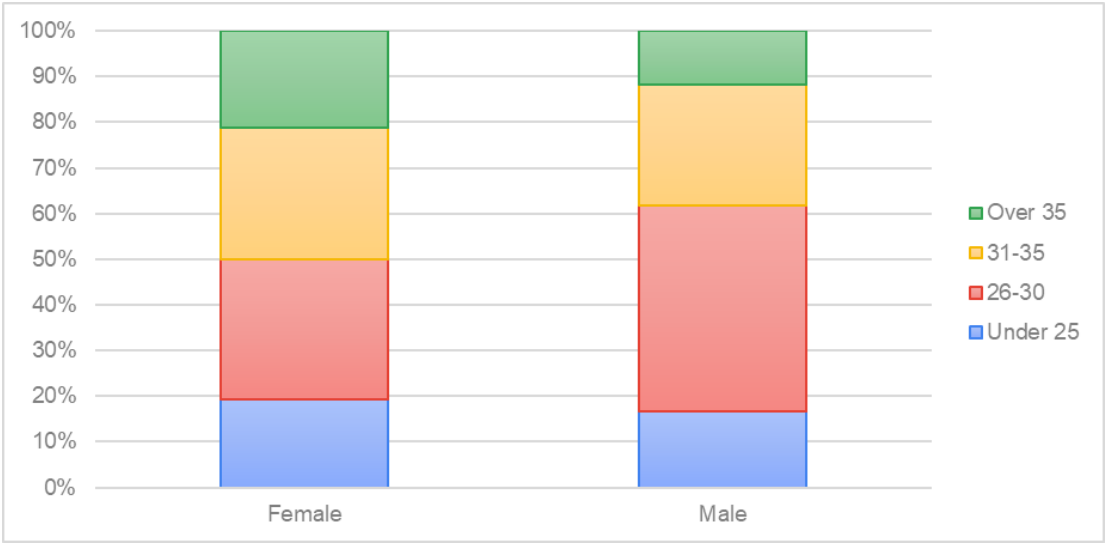


Figure 7 – Age ranges by gender

As for the origin of the respondents, 29% of them were from Poland, specifically from the Technical University of Gdansk, as can be seen in Figures 9 and 10.

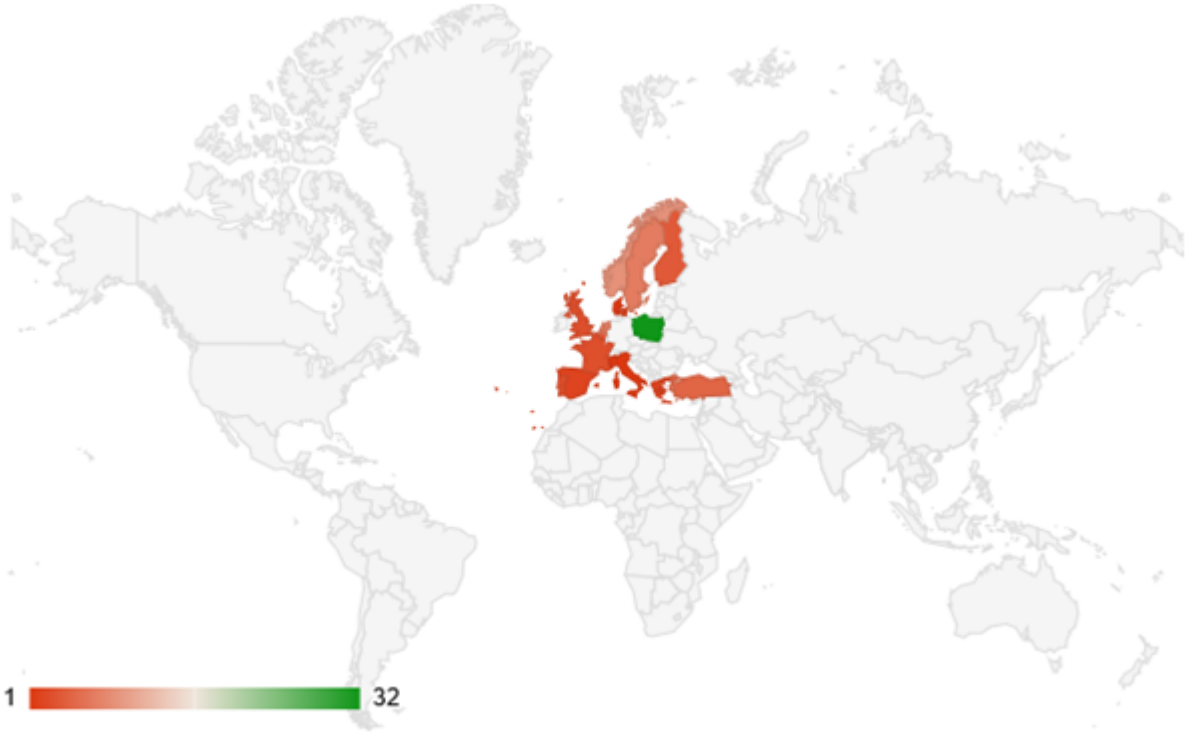


Figure 8 – Responses by country

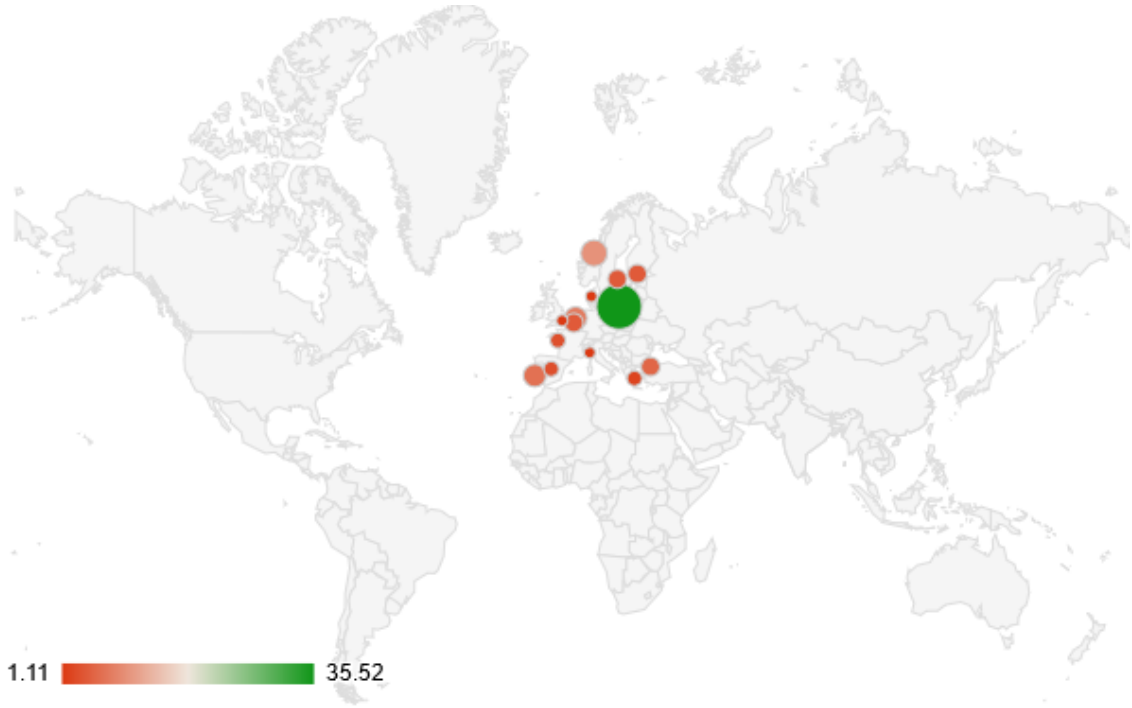


Figure 9 – Responses by city

University	Country	Number of responses
Gdansk University of Technology	Poland	32
University of Cordoba	Spain	12
Norwegian University of Science and Technology	Norway	9
TU Delft	The Netherlands	7
World Maritime University	Sweden	7
Instituto Superior Tecnico	Portugal	6
Universidad Autonoma de Madrid	Spain	3
Istanbul Technical University	Turkey	5
Ghent University	Belgium	4
KTH Royal Institute of Technology	Sweden	4

Aalto University	Finland	4
University of Strathclyde	Scotland	3
University of Lisbon	Portugal	3
Ecole Centrale de Nantes	France	3
National Technical University of Athens	Greece	2
University of Southampton	United Kingdom	2
Universidad Politecnica de Catalunya	Spain	2
Universita degli Studi di Genova	Italy	1
Technological University of Denmark	Denmark	1
Imperial College London	United Kingdom	1
Total respondents		111

Table 4 – Number of responses by university and country

Most of the students reported that they were in the first or second year of their doctoral thesis, which is in line with the age ranges indicated.

Year of PhD	Frequency	Percent
First	41	36.94
Second	34	30.63
Third	14	12.61
Fourth or higher	23	20.72

Table 5 – Year of PhD

Finally, most of the respondents (more than 70 of the answers) belonged to scientific areas linked to the applied sciences, especially fields related to life sciences and the various branches of engineering.

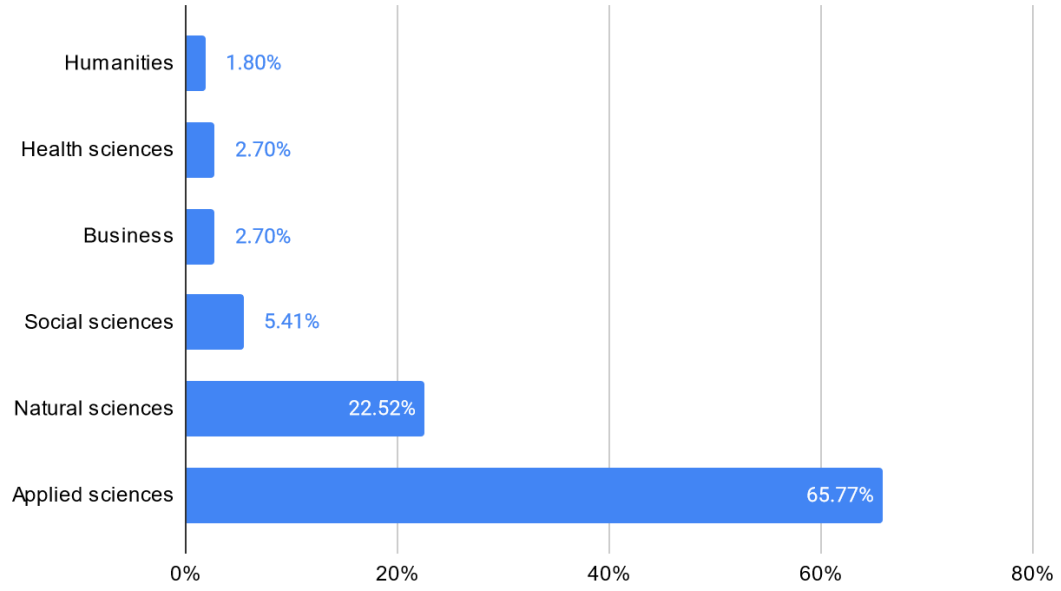


Figure 10 – Student discipline/area

4.1.2 CAREER INTENTIONS

The following questions are related to the students' career prospects, especially in terms of whether they intend to become entrepreneurs and what factors might have contributed to that idea.

Most of the respondents indicated a preference for continuing in academic institutions (n=60) or an intention to work in the private sector (n=44), with entrepreneurship as the third most chosen option, with 27 responses.

What do you plan to do when you finish your PhD?	Frequency
Find a job in academia	60
Find a job in the private sector	44
Start my own business	27
Do not know yet	21
Find a job in the public sector	19

Find a job in a non-profit organization	5
Continue to be an employee in the public sector	1
Not sure yet. Either continue my research or start in a private company	1

Table 6 – Student career prospects

Among those who responded that they were interested in entrepreneurship, the most important factor was funding opportunities (n=12). This factor outranked others, such as belonging to an entrepreneurial family or the student's personal motivation. The last factor mentioned by students was encouragement from their professors.

Factors encouraging students to start a business	Frequency
Financial opportunities for entrepreneurs	12
My parents/family have a business of their own	7
My friends own or are planning to start a business of their own	6
University courses and initiatives have encouraged me to start my own company	6
Self-motivation	6
Government policies that support entrepreneurs	3
My professors have encouraged me to set up a business	2

Table 7 – Factors encouraging students to start a business

Students' main motivation for becoming entrepreneurs is a desire to work in a more flexible, independent environment. In second place they value the possibility of creating something of their own and making money.

Motivation	Frequency

To have more flexibility and independence	20
To create something of my own	16
To make money	16
To satisfy a market need	15
To solve a social problem	11
To head up an organization	8
To create jobs	8
To pursue my passion for entrepreneurship	7
To gain high social status	5
To have more free time	2
To follow a family tradition	2

Table 8 – Motivations for being an entrepreneur

4.1.3 BUSINESS PROSPECTS AND BACKGROUND

In order to find out more about the students' background in entrepreneurship, a series of questions were asked. The first question was whether they already belonged to some kind of company, to which the majority of them (90%) answered that they did not.

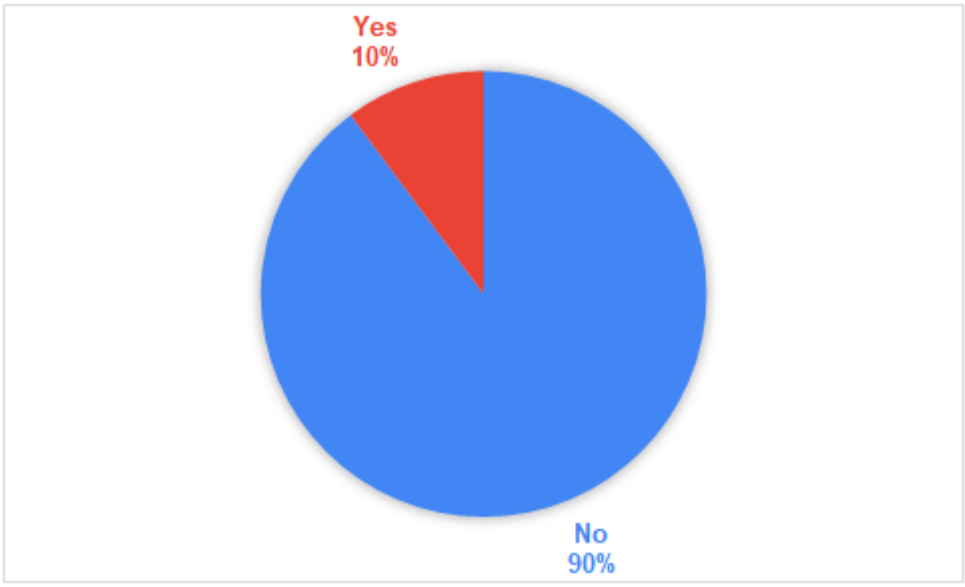


Figure 11 – Students' entrepreneurship background

They also overwhelmingly (85%) indicated that they had not received any support from their universities to help them engage in business activities.

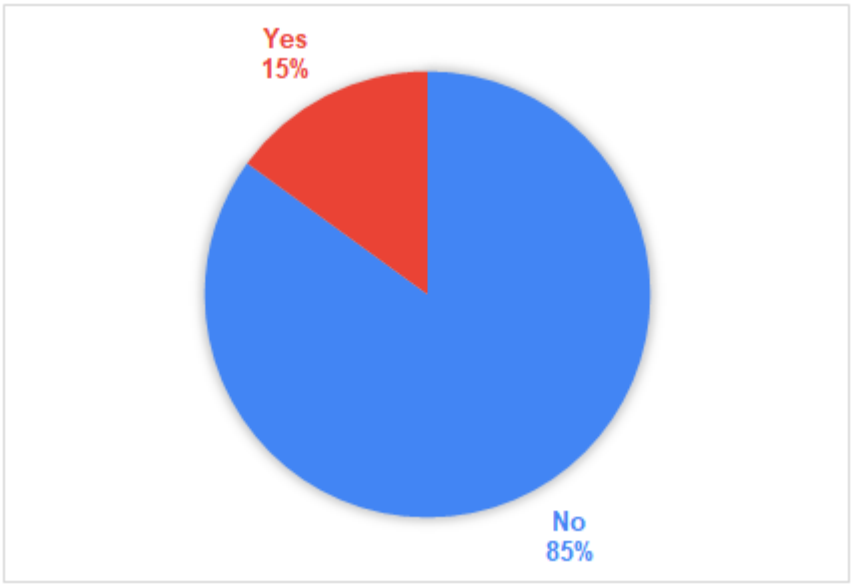


Figure 12 – Percentage of students with university support to set up their own company

Lastly, students were asked about their view of entrepreneurs' jobs. Most of the students strongly agreed that being an entrepreneur is rewarding, although it is a hard job (39 answers). This answer was followed much less frequently by 'I think having a company can be very hard' and 'I believe being

an entrepreneur is risky', with 27 and 26 answers, respectively. Table 10 shows the student responses (1 meaning they 'strongly disagree' with the sentence and 5, that they 'strongly agree').

Please rate your view of an entrepreneur's job	1	2	3	4	5
I believe being an entrepreneur is risky	1	2	25	52	26
I think having a company can be very hard	2	4	25	48	27
I believe entrepreneurship might be a fun career option	3	19	21	43	19
I think being an entrepreneur is too stressful	1	20	38	33	14
I believe it is a hard but rewarding job	2	4	25	35	39
I believe being an entrepreneur gives you more freedom than other jobs	8	18	36	26	19
I believe that the results of my thesis could be used to create a spin-off/tech start-up	22	24	26	27	7
Total	39	91	196	264	151

Table 9 – Student views on an entrepreneur's job

4.1.4. ENTREPRENEURSHIP COURSE INFORMATION

The next section of the survey focused on the training that students had already received in the field of entrepreneurship. The majority of respondents (64%) answered that they had not received any training in this area during their student career.

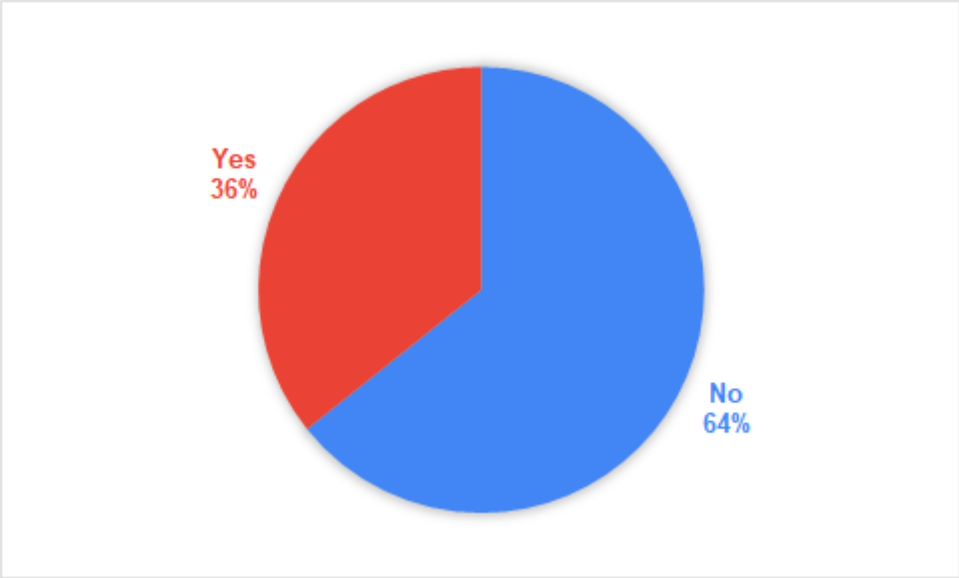


Figure 13 – Participation in entrepreneurship training courses before starting the PhD

In the cases where they had taken entrepreneurship training courses, it was mainly while pursuing their undergraduate degree (n=21) or master's degree (n=17) or, to a lesser extent, it was in the form of specific courses and activities (n=12). However, 70% of respondents did report an interest in receiving entrepreneurship training in the future.

Where?	Frequency	Percent
University training: undergraduate degree	21	18.92%
University training: master's degree	17	15.32%
Non-university courses, workshops, etc.	12	10.81%
Training programme	2	1.9%
High school	1	0.9%

Table 10 – Entrepreneurship training courses

Seventy percent of the students surveyed were in favour of taking additional entrepreneurship training modules during their PhD studies. Where students reported attending or having attended this type of training, the majority (53%) indicated that they spent an average of two hours per week on it (Figures 15 and 16).

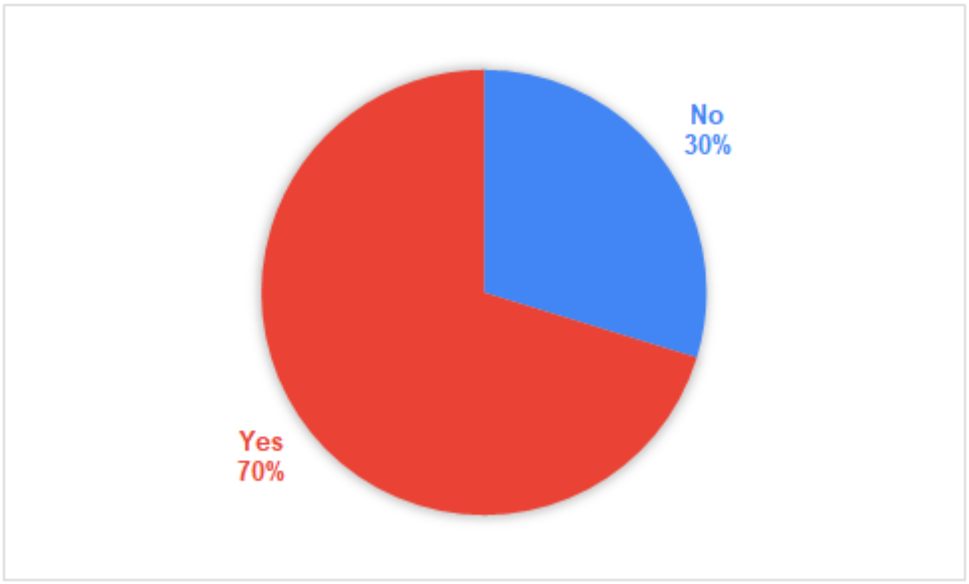


Figure 14 – Percentage of students interested in attending additional entrepreneurship training modules during their PhD studies

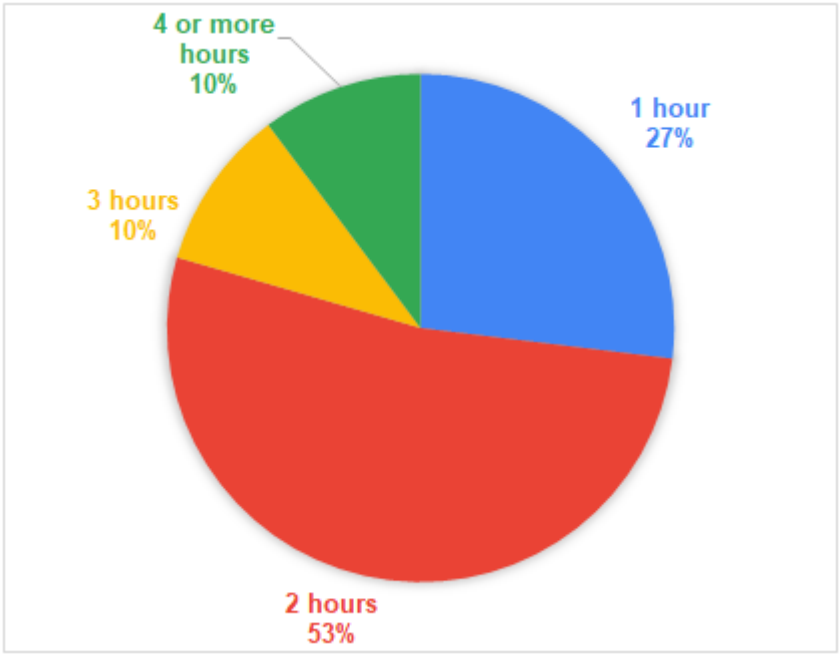


Figure 15 – Commitment to training modules

4.1.5 ALTERNATIVE ENTREPRENEURSHIP TRAINING

The questions in the next section explore the entrepreneurship training received by students outside the formal channels of the university. Although 39% of respondents indicated that the university had specific courses and seminars on entrepreneurship, a striking 52% indicated that they did not know whether the university offered such training or not.

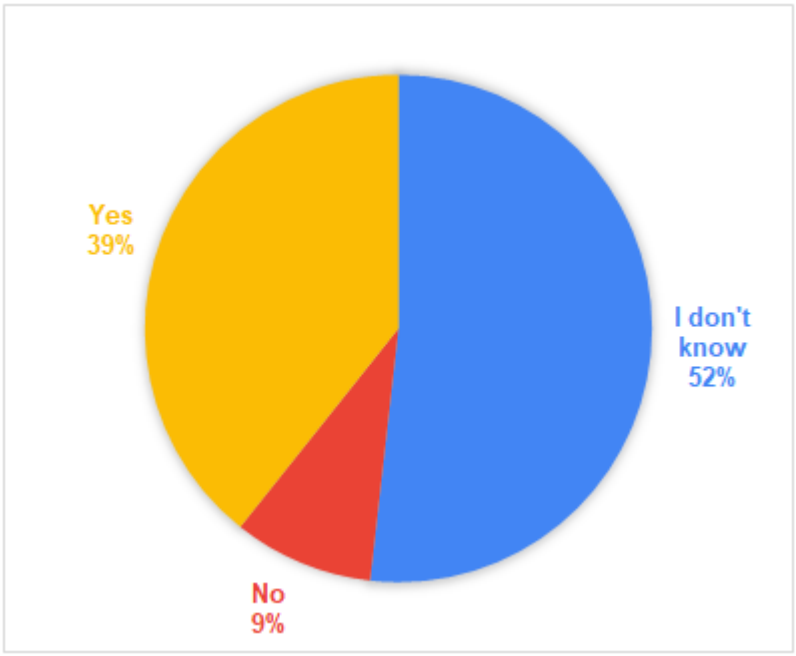
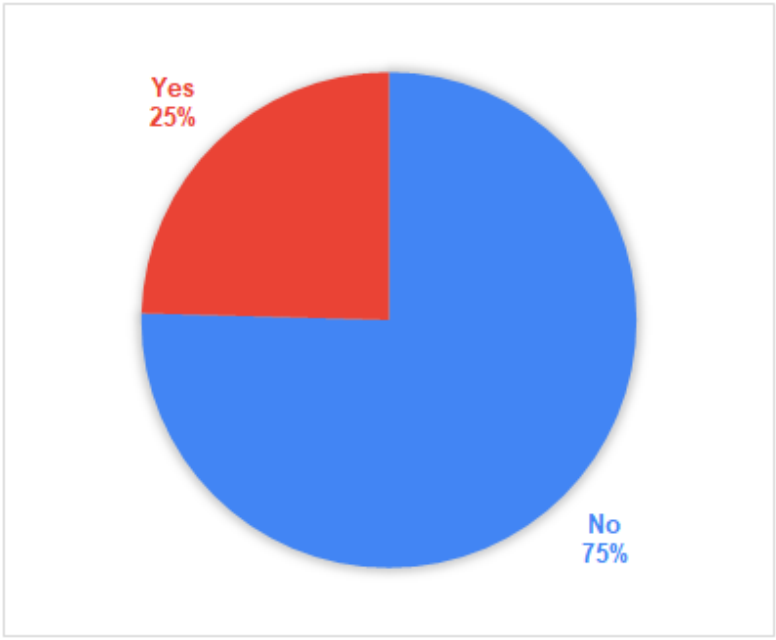


Figure 16 – University entrepreneurship seminars, workshops, or conferences

Seventy-five percent of the students surveyed indicated that they had never attended seminars,



conferences, etc. on entrepreneurship.

Figure 17 – Seminar, workshop, or conference attendance

More than half of the respondents (52%) did not know whether there were any entrepreneurship orientation units for students at their university (e.g.: incubators, business associations, science parks). Because of this lack of knowledge, only 5% of PhD students have used any such services (Figure 20).

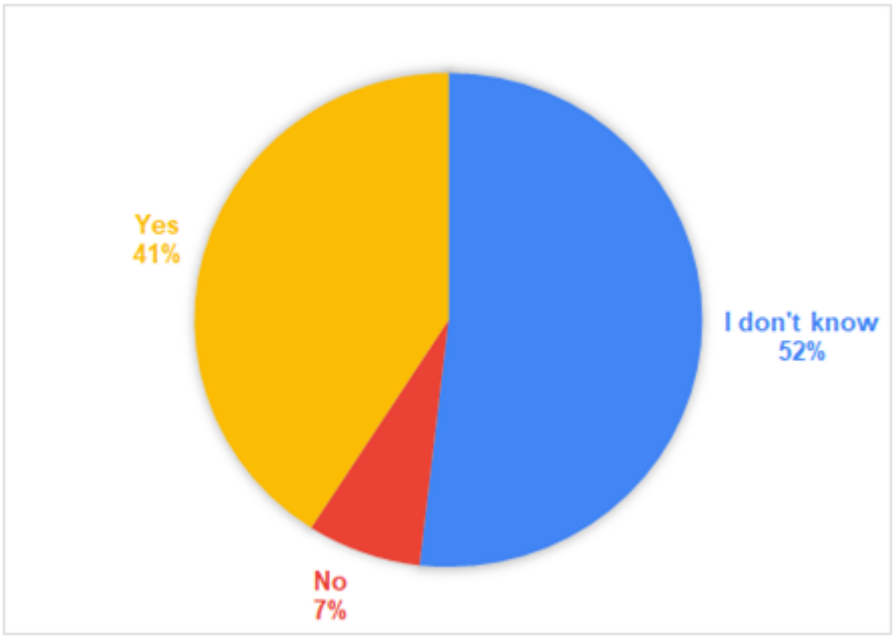


Figure 18 – Existence of entrepreneurship orientation units for PhD students

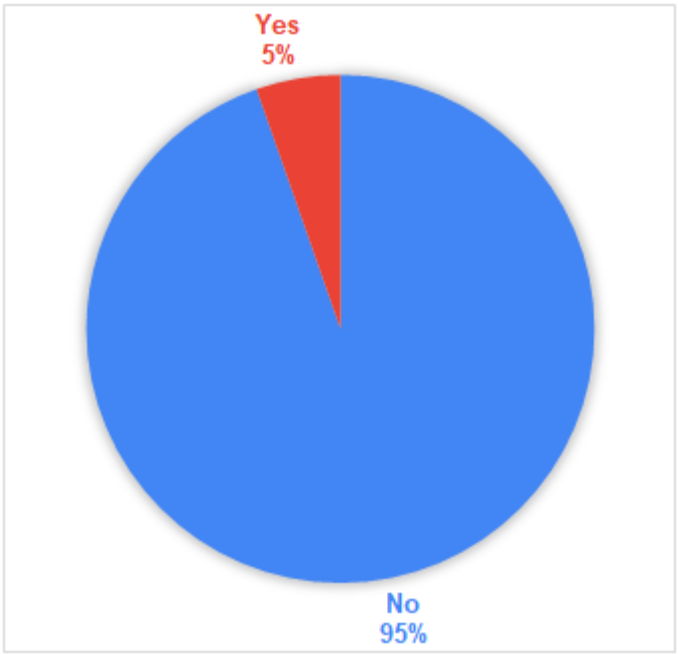


Figure 19 – Use of entrepreneurship orientation units by PhD students

Entrepreneurship initiatives follow a similar pattern: 76% of the respondents said that they were not aware of any (Figure 21). Furthermore, in the cases where respondents were aware of entrepreneurship initiatives, very few had participated (only 6% of the respondents) (Figure 22).

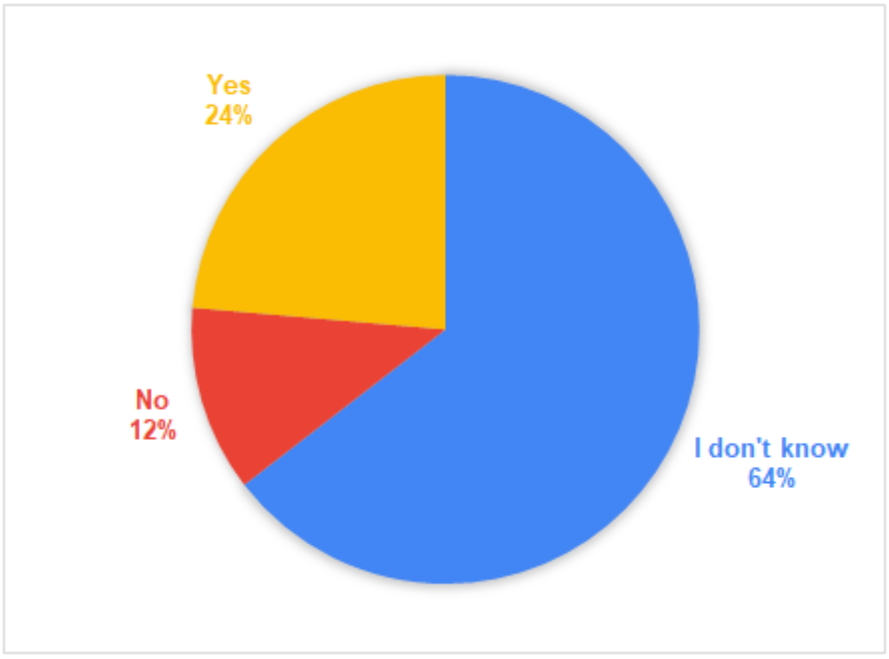


Figure 20 – Universities' incentives for entrepreneurial activities

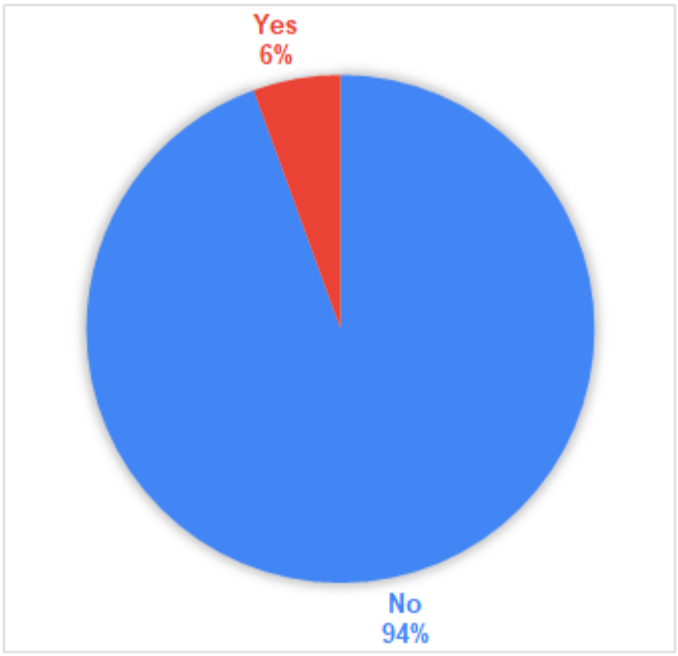


Figure 21 – Student participation in universities' activities and incentives

Lastly, only 2% of the students said that they are aware of any other type of initiative organized by their universities regarding entrepreneurship training.

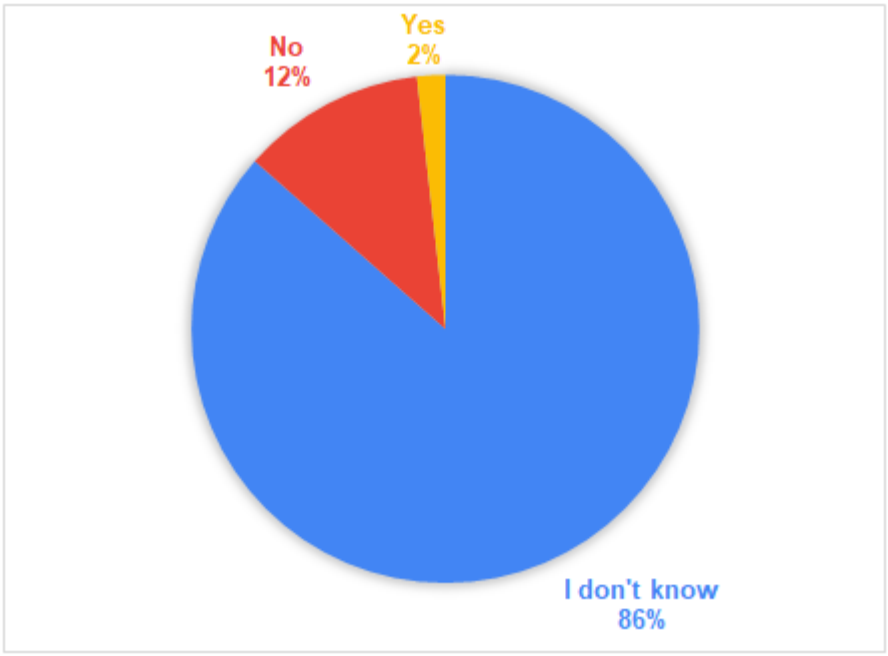


Figure 22 – Existence of other initiatives related to entrepreneurship organized by universities

4.1.6 ENTREPRENEURSHIP COMPETENCES

Respondents were asked about their level of competence in a number of general skills related to entrepreneurship. The responses show that students are more confident about their interpersonal abilities than their instrumental and conceptual capabilities. In other words, the surveyed students believe they have relatively good leadership, team management, networking, and negotiation abilities (Table 12).

Entrepreneurship skills	1	2	3	4	5
Instrumental skills (problem solving, decision making, risk managing, finances and accounting)	4	11	48	34	11
Interpersonal skills (leadership, managing teams, networking, negotiation, business ethics)	4	12	37	37	17
Conceptual skills (business opportunity identification, creativity, innovation)	7	21	34	31	14

Table 11 – Entrepreneurship skill importance rating

The respondents also rated the importance of several entrepreneurial skills. Abilities such as decision making, problem solving, and leadership were scored very high, whereas other more technical skills, like web design, search engine optimization, and IT competences, were ranked much lower (Table 13).

Entrepreneurship skills rating	1	2	3	4	5
Project development	0	1	12	49	46
Teamwork	0	0	17	45	46
Problem solving	0	2	10	39	58
Budgeting	0	1	20	42	44
IT competences	3	14	44	33	14
Web design	14	32	39	19	4
Decision making	0	0	5	25	78
Data management	1	12	31	32	32
Creativity	0	1	17	35	55

Data analysis	2	8	29	47	22
Search engine optimization	12	20	34	27	15
Finances and accounting	3	10	28	36	31
Advertising and promotion	1	21	31	30	34
Content creation	1	18	34	30	24
Leadership	0	2	15	35	56
Strategic planning	0	2	13	41	52
Negotiation	0	3	14	45	46
Risk management	0	1	12	43	52
Legal structures	4	6	38	35	25
Market research	0	5	21	47	36

Table 12 – Importance of the skills an entrepreneur should have

Similarly, respondents felt that acquiring these skills was important, regardless of their specialization field. Most of them agreed with the statement that many of the skills could not be acquired in class and that they would be useful in the future, whether or not the students eventually pursued an entrepreneurial career. The table below shows the students' responses, where 1 means they 'strongly disagree' with the sentence and 5, that they 'strongly agree'.

Entrepreneurship training	1	2	3	4	5
I believe that training in entrepreneurship is important regardless of one's specialization field	3	18	29	35	26
I believe that essential entrepreneurship skills cannot be taught in a class	10	27	37	26	12
I believe entrepreneurship training can develop skills that will be useful in the future	0	5	19	50	37
I believe entrepreneurship training is only important if you want to start a business	22	42	26	14	7

Table 13 – Importance of entrepreneurship training

4.1.7 EVALUATION OF ENTREPRENEURSHIP COURSES

Lastly, they were asked to indicate those aspects of entrepreneurship which should be addressed in entrepreneurship courses. They highlighted issues related to planning, obtaining and managing

resources, strategies for presenting and selling products, and examples of success. On the other hand, the respondents gave less importance to receiving encouragement to become an entrepreneur. Table 15 shows the students' responses, 1 meaning they `strongly disagree' with the sentence and 5, that they 'strongly agree'.

Entrepreneurship courses	1	2	3	4	5
Theoretical concepts behind setting up and running a business	3	14	56	29	8
Encouragement for students to set up and run their own business	4	19	40	32	15
Strategies for managing and ensuring the growth of established companies	0	9	23	48	29
Training in marketing and finance	1	10	30	40	29
Conditions that favour business creation	0	8	35	51	16
How to move/make the transition from traditional employment to self-employment	0	7	29	49	26
Presentation and review of real cases of entrepreneurship	0	2	26	46	36
Business plan development	0	2	18	48	42
Training in innovation and creativity	2	8	30	39	31
Understanding how different kinds of businesses work	0	7	29	47	27
The competences and skills that make a successful entrepreneur	0	6	26	48	30
How to obtain resources to create my own business	0	3	18	38	51
Problem-solving skills	3	9	30	32	36
Dealing with failure	3	10	18	38	41
How to work under pressure	5	13	22	41	29
How to bring my project/ideas to the market	0	3	12	43	52

Table 14 – Expected content of entrepreneurship courses

4.2. FACULTY

As discussed in the methodology section, the survey was answered by 32 faculty members from several European universities. This section reports the analysis of the responses.

4.2.1 DEMOGRAPHIC INFORMATION

Most of the respondents were teaching at the undergraduate, master's degree, or doctorate levels. In some cases, the respondents held positions of academic responsibility as dean, vice dean, head of department, director of the doctoral programme, or some similar capacity (Figure 24).

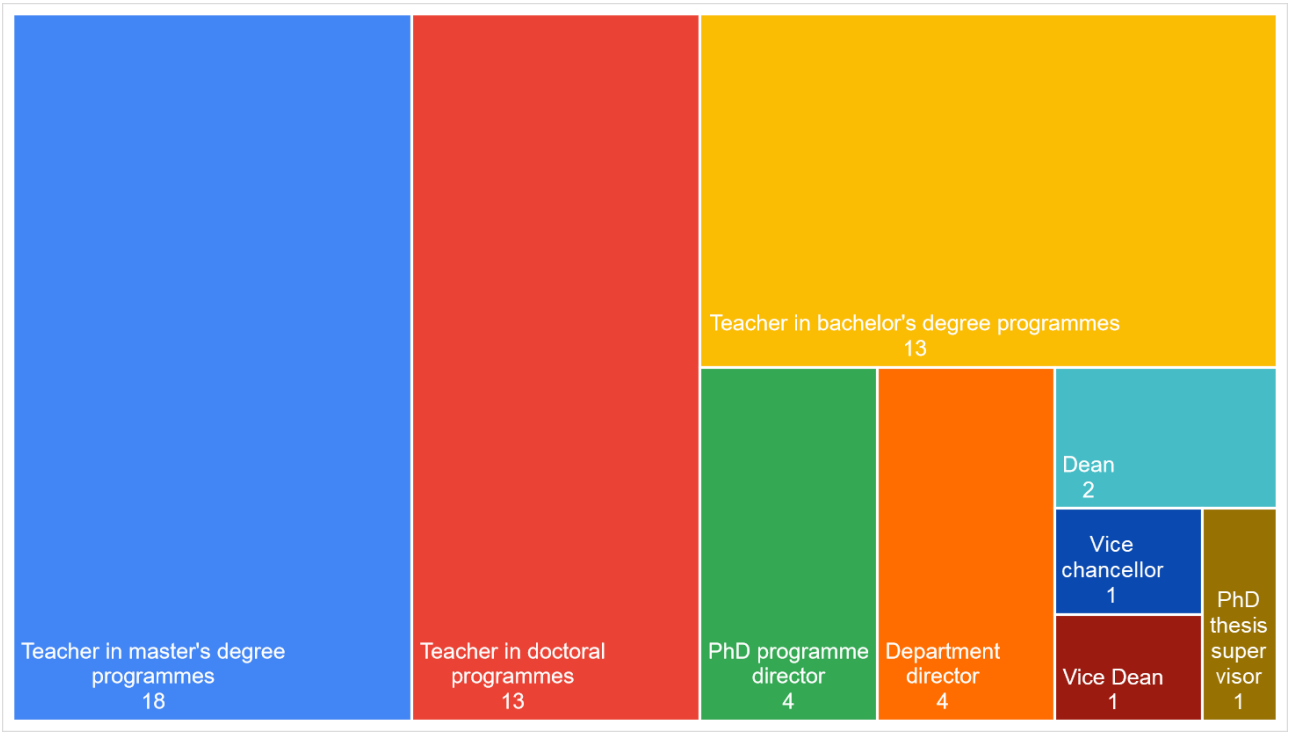


Figure 23 – Current academic situation of faculty members

Seventy-five percent of respondents were male, and 22%, female. Three percent of the respondents preferred not to state their gender (Figure 25).

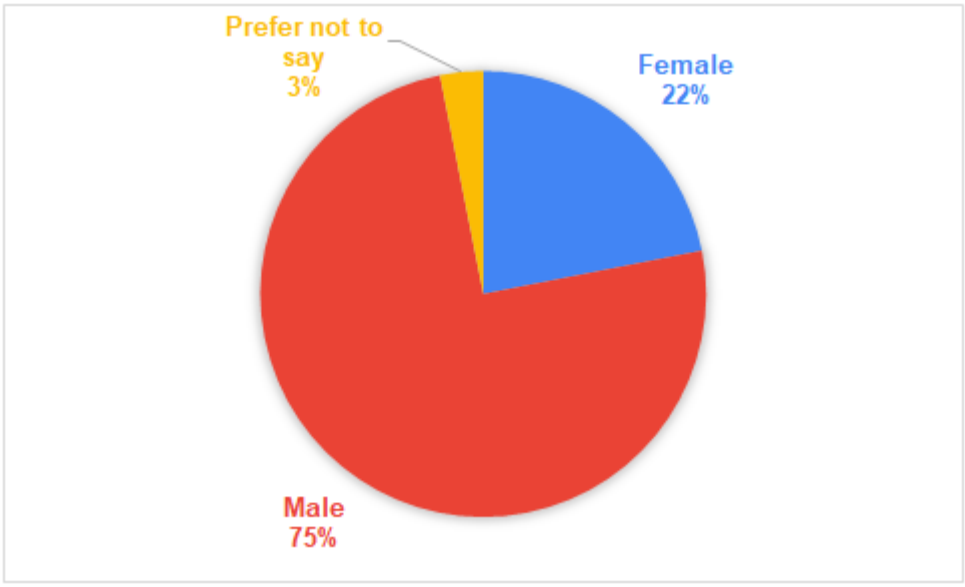


Figure 24 – Respondent gender

Most of the respondents worked at technical universities and, therefore, universities of applied sciences. Gdansk Technical University was the institution from which the highest number of responses were sent (14). One or two responses apiece were received from the rest of the institutions listed in Figure 26 and Table 15.

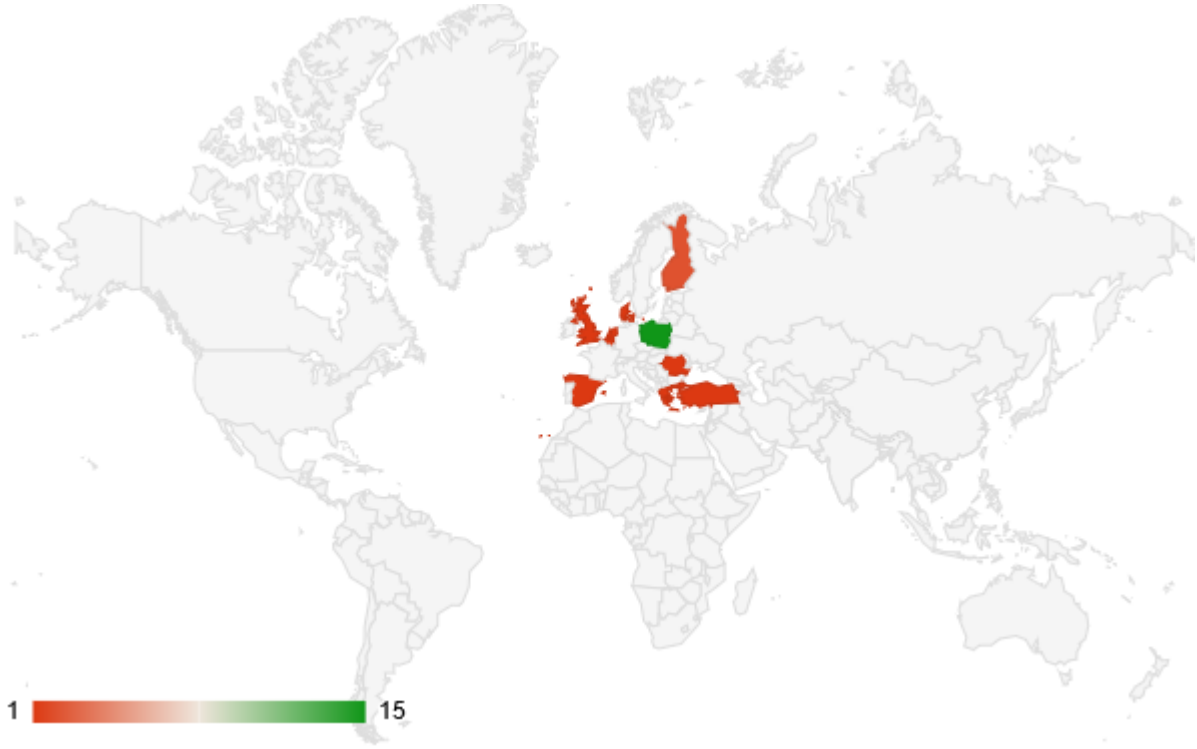


Figure 25 – Location of respondents' universities

University	Country	Number of responses
GUT University	Poland	15
Aalto University	Finland	2
Universidad Politecnica de Madrid	Spain	2
ENSTA Bretagne	France	2
Delft University of Technology	The Netherlands	1
Dunarea de Jos University of Galati	Romania	1
Ghent University	Belgium	1
Piri Reis University	Turkey	1
Southampton University	United Kingdom	1
Technical University of Denmark	Denmark	1
University of London UCL	United Kingdom	1
Universidad Politecnica de Catalunya	Spain	1
University of Liege	Belgium	1
University of Piraeus	Greece	1
University of Strathclyde	United Kingdom	1
Total number of responses		32

Table 15 – Number of faculty survey participants per country and university

Figure 27 shows that 71% (23) of the respondents were in the area of applied sciences, computer science, and engineering, while five belonged to natural sciences, and four, to business.

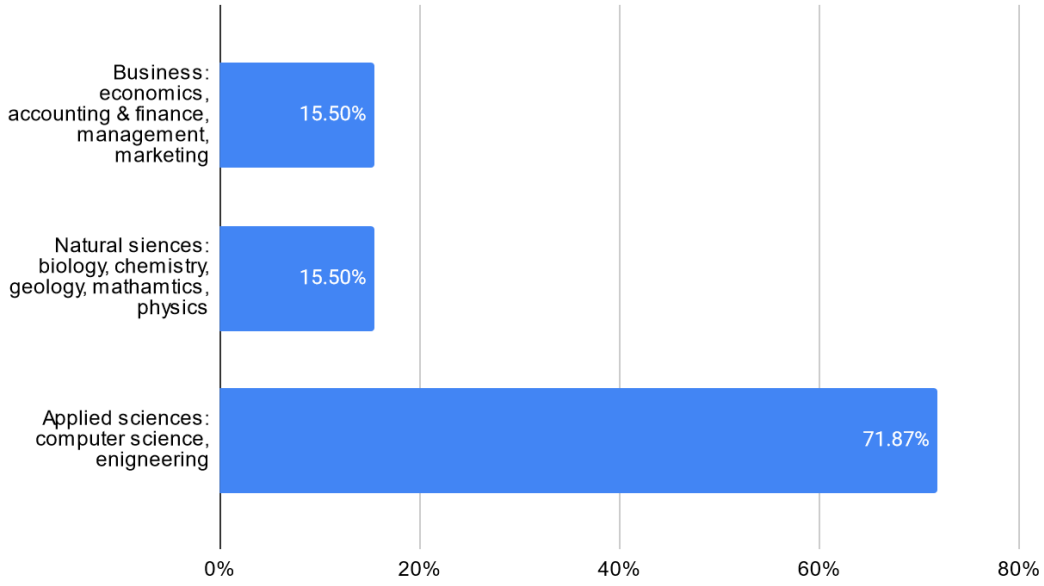


Figure 26 – Respondent discipline

4.2.2 ENTREPRENEURSHIP COURSES AND EXPERIMENTAL TRAINING

Most of the faculty who responded to the questionnaire (91%) said that they did not teach any entrepreneurship courses of any kind (Figure 28). Those who did teach entrepreneurship courses (9%) specified that the courses also addressed other skills, such as programming, macroeconomics, and digital entrepreneurship (Figure 29).

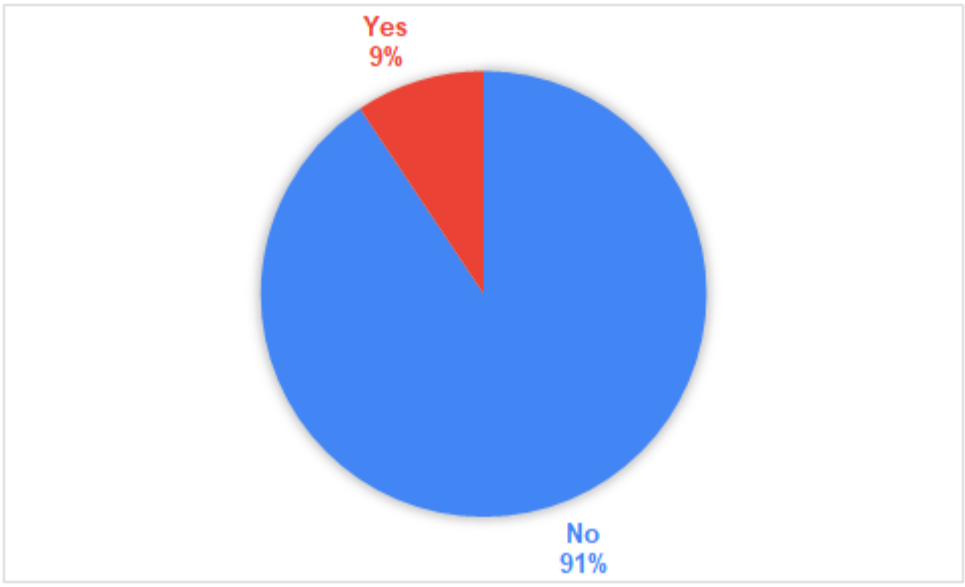


Figure 27 – Teaching in entrepreneurship courses

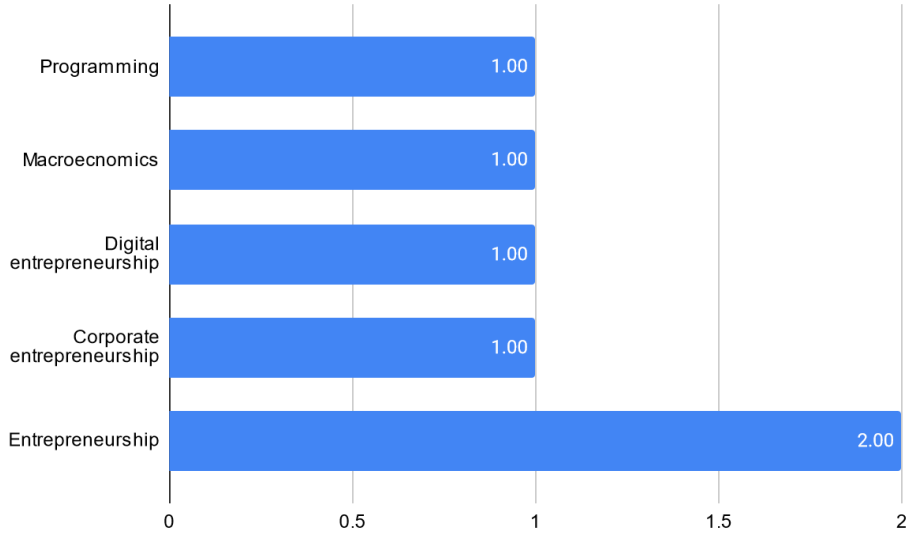


Figure 28 – Entrepreneurship course topics

When asked about the main objectives of the entrepreneurship courses they teach, most of the respondents stated that they teach theory (71.43%). Encouraging students to set up and run their own businesses was another of the objectives considered important by almost 30% of the faculty who responded to the survey (Figure 30).

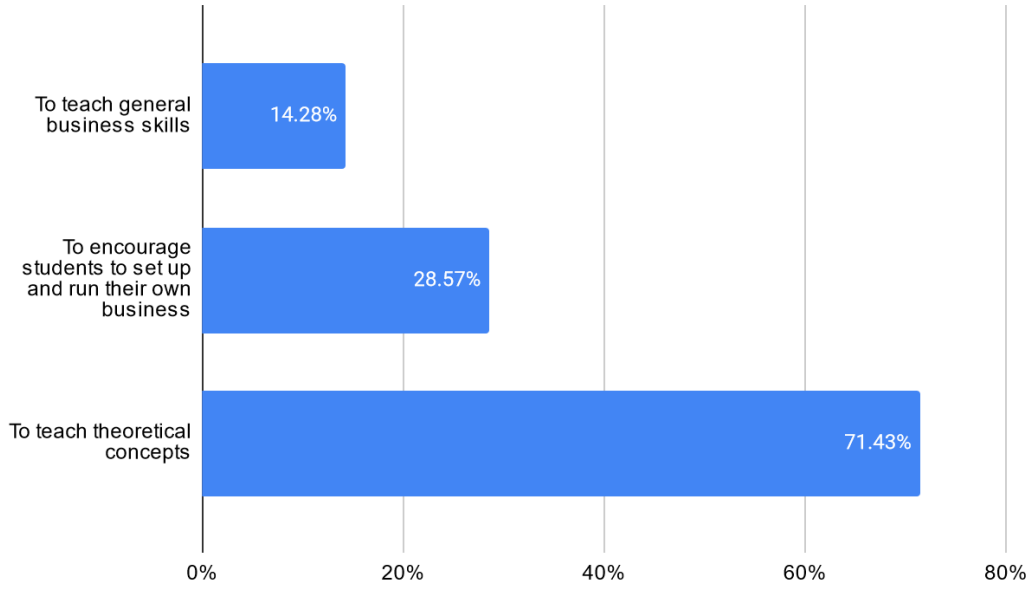


Figure 29 – Main aim of entrepreneurship courses

Forty-one percent of the professors declared that they would be interested in teaching this type of course if they were given the opportunity, and that if they had not done so before it was mainly because they did not have the right competences or enough time. A minority pointed to the fact that the university already had a specific entrepreneurship programme, students were not interested, or the respondents did not consider entrepreneurship an appropriate part of doctoral studies (Figure 31).

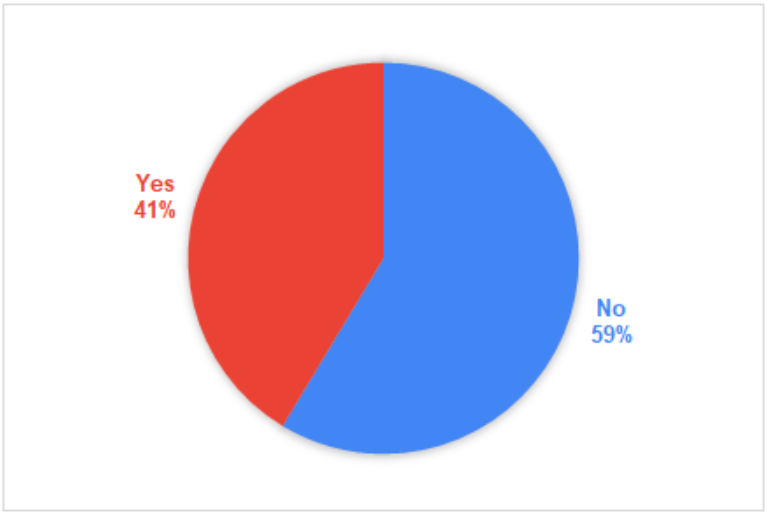


Figure 30 – Faculty interested in teaching entrepreneurship courses to PhD students

The faculty who responded that they were not interested in teaching entrepreneurship courses (59% of the sample) were asked why. The majority cited a lack of skills for teaching entrepreneurship. Other reasons were lack of time and the consideration that such courses were not important for training in PhD programmes (Figure 32).

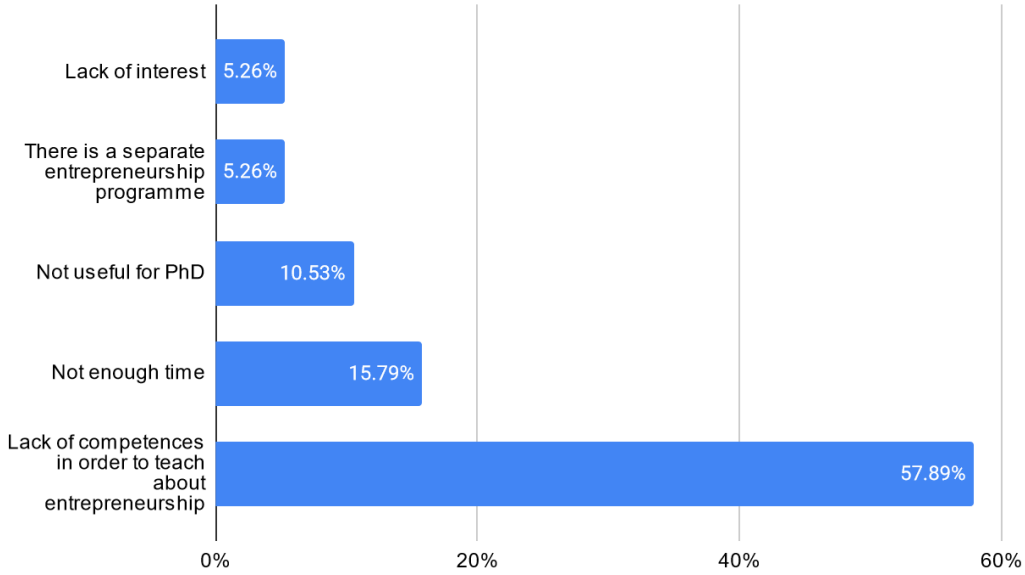


Figure 31 – Teachers' reasons for not teaching entrepreneurship courses

When asked about their universities' initiatives in relation to entrepreneurship, most of the faculty members mentioned seminars and webinars, followed by workshops and incubators. A lower percentage mentioned initiative such as entrepreneurship associations (Figure 33).

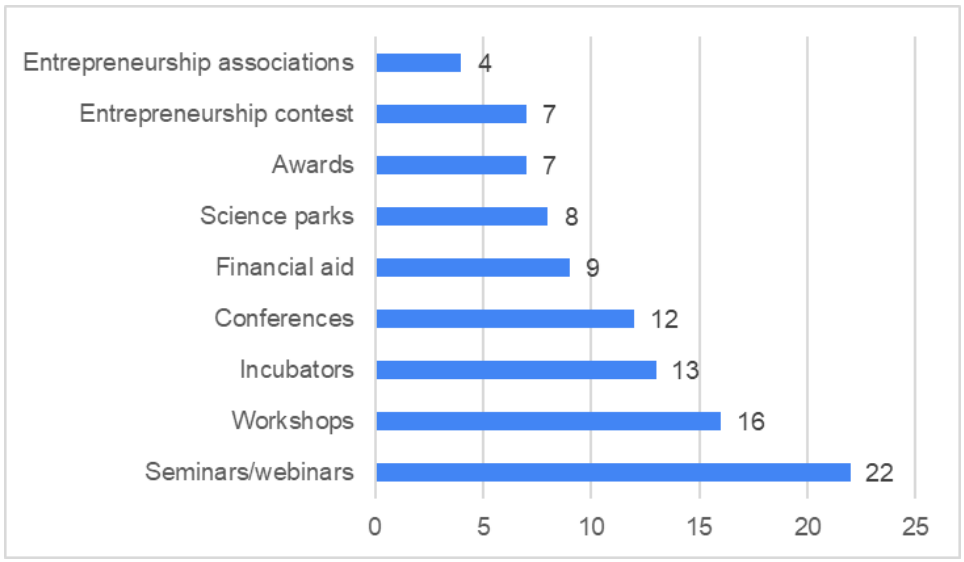


Figure 32 – Entrepreneurship initiatives offered by universities for PhD students

However, despite claiming a lack of skills as a problem, more than half of the teachers (56%) indicated that they were or had been involved in technology-based companies or had transferred research results to companies at some point (Figure 34).

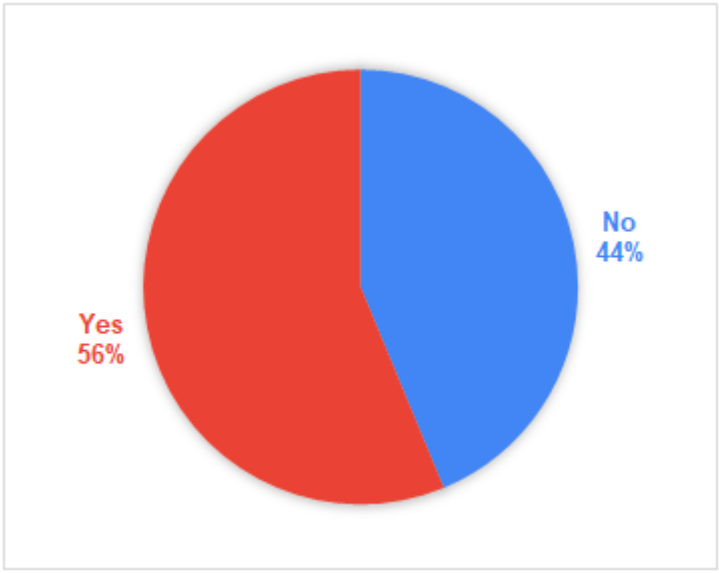


Figure 33 – Participation in a technology-based company or university-company partnerships

They also indicated that entrepreneurship courses tended to involve their own departments and/or areas of knowledge and tended to be university-specific programmes, specific research projects, or technology-based companies (Figure 35 and Table 16).

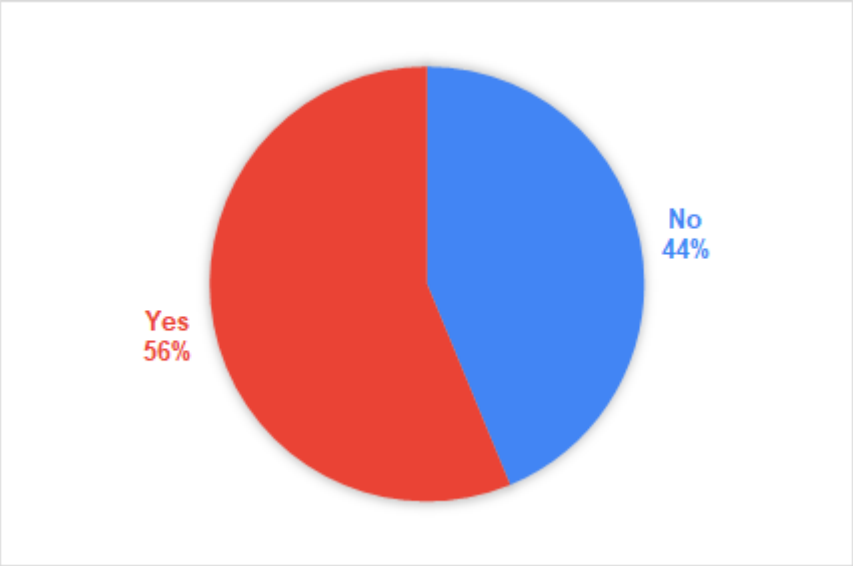


Figure 34 – Interdepartmental coordination regarding entrepreneurial training

Kind of collaboration	Frequency
Specific programme at the university	6
Specific projects	4
Spin-offs/start-ups	3

Table 16 – Kinds of interdepartmental collaboration

When the faculty members were asked to describe the main barriers, they had encountered that prevented them from providing students with entrepreneurship opportunities, they mostly pointed to lack of resources (n=6) and student preferences (n=6). Table 17 concerns an open-ended question whose answers have been standardised and grouped according to content.

Barriers	Frequency
Lack of resources	6
Student preferences	6
Formal barriers (regulations, requirements, etc.)	4
Lack of specific programme	4
There are no barriers	3
Enterprises are not prepared to accommodate PhDs	2
Time, but this is also a matter of priorities	1

Intensive nature of PhD	1
Different expertise	1

Table 17 – Significant barriers, obstacles, and challenges in offering entrepreneurship training to PhD students

The experiences in entrepreneurship education that respondents found most interesting to offer to PhD students were scientific training programmes and direct contact with entrepreneurs. They pointed to the existence of these programmes as fundamental to offer opportunities to students who want to create a company. The faculty also considered it very valuable to have direct contact with other entrepreneurs and offer opportunities that are truly realistic (Table 18).

Experiences	Frequency
Scientific training programmes	7
Direct contact with entrepreneurs	6
Awareness of realistic opportunities	5
Experience working in a business environment	3
Funding opportunities	2
Legal and administrative support	2
Financial issues and business plan	2
English competence	1

Table 18 – Most relevant training to offer PhD students interested in entrepreneurship

4.2.3 ENTREPRENEURSHIP COURSES

Finally, they were asked the same question as the students about the skills that should be included in entrepreneurship courses. Faculty members agreed with the students about the more strategic skills (planning, project development, etc.), but they differed substantially from them in the fact that they considered it fundamental to encourage students to be entrepreneurial, while the students did not consider encouragement a fundamental part of course content. Table 19 shows the faculty responses, 1 meaning they 'strongly disagree' with the sentence and 5, that they 'strongly agree'.

Entrepreneurship abilities	1	2	3	4	5

Theoretical concepts behind setting up and running a business	2	8	11	5	3
Encouragement for students to set up and run their own business	1	5	4	12	8
Strategies for managing and ensuring the growth of established companies	5	2	8	11	4
Training in marketing and finance	3	3	12	7	5
Conditions that favour business creation	4	4	10	7	5
How to move/make the transition from traditional employment to self-employment	4	2	10	10	4
Presentation and review of real cases of entrepreneurship	1	4	8	6	11
Business plan development	2	1	5	12	10
Training in innovation and creativity	3	1	5	11	10
Understanding how different kinds of business work	4	2	8	15	1
The competences and skills that make a successful entrepreneur	3	2	10	10	5
How to obtain resources to create my own business	3	2	8	12	5
Problem-solving skills	2	2	6	13	7
Dealing with failure	2	4	6	7	11

How to work under pressure	2	7	7	9	5
How to bring my project/ideas to the market	3	1	3	15	8

Table 19 – Expected content of entrepreneurship courses

5. CONCLUSIONS

The prodPhD project addresses the introduction of entrepreneurship training in doctoral programmes in different disciplines, designing innovative teaching methodologies and creating a platform for teaching entrepreneurship. The necessary starting point was to discover the state of the art and the needs and perspectives of the agents involved (students and teachers). This is the objective of this work package.

5.1. STATE-OF-THE-ART ANALYSIS:

Regulations

Recognition of entrepreneurship as a driver of economic growth and job creation is reflected in EU regulations with the 2012 Action Plan, which identifies entrepreneurship as an important driver of social cohesion and sustainability. Subsequent regulations underscore the importance of entrepreneurship education for greater competitiveness and the role of universities.

Entrepreneurship training

The literature on entrepreneurship and university-level entrepreneurship education is growing considerably both in the United States and in Europe.

The scientific literature reflects interest in finding an adequate entrepreneurship education, which requires knowledge of the aims and objectives of entrepreneurship education interventions, the alternative forms entrepreneurship education interventions can take, and the need to train trainers.

There are several approaches to curriculum design. Most emphasize the importance of teaching students how to discover, evaluate, and seize opportunities.

Universities contribute to the development of entrepreneurship through education and the fostering of entrepreneurial attitudes in young people, by developing teaching and learning practices, involving stakeholders inside and outside the university, and creating an enabling institutional environment.

Students in entrepreneurship programmes increase their competences and strengthen their intention to become self-employed, with a significant positive impact on the likelihood of their creating businesses in the future.

5.2. NEEDS AND REQUIREMENTS: STUDENTS

The sample consisted of 111 students who responded to the online survey. Their gender distribution was relatively even. Most of them were between 26 and 30 years old and were in their first year of doctoral studies, mostly in applied sciences. Their geographical origins varied, although most of them were from Poland and more specifically the Technical University of Gdansk.

Most of them expressed an intention to continue in academics after finishing their PhD studies or to seek employment in the private sector.

Financial opportunities for entrepreneurs and the circumstance of their family's owning a business already were the main factors reported as reasons for starting a business. The most cited reason for entrepreneurship was the possibility of having a flexible job and earning money, although in students' opinion entrepreneurship involves risks and entrepreneurs have to work very hard to get results.

A high percentage of the students surveyed (64%) answered that they had not received any training. However, most of them agreed to receive training and would be willing to spend two hours a week on it.

More than half of the respondents (52%) did not know if there were any training courses in entrepreneurship at their university or if there were orientation units, and a higher percentage (95%) did not know about the existence of incentives for entrepreneurship. Only 6% participated in entrepreneurship incentives.

Students pronounced instrumental skills, especially in relation to decision making, problem solving, leadership, and strategic planning, very valuable for entrepreneurship. They valued training in these skills very positively also; in their opinion, training should especially emphasize planning, resource procurement and management, product presentation and sales strategies, and examples of business success.

5.3. NEEDS AND REQUIREMENTS: FACULTY

The questionnaire was answered by 32 faculty members teaching in doctoral, master's degree, and bachelor's degree programmes and holding various academic positions. Their gender distribution was unequal; the majority of respondents, 75%, were male. As in the student survey, the highest percentage of responses came from the Technical University of Gdansk, Poland, and about 72% of the respondents were from the area of applied sciences, computer science, and engineering.

Fifty-six percent were or had been involved in technology-based companies or had transferred research results to companies.

Ninety-one percent of the respondents had never taught courses related to entrepreneurship, although 41% were interested in doing so if they had the opportunity. Those not interested gave as the main reason their lack of the skills needed to teach entrepreneurship and lack of time.

When asked about their university's initiatives in relation to entrepreneurship, they mentioned above all seminars and webinars, workshops and incubators. Most activities are run at the departmental level.

Faculty members think scientific training programmes and direct contact with entrepreneurs are important in training for entrepreneurs. They particularly highlighted the development of skills such as the ability to bring a project/idea to the market, business plan development and training for innovation and creativity.

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APPENDIX 1: READING GUIDE FOR COMPLETING THE BIBLIOGRAPHIC DATABASE

This document refers to the instructions for completing the spreadsheet and bibliographic database for WP2.

Document access

To achieve these objectives, you must supply the bibliographic database as well as the associated spreadsheet, which contains some additional fields related to content analysis.

The process consists of the following steps:

1. Open the 'Literature Read' spreadsheet accessible at the following link: https://docs.google.com/spreadsheets/d/1am9tkEHGvsfPhT5vbjoYwz2uJhrQ4GKE/edit#gid=688849947
2. Select the document to be analysed (the originals will be collected in the shared folders in Google Drive). Make sure that the document is not already being analysed by another researcher. Check the 'reading status' field on the spreadsheet.
3. Once you have selected the document fill in the empty fields as indicated below.
4. Once all the fields have been filled in, change the 'reading status' field to 'read'.

Description of the fields

Source

Source where the document was obtained

- Previous Erasmus + and MSCA projects
- Cordis
- Google Scholar
- WoS
- Scopus
- Eric Database
- Web of the European Commission
- Universities' repositories

Reading status. Drop-down field with the following values: Empty/In process of reading/Read

Document situation. If this field is empty, it means that no one has selected this document to be analysed. When you select the document for reading, you must change this value to 'in process of reading' while performing the analysis and change it to 'read' once you have completed the analysis.

Researcher. Free text field

Enter your name when you indicate in the 'reading status' field that you have started to analyse the document.

Document type. Drop-down field with the following values

- Journal article
- Meeting proceedings
- Miscellaneous
- Policies and regulations
- Pre-print
- Working paper
- Report
- Standards and guidelines

Author(s). Free text field

Authors of the document (in the case of multiple authorship, separated by semicolons (;)).

Ex: Abadal, Ernest; Melero, Remedios

Title. Free text field

Enter the title of the document (journal article, report, book chapter, book...) in the original language.

Year published

Enter all four digits.

Publication name (Journal). Free text field

Title of the journal or bulletin in which the document is published.

Conference/Meeting. Free text field

Location data (name, date, place, etc.) if the document analysed is a conference or meeting.

Pe: X EDICIC Meeting, Barcelona (Spain), July 2019

Book title. Free text field

When analysing a chapter of a book, include the title of the parent book.

Organizations. Free text field

Institutions to which the authors of the document belong (in the case of multiple institutions, separate by semicolons).

Countries. Free text field

Countries of the participating institutions (in the case of multiple countries, separate by semicolons).

Abstract. Free text field

If the document includes an English abstract, use this abstract.

If the abstract is in another language, translate it into English.

If the document does not contain an abstract, summarize the document's contents in English.

Topic. Free text field with the various terms related to the project

You may include several terms separated by semicolons (;).

Objective of the analysed document or research questions. Free text field

Objective as indicated in the document itself. If the objective is not specified, please indicate the research question.

Usefulness. Free text field

Please indicate how this document can be useful for research. For example: This document is useful for achieving one of the objectives, for establishing the state of the art, for the methodology (quantitative or qualitative), etc.

Link. Free text field

Link to the document. It should already be included.

Additional Information. Free text field

In this additional field you may enter a note of anything you consider of interest that cannot be included in any of the previous fields.

Location folder. Free text field

Shared folder in which the document is located.

This project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement Nº 101005985

APPENDIX 2: STUDENT SURVEY

Introduction

Social network tools and procedures for developing entrepreneurial skills in PhD programmes (prodPhD) is a project funded by the European Commission's H2020 funding programme, subprogramme: 'Science With And For Society' H2020-SWAFS-2018-2020 (reference: 101005985). The main objective of the prodPhD project is to implement innovative social network-based methodologies for teaching and learning entrepreneurship in PhD programmes. The multidisciplinary teaching and learning methodologies to be developed will allow entrepreneurship education to be introduced in any PhD programme, providing students with the knowledge, skills, and motivation to engage in entrepreneurial activities. The methodology will be conceived to develop experiential knowledge. Academics, entrepreneurship experts, and mentors will be involved in its development and implementation.

This survey aims to gather information about your experiences and involvement in entrepreneurship activities and education. Entrepreneurship refers to the practice of starting business ventures based on the development of new products and/or services.

This survey takes approximately 10 minutes to complete. It is voluntary and all personal data will be anonymized. Personal information, such as your name and email address, is requested so that we can conduct follow-up interviews with a small sample of students. At the end of the survey, you will be given the option to opt out of being contacted for a follow-up interview. If you agree, you can provide your contact details. Otherwise, you do not have to provide any contact information. Identifying information will not be released in any way.

If you continue and respond to the questions below, you are agreeing to be included in this survey. If you do not wish to continue, you may close your browser now.

Instructions

Please take your time to answer each question as honestly and as accurately as possible.

You will need to click on the arrow button at the end of each page to save it and move on to the next.

Please be sure to click the 'Submit' button on the last page to complete the survey.

Section 1: Demographic information

1. Please specify your age group:

Under 25
26-30

31-35
Over 35

2. Please specify your gender:
Female
Male
Other
Prefer not to say

3. In which university are you pursuing your PhD?

4. In which year of your PhD are you?

First
Second
Third
Fourth or higher

5. What is your discipline/area?

Humanities: art, history, languages, literature, music, philosophy, religion, theatre
Social sciences: anthropology, education, geography, law, political science, psychology, sociology
Business: economics, accounting & finance, management, marketing
Natural sciences: biology, chemistry, geology, mathematics, physics
Health sciences: medicine, nursing, physiotherapy, pharmacy
Applied sciences: computer science, engineering
Other. Specify:

6. Please write the full official name of your PhD programme:

Section 2: Career intentions

7. What would you like to do when you finish your PhD?

Find a job in academia (if you do not check 'Start my own business', please skip to question 10)
Find a job in the public sector (if you do not check 'Start my own business', please skip to question 10)
Find a job in a non-profit organization (if you do not check 'Start my own business', please skip to question 10)
Start my own business (if you check this option, please answer questions 8 and 9)

Find a job in a business (if you do not check 'Start my own business', please skip to question 10)
Do not know yet (if you do not check 'Start my own business', please skip to question 10)
Other. Specify: (if you do not check 'Start my own business', please skip to question 10)

8. Please select the factors that have contributed to your intention to start a business:

My parents/family have a business of their own
My friends own or are planning to start a business of their own
My professors have encouraged me to set up a business
University courses and initiatives have encouraged me to start my own company
Government policies that support entrepreneurs
Financial opportunities for entrepreneurs
Other. Specify:

9. Please select your motivation(s) for being an entrepreneur:

To satisfy a market need
To solve a social problem
To create something of my own
To have more flexibility and independence
To have more free time
To make money
To head up an organization
To create jobs
To follow a family tradition
To gain social status
To pursue my passion for entrepreneurship
Other. Specify:

Section 3: Business prospects and background

10. Do you own any kind of enterprise or are you part of a business partnership?

Yes
No (if you answer no, please skip to question 13)

11. Did you receive any kind of support from the university when setting up your company?

Yes
No (if you answer no, please skip to question 13)

12. What kind of support did you receive?

13. Please rate your view of an entrepreneur's job on a scale from 1 to 5 where 1 is 'strongly disagree' and 5, 'strongly agree':

I believe being an entrepreneur is risky
I think having a company can be very hard
I believe entrepreneurship might be a fun career option
I think being an entrepreneur is too stressful
I believe being an entrepreneur gives you more freedom than other jobs
I believe it is a hard but rewarding job
I believe that the results of my thesis could be used to create a spin-off/tech start-up

Section 4: Information on entrepreneurship courses

14. Have you ever taken a course on entrepreneurship as either an elective or a compulsory course during previous studies (before you started your PhD)?

Yes
No (if you answer no, please skip to question 16)

15. Where?

University: undergraduate degree
University: master's degree
Non-university training programme
Courses, workshops, chats, clubs
Other. Specify:

16. Would you be interested in attending additional entrepreneurship training modules during your PhD studies?

Yes
No (if you answer no, please skip to question 18)

17. How much time would you spend on additional entrepreneurship training modules?

1 hour per week
2 hours per week
3 hours per week
4 or more hours per week

Section 5: Alternative entrepreneurship training

18. Does your university offer seminars, workshops, or conferences on entrepreneurship?

Yes
No (if you answer no, please skip to question 20)
I don't know (if you answer no, please skip to question 20)

19. Have you attended any of the seminars, workshops, or conferences described in Q18?

Yes
No

20. Does your university have orientation units on entrepreneurship for students (e.g., incubators, entrepreneurship associations, science parks)?

Yes
No (if you answer no, please skip to question 23)
I don't know (if you answer no, please skip to question 23)

21. Have you used the aids/facilities/services described in Q20?

Yes
No (if you answer no, please skip to question 23)

22. For what purpose have you used this service?

23. Does your university have any other incentives for entrepreneurial activities (e.g., awards, financial aid, entrepreneurship contests)?

Yes
No (if you answer no, please skip to question 26)
I don't know (if you answer no, please skip to question 26)

24. Have you participated in any of the incentives/activities described in Q23?

Yes
No (if you answer no, please skip to question 26)

25. In what kind of initiatives have you participated?

26. Does your university have any other initiatives related to entrepreneurship that are not mentioned above?

Yes
No (if you answer no, please skip to question 28)
I don't know (if you answer no, please skip to question 28)

27. What are they?

Section 6: Entrepreneurship competences

28. Please rate your entrepreneurship skills on a scale from 1 to 5 where 1 is 'no competence' and 5, 'advanced competence':

Instrumental skills (problem solving, decision making, risk managing, finances and accounting)
Interpersonal skills (leadership, team management, networking, negotiation, business ethics)
Systemic skills (business opportunity identification, creativity, innovation)

29. Please rate the level of importance of the following skills for entrepreneurs on a scale from 1 to 5 where 1 is 'not important at all' and 5, 'very important':

Project development
Teamwork
Problem solving
Budgeting
IT competences
Web design
Decision making
Data management
Creativity
Data analysis
Search engine optimization
Finances and accounting
Advertising and promotion
Content creation
Leadership
Strategic planning
Negotiation
Risk management
Legal structures
Market research

Section 7: Importance of entrepreneurship training

30. Please rate your level of agreement with the following statements on a scale from 1 to 5 where 1 is 'strongly disagree' and 5, 'strongly agree':

I believe that training in entrepreneurship is very important regardless of one's specialization field
I believe that essential entrepreneurship skills cannot be taught in a class
I believe entrepreneurship training can develop skills that will be useful in the future
I believe entrepreneurship training is only important if you want to start a business

Section 8: Evaluation of entrepreneurship courses

31. Please rate your level of agreement with the following statements on a scale from 1 to 5 where 1 is 'strongly disagree' and 5, 'strongly agree': I believe that courses on entrepreneurship should focus on...

Theoretical concepts behind setting up and running a business
Encouragement for students to set up and run their own business

Strategies for managing and ensuring the growth of established companies
Training in marketing and finance
Conditions that favour business creation
How to move/make the transition from traditional employment to self-employment
Presentation and review of real cases of entrepreneurship
Business plan development
Training in innovation and creativity
Understanding how different kinds of business work
The competences and skills that make a successful entrepreneur
How to obtain resources to create my own business
Problem-solving skills
Dealing with failure
How to work under pressure
How to bring my project/ideas to the market

32. Please describe how entrepreneurship courses can stimulate your entrepreneurship initiative:

Contact details for follow-up interview

Are you willing to be contacted for a follow-up interview?

Yes (if you answer yes, please continue to the following questions)
No (if you answer no, you may submit your survey now)

If yes:

Please enter your first name.

Please enter your last name.

Please enter your university-assigned email address.

Please list an alternate email address, if you have one (optional).

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APPENDIX 3: FACULTY SURVEY

Introduction

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This survey is to gather information about your experiences and involvement in entrepreneurship activities and education. Entrepreneurship refers to the practice of starting business ventures based on the development of new products and/or services.

This survey takes approximately 10 minutes to complete. It is voluntary and all personal data will be anonymized. Personal information, such as your name and email address, is requested so that we can conduct follow-up interviews with a small sample of faculty members. At the end of the survey, you will be given the option to opt out of being contacted for a follow-up interview. If you agree, you can provide your contact details. Otherwise, you do not have to provide any contact information. Identifying information will not be released in any way.

If you continue and respond to the questions below, you are agreeing to be included in this survey. If you do not wish to continue, you may close your browser now.

Instructions

Please take your time to answer each question as honestly and as accurately as possible.

You will need to click on the arrow button at the end of each page to save it and move on to the next.

Please be sure to click the 'Submit' button on the last page to complete the survey.

Section 1: Demographic information

1. Please choose the option that best describes your situation:

PhD programme director
Teacher in doctoral programmes
Teacher in bachelor's degree programmes
Department director
Vice chancellor
Dean

Other. Specify:

2. Please specify your gender:

Female
Male
Other
Prefer not to say

3. At what university are you employed?

4. What is your discipline/area?

Humanities: art, history, languages, literature, music, philosophy, religion, theatre
Social sciences: anthropology, education, geography, law, political science, psychology, sociology
Business: economics, accounting & finance, management, marketing
Natural sciences: biology, chemistry, geology, mathematics, physics
Health sciences: medicine, nursing, physiotherapy, pharmacy
Applied sciences: computer science, engineering
Other. Specify:

5. Please state the name of your current department:

Section 2: Entrepreneurship courses and experiential training

6. Are you teaching or have you ever taught any courses on entrepreneurship?

Yes (if you answer yes, please respond to questions 7 and 8 and skip question 9)
No (If your answer is no, please skip to question 9)

7. What was the topic of the course(s)?

Entrepreneurship
Corporate entrepreneurship
International entrepreneurship
Digital entrepreneurship
Other. Specify:

8. What were the main aims of the course(s)?

To teach theoretical concepts
To encourage students to set up and run their own business
To teach general business skills

9. Would you be interested in teaching entrepreneurship courses to PhD students if you were offered the opportunity?

Yes (please skip to question 11)
No

10. Why was your answer to Q9 'no' (e.g., I am not interested in the subject, I do not think it is useful, It is too much work)?

11. Please mark the entrepreneurship opportunities/initiatives that your university offers for PhD students:

Seminars/webinars
Workshops
Conferences
Incubators
Science parks
Entrepreneurship associations
Awards
Financial aid
Entrepreneurship contests
Other. Specify:

12. Are you participating or have you ever participated in a technology-based company or at least transferred research results to a company?

13. Does entrepreneurial training at your university involve coordination among several departments/knowledge fields (i.e., multidisciplinary projects)?

Yes
No (please skip to question 15)

14. Please describe the interdepartmental collaboration or multidisciplinary projects.

15. Please describe any significant barriers, obstacles, or challenges that you encountered in offering graduate entrepreneurship education opportunities (e.g., administrative or logistic barriers, lack of resources, etc.):

16. What experiences in entrepreneurship education do you believe it is the most important to offer PhD students interested in entrepreneurship?

Section 4: Entrepreneurship courses

17. Please rate your level of agreement with the following statements on a scale from 1 to 5 where 1 is 'strongly disagree' and 5, 'strongly agree': I believe that courses on entrepreneurship should focus on...

Theoretical concepts behind setting up and running a business
Encouragement for students to set up and run their own business
Strategies for managing and ensuring the growth of established companies
Training in marketing and finance
Conditions that favour business creation
How to move/make the transition from traditional employment to self-employment
Presentation and review of real cases of entrepreneurship
Business plan development
Training in innovation and creativity
Understanding how different kinds of business work
The competences and skills that make a successful entrepreneur
How to obtain resources to create my own business
Problem-solving skills
Dealing with failure
How to work under pressure
How to bring my project/ideas to the market

Contact details for follow-up interview

Are you willing to be contacted for a follow-up interview?

Yes
No

If yes:

Please enter your first name:

Please enter your last name:

Please enter your university-assigned email address: