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PITCH Stocktaking Report

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PITCH

Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education

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2019-1-DE01- KA203-005030

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1. Research Framework

1.1. Theoretical background and practical relevance

The Research Framework of the Project PITCH builds on the concept of fostering creativity, innovation, and entrepreneurship competencies. The focus in PITCH is on deepening the findings and creating solution concepts for higher education institutions. Therefore, PITCH concentrates on students as the final beneficiaries that should already have opportunities of being prepared for those mentioned 21st century skills during their studies and before entering the labour market.

Note: Due to the Corona situation we set a special focus on virtual learning and development environments for fostering creativity, innovation, and entrepreneurship competences under the consideration of possible constraints and opportunities.

The research framework of PITCH is based on the following assumptions:

- Higher education institutions (HEI) see the need for creativity and innovation as competencies that are needed to be acquired by students. HEI undertake efforts to promote these transversal skills **but lecturers report to be restricted by obligations set by universities.**
- Higher education institutions of different European countries agree on the fact that creativity and innovation can be taught by action oriented instructional methods as well as a suitable environment, **but this is strenuous and resource-intensive.**
- There is a clear mindset of higher education representatives: Every person is creative, only the degree to which extent and on what differs **but the question is: who would like to become creative and innovative value creators in the professional field?**
- Mobility is seen as very promising. There is also agreement that real life projects of business organisations foster creativity and innovation competences. **But how targeted are mobility and internship programs in developing creativity, innovation and entrepreneurship?**

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Consequently the following Research Questions based on these assumptions and findings were developed:

1. What is the relationship between universities offering appropriate support measures and the actual competence development of their students?
2. Through what kind of programmes and measures do students really feel supported with regard to their competence development in the field of creativity, innovation and entrepreneurship at their university? What obstacles do students actually see that prevent them from becoming an entrepreneur?
3. Which concrete learning approaches support the acquisition of entrepreneurial competences and (how) are learning outcomes as well as competence gains validated at the universities?

To keep a detailed focus on Innovation and Creativity Skills which are to receive special attention as new areas of emphasis by the Partnerships 21st Century Skills Framework (OECD, 2008), we have used the EntreComp Framework (Bacigalupo, Kampylis, Punie & Van den Brande, 2016) as a basis for conceptual and methodological operationalization of our desk research and data collection. In the following chapters the main target groups, data collection components as well as the procedure are introduced.

1.2.   Methodology and Target groups

PITCH has a special focus on supporting students to acquire competences that are key competences of meeting the future competency requirements of the globally changing world of work (OECD, 2005; European Commission, 2012).

We had the goal to specifically ask students about their current experiences with support services provided by their universities. Furthermore, we asked them what they currently miss within their syllabi (focus on transversal and entrepreneurship competences and applied learning approaches) and whether they get lecture opportunities to acquire entrepreneurship know-how.

Since the results and experiences from previous projects showed that university systems set narrow boundaries regarding innovative learning approaches and time frames, we also planned to consider interviews with lecturers and university administration staff to explore this in more detail.

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1.3.   Data collection

The collection of data will be quantitative and qualitative.

Desk Research

First, all partners done a Desk Research for their country according to the questions UDE provided. These questions guide the partners to portray the status quo and to specify what to find out in the questionnaire and interviews. The overall goal is to answer the above-mentioned PITCH Research Questions.

Online questionnaire

An online questionnaire that is targeted on students was distributed to students from all over Europe to find out how specific educational institutions and companies implement measures to foster and assess creativity, innovation and entrepreneurship competences. The Online questionnaire is based on the EntreComp conceptual model of three different areas (Ideas & opportunities, resources and into action) and competences. The different levels of proficiency are blended with the LEVEL-5-system and taxonomy. Each partner distributed the questionnaire to at least 30 respondents.

Qualitative questionnaire

To deepen the findings from the online questionnaire each partner conducted 2-3 interviews with students and/or with lecturers. The interview guiding questions were based on different topics that are relevant for the development and assessment of the competences of interest.

Needs analysis

After having collected all desk research results from each country as well as collected at least 150 answers on the online questionnaire we conducted a synthesis meeting to consolidate all results and to plan the next work packages. Due to the Corona situation we conducted an intense virtual synthesis session with the help of a digital whiteboard (Mural) and the conference system Zoom.

Product: Comprehensive stocktaking report

This report include a summary of all steps carried out to conduct a broad problem analysis in order to understand the different topics of PITCH and to have a strong basis for the development of meaningful content of the next work packages.

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1.4.   Procedure

The following illustration presents our concrete roadmap of all steps listed above.

1.5.   Literature

Bacigalupo, M., Kampylis, P., Punie, Y. & Van den Brande, L. (2016). EntreComp: The Entrepreneurship Competence Framework. Luxembourg: Publication Office of the European Union; EUR 27939 EN; doi:10.2791/593884

European Commission (2012). New skills and jobs in Europe: Pathways towards full employment. Publications Office of the European Union: Luxembourg.

Organization for Economic Cooperation and Development. (2005). The definition and selection of key competencies: Executive summary. Paris, France: OECD.

Partnership for 21st Century Skills (2008): 21stCentury Skills: How can you prepare students for the new Global Economy?: http://www.oecd.org/site/educeri21st/40756908.pdf, retrieved 31.08.2020.

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2. Desk research

2.1.   Methodology

Objective of the desk research is to gain an overview of existing efforts by European universities on entrepreneurship education in Europe. A special focus is put on approaches that foster competences related to entrepreneurship education, especially creativity and innovation. Even though the JRC has developed the comprehensive EntreComp framework, there is not much known about feasible validation instruments and systems to assess and document the competences the students acquire in existing entrepreneurship studies.

The PITCH partners researched the offers of the HEI's in their respective countries. Besides existing training courses and modules implemented in curricula, blended learning approaches and offers that cross HE with practical learning in internships, incubators or collaborations with businesses were of interest. The first step is to gain an overview of the main (study) programmes and resources and then to take the best programmes or university „Start-up" centres as a model to learn from and transfer the findings to the project PITCH.

Guiding questions for the research were as following:

1. Which (study) programs related to entrepreneurship, innovation and creativity education exist within higher education institutions (HEI) of your country?
2. Are there any specific Start-up centers within HEI of your country? If they appear in a ranking list, please indicate the 10 higher education institutions that perform best in promoting entrepreneurship, innovation and creativity. If there are less, please indicate as many as existing institutions.
3. Which concepts and (learning) formats do these programmes or Start-up Centers apply in order to foster entrepreneurship, innovation and creativity competences out of HE? List them and bring them into an overview within the attached excel-template.
4. Are there any statistics on the number of (doctoral) students that become entrepreneurs during/after their studies? Are there any data about how many of them are successful, failed and about which products or services they offer?
5. Do HEI in your country use any recognition/validation systems to assess entrepreneurship, innovation and/or creativity competences?

The desk research is a comprehensive compilation of the countries practises and demands in regard to the aforementioned research questions. In combination with the survey and the interviews it delivers a solid basis for finding further steps towards Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education.

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2.2. Summaries

2.2.1. Germany

Most universities in Germany offer support for aspiring entrepreneurs. Start-Up centres are widely established. Often universities with a focus on technological subjects have a bigger catalogue of offers and are well connected to businesses.

A lot of these offers focus more on the technicalities of founding a start-up rather than specifically on the competences required to be an entrepreneur. This likely excludes students that are not interested in becoming an entrepreneur but would profit from developing entrepreneurial competences.

There are some bachelor and master programmes that relate directly to entrepreneurship and innovation. Some are modules or courses within a programme, others are study subjects that stand for themselves. Most of them are part of economic faculties.

Competences related to entrepreneurship like creativity and innovation are more likely to be integrated in some courses aimed at students but also staff and researcher at HEI. Competence oriented courses are still more an exception but the norm, but they increase. There might be more offers that don't advertise their focus on competence development but integrate it nonetheless.

It is noticeable that over 80% of founders in Germany have a university degree. Therefore, implementing entrepreneurship competences in HEI seems a desirable objective.

In general, Germany does not yet have a uniform system for validating non-formally and informally acquired competences. Rather, there are many parallel certificates, competence passes, models and procedures that pursue different objectives and are based on different reference systems.

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2.2.2. Greece

Some master degrees and post graduate programmes exist, some have been established just a couple of years ago.

HEI's in Greece have units or committees for innovation and entrepreneurship (MoKE), these provide a framework of activities and services for and education and information on entrepreneurship and innovation.

Pedagogical tools in entrepreneurship education largely focus on role modelling, hands-on experience, ideation, incubation and mentoring support. But there is a large number of additional supportive actions.

Greece has a buzzing startup scene that draws international attention. Main sector for startups is touristic. But there are also fintech, deeptech, agritech and biotech startups.

Universities are very active in national R&D programmes and collaborate with businesses in these projects.

With the exception of AUTH that has piloted LEVEL5 as part of its partnership in a number of EU funded projects, no other university has ever used a recognition or validation system to assess entrepreneurship, innovation and creativity competences.

2.2.3. Italy

There are multiple study programmes in Italy that focus on entrepreneurship. They are combined with other topics, in many cases innovation but also international, finance, business and technology focus. All of them are Master programmes and are taught in English.

Since the Italian start-up law in 2012 the creation and fostering of start-ups has increased. Main sectors are services to enterprises, industrial manufacture and commerce.

Some HEI's assist in startups in different forms, many through an incubator or consortiums for research, creation and innovation.

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Almost all innovative startups are still operating several years after foundation.

No structured validation approach is implemented but an assessment for innovations costumer use.

2.2.4. Lithuania

Many subjects and courses within studies relate to entrepreneurship (most economics programmes), innovation (most engineering programmes) and creativity. Contrary to the other countries there are bachelor programmes regarding entrepreneurship in Lithuania. Still there are more offers in masters programmes than in bachelors.

Some universities have start-up centres. Depending on the HEI they may have a different focus (technology, innovation and business or teaching and learning innovation).

Many universities have additional offers that foster entrepreneurship. Some are directed at students, others aim at connecting businesses with science and/ or students.

Although many HEI have developed some incentives to facilitate entrepreneurship and innovation, there are hardly any official reports or indications of how all these activities have been successful and whether there is a validation system in place.

2.2.5. Portugal

Entrepreneurship, innovation and creativity are present in many curricular units in bachelor and masters programmes in Portugal. Entrepreneurship is most often embedded in courses related to management and business while innovation and creativity take part in degrees related to arts, marketing and engineering.

Some transversal projects at HEI exists, namely centres of development of creativity and innovation. These have special focuses depending on the HEI. Some specialisations are: working with a regional network, support start-ups, help promote entrepreneurial attitudes, turn ideas into action and to support innovative projects in nationwide polytechnic network.

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There is a ranking of universities in Portugal that measures innovation.

"Startup Portugal" is a nationwide (and beyond) initiative with several partners that organises conferences.

Start-up and incubation centres use mainly conferences and workshops as learning formats.

Entrepreneurial spirit amongst students is higher in areas with more economic students, followed by engineering students.

Validation systems are not generally used in HEI in Portugal. But extracurricular activities can be mentioned in the diploma. To foster innovation several challenges and prizes are promoted every year and involve HEI.

2.3.   Country reports

2.3.1. Germany

1. *Which (study) programs related to entrepreneurship, innovation and creativity education exist within higher education institutions (HEI) of your country?*

There are universities in Germany where you can study Entrepreneurship or Innopreneurship. Many universities offer courses or have a focus on entrepreneurship, innovation and creativity in other subjects, many of those relate to business. Some examples will be listed under formats in the chart answering questions 2. and 3.

The OECD's aim with their initiative: "Innovating to Learn, Learning to Innovate" is, that 21st century skills are established and promoted in HEI. The main focus lies on the four C's: creativity, collaboration, critical thinking and communication. To foster these 21st Century skills universities have additional offers. These are directed towards students but some also

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towards staff, PHD students & professors. Here are some examples of different didactical approaches to foster these competences at German universities.

The physics department of the Humboldt University in Berlin earned a scholarship for their project: "21st century skills für Studierende des Grundschullehramts". It is a project seminar directed towards future primary school teachers. 21st century skills are taught through collaboration and use of digital media. The aim is to solve a physics problem that is relevant for society. This is done by using the design based research approach. As of autumn 2019 the seminar is developed, tried out, evaluated and will be implemented permanently (https://www.physik.hu-berlin.de/de/institut/cdi-news/junior-fellowship-des-stifter-verbandes-fuer-dr-steffen-wagner , 21.05.20).

The University of Bonn offers different seminars and workshops to implement 21st century skills. What makes the program stand out is the organiser and the target group. The offer is conducted by the human resource development department of the university and is specifically made for employees of the university. This includes lecturers, scientific researchers, postdocs, PhD students and administration staff. On their website they state that, in order to face the challenges of the 21st century it is more important than ever to be able to: think agile, find innovative and creative solutions, work in diverse and interdisciplinary teams and use new media and information technology efficiently. To meet those needs their offers include seminars on e.g. design thinking, agile methods, agile project management for scientific or for administration teams and mobility for university employees. Some of these are face to face events, others online and some are executed via a blended learning approach (https://www.uni-bonn.de/einrichtungen/pe-karriere/21st-century-skills, 21.05.20).

The initiative Lehramt@digital at the university of Halle-Wittenberg aims towards students that want to become teachers. The objective is to help future teachers to be able to use and create new technological and didactical developments in education. To do that, the dialogue

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and cooperation between education research and education practises will be enforced. Webinars, workshops and a digital learning lab help students to learn about digital learning, test digital tools and work on concepts for education with media. In practice projects the students get to test out what they learnt. Additionally, they substitute for recent graduates so they can attend vocational education programs regarding digital education (https://blogs.urz.uni-halle.de/lehramtdigital/projektinfo/, 21.05.20, https://www.zlb.uni-halle.de/zentrum/projekte/digitale_kompetenzen/#anchor3168290 07.07.20, https://wcms.itz.uni-halle.de/download.php?down=52091&elem=3174768 07.07.20).

The students of the Karlsruhe Institute of Technology can participate in an extraordinary Design Thinking course. The seminar is directed to master students. It is not only interdisciplinary but also international and connects HEI and businesses. The collaboration partners are part of the SUGAR network which includes universities from the EU and other countries. Students that participate come e.g. from Brasil, China, USA, Australia, Finland, Ireland and Switzerland. Projects have been done in collaboration with e.g. Porsche, BASF, GIZ and RWE. The students are given a challenge from the business partner and over the course of nine months go through the entire design thinking process. Weekly lectures and coaching sessions provide the needed assistance. Over the course of that time they manage their own budget that they need to develop their prototype, go to international meetings and business trips and to meet up in their international teams (http://sdt-karlsruhe.de/, 21.05.20).

2. Are there any specific Start-up centers within HEI of your country? If they appear in a ranking list, please indicate the 10 higher education institutions that perform best in promoting entrepreneurship, innovation and creativity. If there are less, please indicate as many as existing institutions.

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3. Which concepts and (learning) formats do these programmes or Start-up Centers apply in order to foster entrepreneurship, innovation and creativity competences out of HE? List them and bring them into an overview within the attached excel-template.

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Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education

HE Institution	Goal	Target Group	Formats	Coopera-tions	Thematic Emphasis (of the products of the start ups)	Start-ups (some examples)	Website	personal impres-sion

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| TU Munich | become one of the best entrepreneurial universities in Europe, forster a supportive environment for innovation with a market-oriented approach | | global venture programms (e.g. silicon valley, EuroTech Universities), Entrepreneurship ambassadors from every falcuty, scientific advisors, Entrepreneurship Research, Entrepreneurship Education (Star-TUM: Sense, Touch, Assess, Recognize, Take-off, Understand More = intregrated TU-Mentrepreneushie eduation approach), TUM IdeAward, Start-up Advising team, Qualification: courses | **partners in industry, politics and science:** e.g. Denkfabrik Entrepreneurial Universities, Social Entrepreneurship Academy, Center for Digital Technology & Management, Grüderregio M | IT technology, communication technology, medical technology and Clean Tech | Entrepreneurial Pioneers (founder of the university founded a company 130 years ago), Entrepreneurs of excellence, companies founded A-Z (there are a lot), **Dynium:** winner IdeAward 2019, Urological MedTech that reduces the recurrence rate of kidney stones from 50% to 1% | https://www.tum.de/innovation/entrepreneurship/ | innovation is one of six categories one main page of the website--> shows how much of a focus this is for the TUM |

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			by UnternehmerTUM and TUM School of Management include interdisciplinary Bachelors and Masters programs as well as an EMBA program and seminars and lectures with practical experts, Financing, Patent and licensing: marketing inventions,TUM Entrepreneurship Day, MakerSpace: Hightech working space, TUM Incubator: office space					

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LMU Munich	Empowering Entrepre-neurs, edu-cate future leaders, ac-tively sup-port the founding of new startups and foster a culture en-trepreneurial thinking and acting	stu-dents, PhD stu-dents, people who ha-bilitate, profes-sors, in-ter-ested persons outside the uni-versity	**Teaching** (courses for stu-dents of the LMU, seminars for scientists and partners, praxis oriented), **Accelerator** (Co-Working space, coaching, men-toring hand-book), **Commu-nity** (Network-ing between Startup teams, alumni teams, investors & partners, Events: Co Founder Match, Leading Entre-preneurs,	**Networks**: German Ac-celerator, Social Entre-preneurship Akademie, German Ent-repreneu-rship GmbH, **Partners (e.g.)**: ERGO, Sparkasse München, InnoEnergy, Versiche-rungskam-mer Bayern, iiinvest	Life Sciences, business and many others	**Bluedot:** App for elec-tric vehicle charging, **Hellsicht:** augmentic intelligence, deep learn-ing software for adaptive data analy-sis, **loewi:** personalised health and fitness sup-port for eve-rybody based on ex-periences in elite sports	https://www .entrepre-neurship-center.uni-muenchen.d e/index.html	

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			Cashwalk), **Research** (in cooperation with institute for innovation management and Max-Plack Institut für Innovation und Wettbewerb),					
HE Institution	**Goal**	**Target Group**	**Formats**	**Cooperations**	**Thematic Emphasis** (of the products of the start ups)	**Start-ups** (some examples)	**Website**	**personal impression**
	implement a holistic entrepreneurial education at the KIT, deveop a culture of ture of	students, scientists, entrepreneurs,	**Consulting** through all phases (orientation, focus, planing, financing, founding), **workspaces** on	partners at the **university**, from **economy**, **industry** and the **public** (EXIST,	Technological, IT	**evoach:** digital self coaching for businesses, **Glassomer:** 3D print glass	http://kit-gruenderschmiede.de/de/	great website, very user-friendly, frequently updated e.g. start-

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	entrepreneurship amongst students/ employees/professors, foster innovation in research, strenghten the regional ecosystem and the technological Region Karlsruhe, international co-operations, visibility as a center for entrepreneurship	investors	campus and with partners, **teaching** (spring/ summer schools, Startup catalyst-KIT Accelarator, lectures and seminars i.a. by Lehrstuhl für Entrepreneurship und Technologiemanagement, E-Talks, Master/Bachelor thesis, key skills house of competence, teaching targeted to scientists, workshops, boost-camps), **Events** (Innovationstag Neuland, KIT Venture Fest), **networking**	European social funds, Bundesministerium für Wirtschaft und Energie)				up of the month

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		(e.g. StartupsKA connect re-gional startups)					

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HE Institution	Goal	Target Group	Formats	Coopera-tions	Thematic Em-phasis (of the products of the start ups)	Start-ups (some exam-ples)	Website	personal impres-sion
TU Berlin	create a cul-ture of seren-depity and a flourishing Startup Eco-system in the region and beyond, con-nect to prac-tice, connect to the Ger-man Startup-Scene	stu-dents, scien-tists, alumni	Courses and Thesis for Bach-elor and Master students, Con-sulting, Technol-ogy transfer (also patenting & licensing), fi-nancing, events, contests	**student ini-tiatives,** of-fers by the **university** (e.g. Mann-heim Center for Entrepre-neurship and Innovation), **extern sup-port** offers (e.g. Grün-derverbund Rhein Neckar)	Business	Startups founded and listed 1967 up till today, e.g. **Zingoo:** help out small inde-pendend businesses in the age of online shop-ping, order online gift voucher from local stores	https://www.uni-mann-heim.de/star tups/	

HE Institution	Goal	Target Group	Formats	Cooperations	Thematic Emphasis (of the products of the start ups)	Start-ups (some examples)	Website	personal impression
University of Mannheim	building of an Excellence Startup Center in which all the Startup and founding activities of the university are unified and supported by professionals	students, Post-docs and Post-graduates	Minor Entrepreneurship for business Master students, workshop for post-docs and post-graduates, competition Launch Pad (digital idea competition), consulting	FH Münster, Uni Twente, Digital Hub münster-Land, WWU Weiterbildung, ESC Initiative by the state NRW			https://gruenden.uni-muenster.de/	Initiative has just started, website very hidden and not much content yet.

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| University of Münster | the University of Bremen sees the spin offs of companies as an important part of its task as an university to help transfer knowledge and technnology, support startups coming out of the BRIDGE network consisting of mutiple Universities in Bremen | Students, Graduates and scientists | **Seminars and workshops** (e.g. qualification via StartUp-Workout, Startups that started in BRIDGE introduce themselves), **Consulting** (counceling for first steps, financing & finding a work space, promotional programmes by the state and country), **yearly competition "CAMPUSiDEEN"** (competition for business ideas of the HEI in Bremen, long time running and successful, one of | Hochschule Bremen, Hochschule Bremerhaven, Bremer Aufbau-Bank, Bundesministerium für Wirtschaft und Energie, Technologie Allianz e.V. | very varied business ideas, e.g. some technological, some focus on sustainability | **Erntewächter:** a sensor system for agricultural machines to sense hidden objects in fields that could harm the machines. **Farbrecht:** Mulitcolour Extruder, addition to a desktop 3D printer, to be able to print multicolour objects | https://www.uni-bremen.de/kooperationen/uni-wirtschaft/wissens-und-technologietransfer/existenzgründung/ http://www.bridge-online.de/bridge.html | |

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			the sponsors is the EU with their fonds for regional devel-opment)					

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HE Institution	Goal	Target Group	Formats	Coopera-tions	Thematic Emphasis (of the products of the start ups)	Start-ups (some exam-ples)	Website	personal impres-sion

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University of Bremen	create a culture of entrepreneurship at the university (including all faculties), Cologne and Rheinland should become places of innovation and be prepared for a digitalised future	Students, Graduates and wissenschaftliche MitarbeiterInnen (research associates?) of the university of Cologne or other HEI in the hgnc	consulting, financial aid (grants), office accommodations, events, certificate "basics of entrepreneurship" --> courses (lectures, seminars and workshops) at the university as well as organised by hgnc	Exzellenz Startup Center: supported by the state NRW **hgnc:** hochschulgruendernetz cologne e.V. (--> HE entrepreneurship network) includes different HEI in Cologne, the city, banks, the IHK	very varied business ideas, e.g. IT, sports, chemistry, service	**VYTAL:** winner best start-up 2020, packaging-as-as-Service-Modell, reduce waste in food industry by reusable packaging for take-away, eletronic labels and an app make sure it's returned	https://www.gateway.uni-koeln.de/	all "Alumni" Startups introduce themselves, their vision and give some advice and if they're looking for people to work with, lots of offers for interested students (at the university but also through the network via hngc)

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HE Institution	Goal	Target Group	Formats	Coopera-tions	Thematic Emphasis (of the products of the start ups)	Start-ups (some exam-ples)	Website	personal impres-sion

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University of Cologne	transfer of knowledge and technology, foster entrepreneurship amongst students, build up cooperations between science and economy	students, scientists	Team-space and coworking-space, advisory services (startup consulting, patent consulting, funding), knowledge and technology transfer, events, makerforum ("open workshop", practical teaching venues and location for experiments), Lernfabrik (experience the entire production process through theory, simulations and role plays in an industrial production environment)	Exzellenz Startup Center: supported by the state NRW, ruhr HUB, university partners (UA Ruhr, Gesundheitscampus Bochum, Institute for production systems), Technologie Zentrum Ruhr, NRW Bank, Univercity, Bochum Wirschaftsentwicklung, CUBE5, High Tech Gründerfonds, project Elli	production		https://transfer.ruhr-uni-bo-chum.de/de/entrepreneurship, https://www.worldfactory.de/#welcomeSection/	Lernfabrik as an simulator and oppurtunity to start cooperation with businesses

				with RWTH Aachen & TU Dortmund for inge-nieurs				

Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education

HE Institution	Goal	Target Group	Formats	Coopera-tions	Thematic Em-phasis (of the products of the start ups)	Start-ups (some exam-ples)	Website	personal impres-sion
Ruhr Univer-sität Bochum	build the leading inte-grated tech-incbubator in Europe, em-power tal-ented and motived peo-ple, build im-pactful tech-nology com-panies, sup-port and ac-company re-searchers and inventors of RWTH Aa-chen Univer-sity in the en-tire innova-tion process from	scien-tists, stu-dents, inven-tors, found-ers, in-vestors, compa-nies	Inventor Consul-tations, teach/ inform about in-tellectual prop-erty, report and protect inven-tions, trainings, events, awards, job offering/ad-vertise a vancancy, online courses, network, 3-month ideation program (in-cludes i.a. men-toring, co-founder net-work, coaching, foundation trainings, pitch trainings), 6-12	within the **university**: RWTH Uniklinik, In-ternational Academy, Digital Hub, **Institutions:** IHK Aachen, Gründerre-gion Aachen **partners in industry:** e.g. Viessman, Telekom, bain com-pany, WSS Redpoint **strategic partner-ships:** Ford,	Technology, 6 topic specific in-novation ecosys-tems: 1. Future of mobility & ur-ban life, 2. next level life science, health & nutri-tion, 3. IoT, AI, Robotics & Com-munication Tech, 4. 21st Century production, 5. green energy, chemicals and materials, 6. digi-talStartups -pow-ered by digi-talHUB Aachen	**PerAGraft:** medtech that makes individual implantats fitted to the patient, **En-ergyCortex:** energy data base	https://www .rwth-inno-va-tion.de/de/	RWTH In-novation **GmbH!,** category of RWTH technolo-gies (tech-nologies developed at the RWTH)--> focus more on the in-novations and inven-tions ra-ther than the startups/fo unders

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	developing the idea to marketing the technology, provide companies with direct access to the research and innovation landscape of the RWTH		month incubation program (includes i.a. Co working Space, exclusive workshops and trainings, cross university co founder network, mentoring and individual coaching)	BMW, Siemens, Huawei, Total, Aquarius engines, Utimaco, RA Consulting				

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RWTH Aa-chen							

4. Are there any statistics on the number of (doctoral) students that become entrepreneurs during/after their studies? Are there any data about how many of them are successful, failed and about which products or services they offer?

There is no statistic on the number of students that become entrepreneurs. The Startup Monitor questioned 1933 Startups and their results show that amongst founders, the vast majority went to higher education institutions. 81,7 % of founders have a university education. 27,8 % hold a master degree, 20,8 % a bachelor degree, 20,1 % have a diploma and 13 % a doctorate degree (Kollmann/ Hensellek/ Jung/ Kleine-Stegemann: *Deutscher Startup Monitor 2019*, 2019, p. 32).

The Startups in Germany offer very different services and products. The biggest sector is information and communication technology with a market share of 30 %. It is followed by food & nutrition with 10 % and then products and services for the medical & health sector with 8 % (Kollmann u.a. 2019, p. 27).

After 3 years only 70 % of new Startups still exist. The reasons for discontinuing are various but mostly not out of economic necessity. Only in 2 % of the cases they stopped because of insolvency. Some of the personal reasons to discontinue the company are stress, illness, discontent with the income or better job alternatives. Some Startups are set up from the beginning to only last for a certain amount of time. (Metzger: *Kfw Gründungsmonitor 2019*, 2019, p. 9)

5. Do HEI in your country use any recognition/validation systems to assess entrepreneurship, innovation and/or creativity competences?

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There is no validation system for competences that is area wide implemented in HEI. "Validation of non-formal and informal learning is taking place within all education sectors in Germany with all sectors having different approaches in place. Approaches to and understanding of validation differ." […]. Overall, validation in Germany can still be described as a colourful mosaic of local, regional, sectoral and national approaches and initiatives which also reflects the allocation of responsibilities within the complex German educational system." (Ball 2016, p. 1, p. 3)

In general, Germany does not yet have a uniform system for validating non-formally and informally acquired competences. Rather, there are many parallel certificates, competence passes, models and procedures that pursue different objectives and are based on different reference systems.

Some general validation systems and tools are:

"ProfilPass": https://www.profilpass.de/

"Europass": https://europa.eu/europass/en

"Qualipass" – Bildungspass Baden Wuerttemberg": www.qualipass.de/der-qualipassfuer-erwachsene/

"Qualifizierungspass" http://www.qualifikationspass.de/information/index.html

"AiKomPass": https://www.aikompass.de/

Approaches to a uniform validation and recognition of non-formally and informally acquired competences, especially in vocational terms, already exist in Germany:

-These are based on the German Qualifications Framework, which assigns the qualifications of the various fields of education to eight levels described by learning outcomes.

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-The Federal Recognition Act has simplified and standardised the procedures for assessing and recognising foreign professional qualifications. If written proof is missing for the recognition of foreign qualifications, the necessary competences can alternatively be proven by a so-called qualification analysis.

-Since November 2015, the Federal Ministry of Education and Research (BMBF) has been funding the ValiKom development project (ttps://www.valikom.de) in order to make the competences of people without formal vocational qualifications visible. Partners in this project are various chambers of industry and commerce, chambers of crafts and chambers of agriculture from all over Germany (Nationale Bundesagentur beim Bundesinstitut fur Berufsbildung, 2019).

Entrepreneurship, innovation and creativity as competences could be validated through LEVEL 5. This approach promotes the learning and validation of competences in practical and informal learning situations, as well as in innovative competence fields. "LEVEL5 is based on a three-dimensional model which maps the development of: Knowledge (-> cognitions), Skills (-> capabilities) and Attitudes (-> emotions and values) along five quality levels – from beginner to competent expert." (https://reveal-eu.org/level-5/, 12.06.2020)

Entrepreneurship competence is on of the eight key competences for lifelong learning as determined by the EU. The development of the entrepreneurial capacity of European citizens and organisations is one of the key policy objectives for the EU and Member States. The Joint Research Centre has therefore developed EntreComp: The Entrepreneurship Competence Framework. EntreComp describes entrepreneurship as a lifelong competence, identifies what are the elements that make someone entrepreneurial and describes them to establish a common reference for initiatives dealing with entrepreneurial learning. An entrepreneurial person acts upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural, or social (https://ec.europa.eu/jrc/en/entrecomp).

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There is no IT supported validation system for Entrecomp. But LEVEL 5 as a system offers a construct to weave the competences that are operationalised in Entrecomp into a validation system.

2.3.2. Greece

1. **Which (study) programs related to entrepreneurship, innovation and creativity education exist within higher education institutions (HEI) of your country?**

1. Joint MSc in Digital Innovation and Startup Entrepreneurship: University of the Aegean and the National Technical University of Athens (http://msc.icsd.aegean.gr/innovation/?lang=en)

2. Interdepartmental Program of Postgraduate Studies (DPSM) "Entrepreneurship and Counseling in Rural Development", operates in the Department of Agricultural Economics and Development of the School of Food, Biotechnology and Development of Agriculture, University of Athens in collaboration with the Department of Animal Production Science of the School of Agricultural Production, Infrastructure and Environment of the Agricultural University of Athens (http://www.farmbm.aua.gr/)

3. The Departments of Economics of the University of Peloponnese and Business Administration and Organizations of the Technological Educational Foundation of the Peloponnese organize and operate from the winter semester of the academic year 2015-2016 joint Postgraduate Program "Entrepreneurship and Governance" (http://es.uop.gr/esmet/)

4. MSc in "Entrepreneurship" is the evolution of the postgraduate programme in "New Entrepreneurship Innovation and Development", which lasted from the academic year 2014-2015 to 2018-2019. Under the view of the most effective targeting of the subject of Entrepreneurship, the Department of Economics collaborates with the new Department of Business Administration of the University of Thessaly (https://msc-entrepreneurship.uth.gr/en/)

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5. In the last three years, the Postgraduate Program of Studies "Innovation in Technology and Entrepreneurship" has been operating at the TEI of AMTH in Kavala and specifically in the Department of Electrical Engineering (http://msc.tie.teikav.edu.gr/index.php/el/)

6. The Department of Tourism Management of the University of West Attica and the Department of Business Administration of the University of the Aegean, organize and operate from the academic year 2015 - 2016 common Postgraduate Program (P.M.S.), entitled: "Innovation and Entrepreneurship in Tourism" (http://tourpost.teiath.gr/)

7. The TIME (Technology Innovation Management and Entrepreneurship) MBE program offers a novel inter-university Masters of Business Economics curriculum that combines targeted classroom and practical training to offer to young entrepreneurs, small firms, and startups the needed skills in managing and developing new technology intensive products (http://timembe.eu/about/accelerate)

2. **Are there any specific Start-up centers within HEI of your country? If they appear in a ranking list, please indicate the 10 higher education institutions that perform best in promoting entrepreneurship, innovation and creativity. If there are less, please indicate as many as existing institutions.**

The majority of Greek HEIs do not have start-up centers as such, but they do have their own units (or in some cases committees) for innovation and entrepreneurship. These units are called MoKE and operate independently within the insitutions. MoKE has set the following goals:

• Help stakeholders develop innovative ideas and take advantage of business opportunities.

• Encourage and support business initiatives.

• Provide advice on entrepreneurship.

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• To develop the skills of students and graduates regarding the establishment and management of a business.

• To provide a comprehensive educational and informative material on entrepreneurship and innovation.

• To contribute to the development of a more friendly attitude towards entrepreneurship and innovation.

• To strengthen the cooperation between the educational community of the Foundation and the business world.

To achieve the above goals, MoKE focus its work on providing a framework of activities and services for education and information on entrepreneurship and innovation, which includes: information activities and training activities for those interested, familiarization activities of students and graduates with the entrepreneur world, as well as activities to encourage and activate students and graduates.

3. **Which concepts and (learning) formats do these programmes or Start-up Centers apply in order to foster entrepreneurship, innovation and creativity competences out of HE? List them and bring them into an overview within the attached excel-template.**

Pedagogical tools employed in entrepreneurship education largely focus on role modelling, hands-on experience, ideation, incubation and mentoring support. Besides these, there is a large number of supportive actions that include the following:

• Development of educational and informative material (guides, leaflets, publications) on issues of entrepreneurship and innovation at the institutional level.

• Introduction of optional Entrepreneurship and Innovation courses in the study programmes.

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• Creating a digital repository of educational and informative content, which will continuously organize and have a wide range of topics of entrepreneurship and innovation issues from internal and external sources via the Internet.

• Conducting awareness and training seminars on current issues of entrepreneurship and innovation with the aim of raising awareness and motivating students and graduates to start their own business activities.

• Organizing educational visits to businesses, incubators, technological parks and research centers with the aim of supporting students and graduates in the design and implementation of business ideas.

• Continuous monitoring and evaluation of the effectiveness of the above actions through a system of recording beneficiaries (students, graduates, members of the OP) and agencies (companies, organizations), in order to achieve the best possible use of the results and early diagnosis and tackling any problems.

• Promoting entrepreneurship as a potential career choice either through the establishment of start-ups or through business development within existing businesses (business development-corporate development).

• The practical support of individuals and groups who want to explore the possibility of starting their own business, from the stage of the original idea, its formatting to a business plan, searching / finding the first customers, raising funding to starting the business.

• Involving rural enterprises for action learning as a professional and pedagogical tool.

• Conducting research and studies of entrepreneurship and innovative initiatives and actions of young graduates.

• Utilization of findings of relevant research on innovation and entrepreneurship (GEM, AGER, EVEO, IOBE, Home of the Greek Industry).

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• Participation in international and national research networks and programs dealing with entrepreneurship issues (AEGIS, Cre8tv.eu)

• Participation in international conferences on innovation and entrepreneurship (DRUID, ZEW, T2S, ISS, EAPE) with specific announcements on the scientific investigation of innovation and entrepreneurship.

• Promotion of experiential education by organizing specialized business game workshops, business plan development, specialized seminars, networking and connection with practice.

• Provision of up-to-date educational material, invitation of speakers to courses, systematic information of teachers and framing of entrepreneurship and innovation courses in all departments.

• Organizing various training programs on business development of start-ups.

• Access to the MoKE Knowledge Centers with Business Plan Development Guides, Financial Planning Software Development for Business Plans, Topical Teaching Chapters and Entrepreneurship and Innovation Case Studies.

• Organizing an Annual Competitive Idea Competition, where the participating students or graduates develop their business plans through a systematic process of acceleration with training and mentoring guidance actions.

• Systematic development of partnerships and connection to the Mentor Network.

• Organizing an annual event "Start-Up Career Days".

• Organizing regular networking events for business groups looking for partners / co-founders (Meet-Team-Go, Prototype Party).

• Invitation of distinguished entrepreneurs and executives of new developing companies for presentations in courses, events and business competitions.

A number of startups have been capitalising on Greece's touristic fame, creating business around the tourism industry, including yachting, hotel booking and cultural activities, and quite rightly so. However, there are also a number of fintech, deeptech, agritech, and biotech startups out there, resolving financial management issues, proposing new ways for

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medical students to learn and helping farmers to increase crop yields. Since the financial crisis, Greek entrepreneurs have been taking issues into their own hands and growing an inspirational and buzzing startup scene. Today the startup ecosystem is attractive to entrepreneurs from all over Europe, with a low cost of living, low crime rate, a host of success stories, prime location in the cross-roads of Europe and previous investments from major companies like Tesla. Plus, Greece was named the 2018 European Capital of Innovation by the EU, and ranked 11th in the world for Science and Engineering graduates by the Global Innovation Index 2018. Most of the Greek startups operate on the Industrial Technology / Production Hardware category (17.1%). Out of the startups that are already having some revenue, the majority (71.5%) are earning up to €50,000, holding the lowest position among European countries overall. Another 14.3% earned €50,000-€150,000 and 14.3% had an annual revenue of €150,000-€500,000 in the past year.

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Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education

HE Institution	Goal	Target Group	Formats (How to achieve the goal?)	Cooperations	Thematic Emphasis (of the products of the start ups)	Start-ups (some examples)	Website
Aristotle University of Thessaloniki (Innovation and Entrepreneurship Unit)	1. Assessing commercial interest in technological innovations; 2. Financing the pre-commercial development of new technologies/products with commercial interest; 3. Identifying potential partnerships; 4. Protecting and managing Intellectual Property rights; 5. Supporting the establishment of Spin-offs and Startups.	Students of all levels, existing active entrepreneurs, SMEs, industry (ICT, tourism, agruculture)	• Action: "Development and Management of Educational Material" Development of Theoretical educational material Development and management of virtual platforms • Action: "Implementation of Entrepreneurship and Seminars Course" Implementation of the 1st cycle of the entrepreneurship course (includes activities such as conducting lectures, conducting laboratory courses, case studies, business visits, Research Institutes and Technology Parks, etc.) Implementation of the 2nd cycle of the entrepreneurship course Implementation of the 3rd cycle of the entrepreneurship course 1st Circuit Open Seminars entitled "New Business Startup Seminars" 2nd Circuit Open Seminars entitled "New Business Startup Seminars" Implementation of the 4th cycle of the entrepreneurship course (added after the extension of the Action) • Action: Implementation of "Idea Nursery" Preparation of the two cycles of the Nursery ideas Implementation of the 1st cycle of the Nursery of Ideas Implementation of the 2nd cycle of the Nursery of Ideas Implementation Assessment and Book Edition	Local and regional SMEs, foreign, businesses (mostly from southern Europe and the Balkans), the majority of Greek Universities, foreign Universities (mostly European). Strategic partnerships include the following: • European-Japan Cluster Collaboration • European Strategic Cluster Partnership – ESCP • InVio - InnovatIon network for Knowledge-based ExperIence economy • Sophia-Antipolis Foundation • Hungarian Pole Programme Office • Cosmote Other sustainable partnerships include: • Society for Macedonian Studies • Foundation of the Museum for the Macedonian Struggle • Australian Institute of Macedonian Studies • Hellenic Agency for Local Development and Local Government • 'OK!THESS' • Panhellenic Federation of Macedonian Cultural Associations • Panhellenic Association of Educators of Pontian Descent	Telecommunications, ICT, tourism, environment, medical care, education & training	• Alexander Innovation Zone S.A. (A.I.Z. S.A.): The managing body that has undertaken to organise and promote the Thessaloniki Innovation Zone. https://www.thessinnozone.gr/en/alexander-innovation-zone-s-a/ • OK!Thess: Thessaloniki's leading startup hub and a catalyst for the growth of the local innovation ecosystem. https://okthess.gr/en/ • DoctorFish: The heart of the fish therapy method is the fish with the name Garra Rufa. They are also found with the names doctor fish, kangal fish and nibble fish. • ShitHappens: Production of biological fertilisers. • Άστε-Γη: Social Cooperative Enterprise founded by three of its students Department of Agriculture. It aims at the social rehabilitation of its individuals sensitive social group of the homeless, overturning the data so far in Greek reality. But at the same time, it encourages the residents of Thessaloniki to help indirectly the vulnerable social group of the homeless showing their preference in our company. • MDCare: Community Cooperative that provides social and medical care services.	https://dasta.auth.gr/cmsitem.aspx?sid=4&id=165
Technical University of Crete (Entrepreneurship Unit)	Through specialized courses, mentoring, research, and social networking with market players, provides students with modern tools with "modern" concepts, "good practices" and "good practices". in the field of innovation and entrepreneurship.	Students of all levels, existing active entrepreneurs, SMEs, industry (ICT, tourism, agruculture)	The Unit supports the training program of sections of TUC through entrepreneurship courses and individual actions such as seminar and laboratory courses, the preparation of business plans, and the development of teaching materials. At the same time, it implements open actions related to synergies with groups of students, strengthening of social entrepreneurship, organization of competitions and business proposals and projects.	• Businesses • Companies • Architectural offices • Research centers • Organizations • Institutions • NGOs • National diplomatic missions (embassies / consulates)	Telecommunications, ICT, tourism, environment, agriculture	CityCrop: A connected indoor garden that lets you grow pesticide-free vegetables, herbs and fruits in your own home. Through their mobile app you can decide what to grow and monitor your produce throughout, with their hydroponics method and microclimate allowing you to grow all year round.	https://www.tuc.gr/index.php?id=1854

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Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education

HE Institution	Goal	Target Group	Formats (How to achieve the goal?)	Cooperations	Thematic Emphasis (of the products of the start ups)	Start-ups (some examples)	Website
Athens University of Economics and Business (Innovation and Entrepreneurship Unit)	Promoting youth entrepreneurship in the development of entrepreneurial spirit, management skills management processes and unit management, and familiarizing young people with business development issues, promoting innovation and research and technology.	Students of all levels, existing active entrepreneurs, industry	• Promotion of experiential education by organizing specialized business game workshops, business plan development, specialized seminars, networking and connection with practice. • Provision of up-to-date educational material, invitation of speakers to courses, systematic information of teachers and framing of entrepreneurship and innovation courses in all departments of OPA. • Organizing various training programs on business development of start-ups. • Access to the MoKE Knowledge Center with Business Plan Development Guides, Business Planning Software Development Software for Business Plans, Topical Teaching Chapters and Entrepreneurship and Innovation Case Studies.	Cooperates systematically with selected partners and initiatives such as the Orange Grove of the Dutch Embassy in Athens, the Center for Volunteer Managers of Greece (K.E.M.E.L.), MoKE Hellenic Universities, incubators (such as INNOVATHENS of the Municipality of Athens) and others notable bodies and organizations, multiplying the development opportunities of its beneficiaries.	Telecommunications, ICT, tourism, finance, business management	• Athens Business Incubator: The New Business Incubation Thermal Cell (THEA) focuses on supporting new innovative business ideas with strong extroversion. • THERMI A.E .: Thermocouple THERMI A.E. hosts newly established innovative businesses, which have the opportunity to be supported in terms of innovation and more generally in their business development. • IQability Thermococcus: The IQability Thermocoat aims to bridge the talent of young entrepreneurs in the field of innovation with resources available to the incubator, in order to achieve significant business results. • Cosmote startup !: The Cosmote Startup! operates in collaboration with EEDE, the Foundation and OTEAcademy, and aims to support youth entrepreneurship	https://www.aueb.gr/en/dasta/content/innovation-entrepreneurship-unit
University of Makedonia	• Individual counseling support in matters of study and career. • The organization of information and networking events with the labor market. • The implementation of group counseling meetings and workshops for the development of social skills and the strengthening of the professional readiness of the students and graduates of the institution. • The announcement of announcements related to the academic and professional choices of our beneficiaries (postgraduate programs, scholarships, competitions, jobs, opportunities to gain work experience, etc.) • The continuous communication and investigation of perspectives of cooperation with the graduates of the University of Macedonia, with scientific, academic and professional bodies and with Greek and foreign companies.	Students of all levels, existing active entrepreneurs, SMEs	• The contribution to the connection of theoretical and laboratory studies with the practical application in the workplace. • Informing students about the new trends and needs of the labor market and the demand for specific specialties and skills required. • The creation of a stable channel of communication between the Foundation and the productive bodies, in order to facilitate their cooperation and thus strengthen the effort for the absorption and professional rehabilitation of its graduates.	• Association of Information Technology Companies of Northern Greece • Integrity Pact- Hellas • National Theatre of Northern Greece • Greek People Management Association (GPMA)-branch of N. Greece • Municipality of Thessaloniki and Praxsis NGO • Thessaloniki International Fair- HELEXPO S.A • Society for Macedonian Studies • Foundation of the Museum for the Macedonian Struggle • Australian Institute of Macedonian Studies • Hellenic Agency for Local Development and Local Government • 'OK!THESS' • Panhellenic Federation of Macedonian Cultural Associations • Panhellenic Association of Educators of Pontiac Descent • French Institute of Thessaloniki • Larissa Chamber of Commerce and Industry	Telecommunications, ICT, tourism, education & training	ISTMOS: A monitoring and alerting system that ensures the quality of bottled wine in the whole supply chain until it reaches the end consumer. The rules, mainly for environmental parameters, are being provided by domain experts and are continuously refined by making use of big data analytics, sample checks and consumer feedback. ISTMOS protects brand reputation, provides reliable traceability and creates marketing advantage to its users.	https://dasta.uom.gr/Moke/default.aspx

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Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education

HE Institution	Goal	Target Group	Formats (How to achieve the goal?)	Cooperations	Thematic Emphasis (of the products of the start ups)	Start-ups (some examples)	Website
University of Peloponnese (Entrepreneurship and Innovation Committee)	1. Organization of Seminars, Scientific Meetings, Symposiums, summer schools and Conferences related to Entrepreneurship and Innovation, by business executives, successful entrepreneurs and specialized Professors of Greek and foreign Universities. 2. Providing Knowledge-how, transferring best practices and organizing mentoring in business plan creation, finding innovative ideas and developing creativity, with students from the University. 3. Cooperation with domestic and foreign organizations and companies that cultivate Innovation and Entrepreneurship. 4. Finding innovative proposals and initiatives from the members of the academic community and supporting their implementation.	Students of all levels, existing active entrepreneurs, SMEs, insdustrialists, businesses	The creation of a Business Incubator (and in the long run Scientific-Technological Park in the Peloponnese Region and the connection of the research activity of the University of the Peloponnese with the production base and entrepreneurs in Greece and abroad.	Cooperation with domestic and foreign organizations and companies that cultivate Innovation and Entrepreneurship, such as other universities, International financial organizations, Economic and Commercial Chambers, Municipalities, Regions, Non-Governmental Organizations, SMEs, large enterprises and multinationals. The aim is to seek joint action to generate revenue for the University of the Peloponnese.	ICT, tourism, education & training, agriculture	• Corallia: Corallia aims to provide support and function as a catalyst for the development of coherent, productive and innovative ecosystems in which coordinated actors operate in specific sectors and regions of the country, where there is a pre-existing competitive advantage and export orientation.	http://iec.uop.gr/

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4. **Are there any statistics on the number of (doctoral) students that become entrepreneurs during/after their studies? Are there any data about how many of them are successful, failed and about which products or services they offer?**

No. There is not such data. However, there is relevant data on the most frequent type of collaboration is between firms and Universities (24%). 75.9% of the projects include at least one University and/or Research Center. Taking into consideration that expenditure on R&D is low in comparison with other countries and that the most active entities in National Programmes were Universities and Research Centers5, it is correct to consider that national subsidies for cooperative R&D supported basic research in those cases where lack of financial resources is observed. The National Programmes (especially PAVE, SYN, EPET, EKBAN) in addition to the European Framework Programmes, constituted for Public Institutions an important source of funding R&D activity. There are 210 Greek firms that have at least once participated in a collaboration funded by a National Programme. However when we examine their activeness, we find out that the vast majority of them (73%) has participated only once. The most active organization in terms of memberships is a University: Aristotle University of Thessaloniki is the top position with 56 participations (more than 1/3 of the projects). In fact a total 11 Universities or Research Centers follow next before the first firm appears on the relevant list. It is Knowledge S.A, which is located in Patras, and its primary activity is Computer Services, that has participated in 9 projects. Only 16 firms have had more than 3 participations. A regional characteristic seems also to hold true. Firms located near the region of Thessalonica collaborate with each other and especially with the Aristotle University of Thessaloniki.

The same goes for the region of Patras, where the most active firm in our database, Knowledge SA, collaborates with the local University and the local Technological Park. Their links with other agents from Athens and especially the National Technical University –the leading and most famous university of Greece- are much looser than those established in their area. A strong linkage exists also between the Foundation for Research and Technology (FORTH) in Crete, and almost all firms in the sector of Computer services and Electronics. FORTH is one of the two main national research centres in Greece and the only one located

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in the periphery. It consists of seven Institutes (one of them being the Institute of Computer Science) located in the cities of Heraklion, Rethymno, and Patras.

5. **Do HEI in your country use any recognition/validation systems to assess entrepreneurship, innovation and/or creativity competences?**

With the exception of AUTH that has piloted LEVEL5 as part of its partnership in a number of EU funded projects, no other university has ever used a recognition or validation system to this end.

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2.3.3. Italy

1. **Which (study) programs related to entrepreneurship, innovation and creativity education exist within higher education institutions (HEI) of your country?**

University	Name	International	Time frame	Blurb
Politecnico Di Milano	International Masters in Innovation and Entrepreneurship (Masters)	International (English)	12 month	Challenges those who think and act as Entrepreneurship. Create innovative leaders for global markets to create continuous opportunities for new business development
Ca' Foscari University of Venice	Global Development and Entrepreneurship – Curriculum in Global Markets	English	24 month	offers you the tools you need to engage with international markets, especially emerging ones, and to understand business growth processes in an international context.
UNIVERSITY OF BOZEN-BOLZANO	Entrepreneurship and Innovation (Masters)	Partially taught in English, Partially taught in German,	24 month	Do you want to learn how you can develop new products and manage innovation in a business? Then this Master in Entrepreneurship and Innovation at the Free University of Bozen-Bolzano is exactly what you need!

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		Partially taught in Italian		
<u>University of Bergamo</u>	The Master of Science in International Management, Entrepreneurship and Finance (Masters)	English	24 month	The Master of Science in International Management, Entrepreneurship and Finance from the University of Bergamo

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Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education

University	Name	International	Time frame	Blurb
UNIVERSITY OF PADUA	Entrepreneurship and Innovation Masters	English	24 Month	Entrepreneurship and Innovation programme at the University of Padova aims at training business developers and new entrepreneurs able to define and apply sustainable business models, master multi-dimensional forms of innovation (technological, marketing, organisational, social innovation), create and grow companies in the current digital scenario, within a global environment.
H-Farm	Master of Science in Entrepreneurship and Applied Technologies	English	12-24 month	H-FARM educational project is characterized by an innovative approach that revolutionizes teaching and learning, **helping students develop their potential through dynamic programs**, the development of multidisciplinary skills and the use of new educational tools.
University of Pavia	Master degree in International Business and Entrepreneurship	English	24 month	International environment, showing faculty and students from all over the world - between in-depth theory and practical experience, including innovative learning methods - Strong Community – 'Members' - coupled with the unique atmosphere and background given by one of the oldest universities in Europe

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2. Are there any specific Start-up centres within HEI of your country? If they appear in a ranking list, please indicate the 10 higher education institutions that perform best in promoting entrepreneurship, innovation and creativity. If there are less, please indicate as many as existing institutions.

Since the Italian start-up law in 2012, Italy has encouraged the ideas of creation and development of innovative startups and further wishes to retain its talent. In this way, Italy chooses to foster sustainable growth. Since then, universities and business have seized this opportunity and implemented hubs to foster and nurture creative initiatives. The main sectors of innovative startups in Italy are **services to enterprises** (software and IT consulting, R&D services, information services); **industrial manufacture** (computers, electronics and optical, machinery, electric equipment); **commerce**. Lombardy is the region with the highest number of innovative startups, followed by Emilia-Romagna, Lazio, Veneto and Campania. The major concentration of start-ups is in the provinces of Milan, Rome, Turin, Naples and Bologna. (Abirascid, 2018)

Universities that assist in Startups

- 1. **PolyHub Milan collaborative Polytechnica Academy, Milan**. Polihub Milan was founded by the city of Milan specifically for the mission of social innovation and supports startups and is a collaboration with Polytechnica Academy. It was originally started as an accelerator and in 2000. It prides itself on technology and innovation and connects to large enterprise. It is considered one of the world leaders in innovation and setups (Politecnico, 2019) and ranked number 3 in 2018 for the world top business incubators -Managed by universities (UBI, 2018).

2. Bocconi University has a "Speed mi up" Milan.

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Speed Mi Up is an initiative to support Employment and Entrepreneurship agreed on and sponsored by the **Milan Chamber of Commerce** and the City of Milan. The Speed Mi Up consortium, established by the Milan Chamber of Commerce and **Bocconi University** is in charge of its implementation (Speedmiup, 2020). It helps new entrepreneurs deal with the future's enormous challenges by supporting them from the start in developing their business ideas. (Speedmiup, 2020)

3. H-Farm Treviso. University Ca' Foscari of Venice

Specialising in the digital platform and its focus is on accelerating new digital companies and helping to upgrade technologies and innovations with existing ones. Founded in 2005 it has grown in size and influence. It is a digital innovation factory, hosting Italian and international companies that focus on digital technologies. (Angela, 2017)

4. Luiss Enlabs, Rome

Connected to Luiss university. This government-certified accelerator provides business coaching and once accepted into the program, the setups have access to funding. There is a strict selection process due to its high demand and selection is held twice a year. It provides tutorage and coaching.

5.Palermo ARCA

ARCA is a consortium for research, creation and innovation which was founded in 2003. It is an incubator located within the University of Palermo. The program is heavily on the promotion of innovative idea initiatives.

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6. Almacube

Almacube is an incubator for the University of Bologna. They aim to foster economic development in the areas of economic growth and to generate education towards a more entrepreneurial approach. The university aspires to become the main university for the development of startups.

7. I3P Turin

I3P is an Incubator at the Politechnica of Turin. It prides itself on being a business incubator and excels in technical and scientific expertise. It has attracted and created technology sensitive business projects to the ecosystem of Turin. It aims to generate economic development and employment throughout innovative industrial chains.

8. Sapenzia Innovisione

Sapenzia Innovisione represents the sector for high technical and scientific business development and supports the interactions between universities, European institutions and research bodies. As well as support funding opportunities, Sapenzia also initiates seminars and conferences on funding opportunities and shares knowledge and skills.

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Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education

3. Which concepts and (learning) formats do these programmes or Start-up Centers apply in order to foster entrepreneurship, innovation and creativity competences out of HE? List them and bring them into an overview within the attached excel-template.

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HE Institution	**Target Group**	**Formats (How to achieve the goal?)**	**Co-operations**	**Thematic Emphasis (of the products of the startups)**	**Start-ups (some examples)**	**Website**
Politecnica	Young entrepreneurs	Identification, Educate, Validate, Launch, Mentoring/coaching	Wind, Tim Enel	Technological Fashion Engineering	18 years SRL Find my Lost Inosail	https://www.poli-hub.it/en/ https://www.po-limi.it/en/scientific-research/research-at-the-politecnico/polihub-business-incubator/
Bocconi University	Basic business	Face to face lectures		Online logistics	StashAway	http://www.speed-miup.it/eng/about-

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	management is required	Guest speakers Groups assignments Interactive learning External competitions		Savings platforms Digital Marketing economics; Technology innovation	MotorK Easy Ship	us/bocconi-university-website/
H-Farm	Technological innovation	Identify candidates and mentor/coach and assist to incubation period	Adidas Braun Carlsberg	Technological Agricultural Digital	Agroop Biofarm AKQA	h-farm.com/en/innovation/our-customers
Palermo University ARCA	Technology Business creation, renewable energy, sustainable living	**address action to students, researchers, innovators, to develop their entrepreneurial potential, foster innovation,** promote the Sicilian entrepreneurial ecosystem	EEN Enterprise, European Network. Living Labs,	Biotech, medical,	Abiel, medical research, AP Wonders Intellectual property	http://www.consorzio-arca.it/index.php/en/

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Sapienza innovazione		Operating through inter-disciplinary platforms, a link between research and production context, it contributes to the transfer of technical-sci-entific knowledge	UniCredit Lifeseeder	Technical-scien-tific		http://www.sapienzainno-vazione.it/
Almacube	Young entrepreneurs	Facilitate the contact be-tween projects and mar-ket and we foster their collaboration with estab-lished enterprises		Sustainable energies Technologies Digital techs	**AffittoGiardino** **Almaplasma** **Greenarco**	http://www.consorzio-arca.it/in-dex.php/en/aboutus
I3P Turin	Anyone will-ing to cre-ate an inno-vative start-up with	We create value for incu-bated startups by con-necting entrepreneurs with a rich network of mentors including	Torino wireless Links Torino Metropoli	Sustainable – Green Medical Industrial	**Aeres Srl** **Aiko** **Altaii**	https://www.i3p.it/en/po rtfolio-startup

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	significant technologi-cal basis	professors, researchers, managers with many years of experience in leading large corpora-tions, successful start-uppers, and serial entre-preneurs.			**blueSpace AI** **Evo**	

4. Are there any statistics on the number of (doctoral) students that become entrepreneurs during/after their studies? Are there any data about how many of them are successful, failed and about which products or services they offer?

The statistic presents the year-on-year survival rate of innovative startups founded in 2014 in Italy between 2014 and 2017. According to the data, 93.6 per cent of innovative startups founded in 2014 were still operating in 2017. The graph shows that less than one in ten of the innovative startups founded in 2014 in Italy ceased activity.
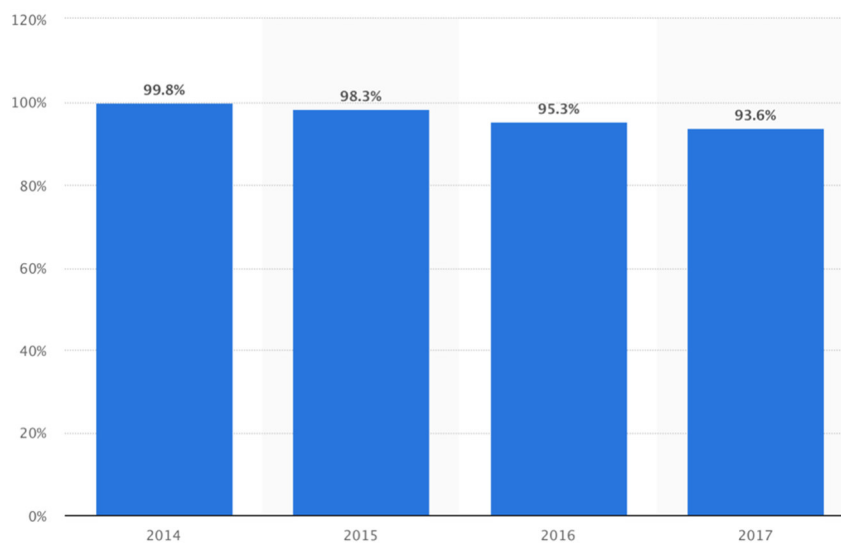
Source: Statistica Aug 8 (Statistica, 2018)

5. Does HEI in your country use any recognition/validation systems to assess entrepreneurship, innovation and/or creativity competences?

Although there is no structured validation approach, we found an interesting assessment that is coherent to the model used by Politecnico in which Professors and researches in a dedicated office called the (TTO) research the innovations potential customer use. The evaluation whilst dealing with a potential start-up should meet these criteria:

- Meet a market need

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- - o Is it a big market? (usually in Billion)
    - o Is this market growing? (CAGR)
- Level of Innovation
    - o Compared to competitors what is new / what is your competitive advantage?
- Technical feasibility
    - o Which is the stage of the project? The Technology Readiness Level form 1-9 (e.g.: Idea, Low/high fidelity prototype, Market validation, Generating Revenues, etc). You can find online many explanations about the TRL.
- Economic sustainability
    - o What is your Revenue Model?
    - o Is it sustainable?
- Scalability
    - o Have you developed a plug&play service/product or does it need consulting or customization
    - o Is it replicable in other industries
    - o Is it transferable to other regions
- Team composition
    - o Does your team cover the main areas to develop the project? (e.g.: Product Dev, R&D, Sales, Marketing, Finance, etc.)
- Team skills
    - o Does your team have the right skills to develop the project?

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2.3.4. Lithuania

1. Which (study) programs related to <u>entrepreneurship, innovation and creativity</u> education exist within higher education institutions (HEI) of your country?

[Kaunas University of Medicine](#) **,**

- o BA Programs: Animal - human interaction

- [Kaunas Technologcal university](#)**,**
  - o BA Programs: Business and entrepreneurship, Marketing, Robotics, Artificial intelligence, Fashion Engineering, Industrial design engineering, Management, The language of new media, Music technology.
  - o MA Programs: **Innovation management and entrepreneurship**, Marketing management, International Business, Business economics, Management Electronic music composition and performance, Digital culture.

- [Klaipėda Universitety](#)**,**
  - o BA Programs: Leisure sports, Management
  - o MA Programs: Innovation management and technology, Business Management, Marketing

- **Lithuanian Sports University (LSU)**
  - o BA Programs: 0
  - o MA Programs: 0

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- [Lithuanian Academy of Music and Theatre/ http://lmta.lt/](http://lmta.lt/)
    - o BA Programs: Cinema art, Music performance ,Music studios ,Theater art
    - o MA Programs: Composition, Cinema art, Theater art

- [Lithuanian Veterinary Academy](#)**,**
    - o BA Programs:0
    - o MA Programs:0

- [Mykolas Romeris University](#)**,**
    - o BA Programs: Informatics and digital content, International business and customs logistics, Financial industry, Active leisure management, Communication and digital marketing, Multicultural communication and new media ;
    - o MA Programs: Communication and creative technologies, Business Psychology, Business Administration, E-business management, Public Relations Management (CI), Leadership and change management

- [Šiauliai University](#) **,**
    - o BA Programs: Business Administration
    - o MA Programs: Intelligent Manufacturing Engineering, Fine art, Management

-
- [Vilnius Art Academy](#) **–all study programs are related to creativity education**
    - o BA Programs:
    - o MA Programs:

- [Vilniaus Gedimino technikos universitetas](#)**,**

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- o BA Programs: Architecture, Landscape architecture, Industrial product design, Multimedia and computer design, Media production, Creative industries, Entertainment industry, Event Engineering, Business Management, Marketing technologies,

- [Vilnius University](#),
  - o BA Programs: Global Marketing, Management, Business information systems, Business and law, Computer physics and modeling, Nano technology, Applied physics, Financial and accounting applications, Creative Communication, Journalism, Information Systems Engineering, Mathematics and Mathematical Applications, International Business, Business finance.
  - o MA Programs: Global business and economics, Quality Management, Marketing and Integrated Communication, Business development, Electronics and Telecommunication Technologies, Laser Physics and Optical Technologies, Laser Technology, Photonics and nanotechnology, Marketing and sales management, Art management, International Business Management, Economics of sustainable finance, Media and digital publishing, Public relations, International communication, Knowledge management and leadership, Computer modeling, Modeling and data analysis, Software systems, Art therapy, Digital Marketing, MBA in Entrepreneurship, International Project Management, International Business Finance;
  - o All master programs in Life Sciences Center are related with creativity competence and innovation education;

- **Vytautas Magnus University,**
  - o BA Programs: Multimedia and Internet technologies, Economics (Specializations in Business Economics), Creative industries, Marketing, Tourism industry, Business Administration, Business finance, all subject in Art department are related to development of creativity competence

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- o MA Programs: Creative industries, Marketing and sales, Marketing and international commerce, Advertising management, Business and entrepreneurship, Business logistics, Agri-food business management (Joint study program), Agricultural business management

- Lithuanian Academy of Agriculture, VMU
  - o BA Programs: Horticulture and landscape design, Tourism industry
  - o MA Programs: , Agricultural business management, Agri-food business management

- Vytautas Magnus University (VMU) Academy of Education
  - o BA Programs: Subject pedagogy (Art education): music, art, dance, theater and cinema

- [ISM University of Management and Economics](#)
  - o BA Programs: Business management and marketing, International business and communication, Industrial technology management
  - o MA Programs: International marketing and management, Innovation and technology management, Financial economics.

- [Kazimieras Simonavičius University](#)
  - o BA Programs: Political communication and journalism, Fashion industry, Entertainment and tourism industries, Creative and cultural industries, Entrepreneurship and management
  - o MA Programs: Integrated creative communication

Summary:

- **almost all business management programs are** related with **entrepreneurship** education**,**

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- **almost all engineering programs are** related with **innovation** education, some include also development of **creativity competence.**

- In Lithuanian Academy of Music and Theatre and Vilnius Art Academy –all study programs are related with **creativity** education

- **Entrepreneurship, innovation** and **creativity** education is more stressed in master programs in comparison with bachelors ones.

2. Are there any specific Start-up centers within HEI of your country? If they appear in a ranking list, please indicate the 10 higher education institutions that perform best in promoting entrepreneurship, innovation and creativity. If there are less, please indicate as many as existing institutions.

Answer**:**

Yes, there are a few, but they do not appear in a ranking list. List:

1. Vilnius University Tech Hub
2. Kaunas University of Technology Startup Space
3. Vilnius University Biotechnology Business Incubator
4. Vytautas Magnus University Center of Business Practitioners
5. Kaunas University of Technology National Center of Innovation and Business
6. Šiauliai University Teaching and Learning Innovation Center
7. Klaipėda University Business Incubator

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6. Which concepts and (learning) formats are applied in order to foster entrepreneurship, innovation and creativity competences out of HE?

HE Institution	Goal	Target Group	Formats (How to achieve the goal?)	Cooperations	Thematic Emphasis (of the products of the start ups)	Start-ups (some examples)	Website
Vilnius University	To promote an increased entrepreneurship and innovation in academia and support the creation of cutting edge technology.	Students, scientists and business	Conferences and discussions, consultations, incubation program for startups, practical workshops, startup masterclasses, startup accelerators, hackatons	Individual consultations for companies that seek to include more innovations and technology	N/A	N/A	https://www.vu.lt/studijos/studentams/vu-tech-hub
Kaunas University of Technology	To work with innovative start-ups, trying to discover a potential of young entrepreneurs and encourage them to make their dreams come true.	Students	Team coordination, consultations, mentorship Office Training, events Assistance in search of partners	Business incubation program	Business innovation	Colourist Guide, virtualracing.lt, Aurora Vitae, Icybit, Ameralabs, Setbitera	https://startupspace.ktu.edu/
Vilnius University	To offer Incubator residents possibilities to select services that are necessary for successful business development	Innovative start-ups that focus on life sciences and related fields	Access to laboratories and technical rooms, office space as well as a selection of services provided by Sunrise Valley Science and Technology Park: consultation on legal, intellectual property management, business development issues, raising of investment and/or funding, accountancy, marketing, validation/testing of products and services as well as consultations on commercialization	Individual business support based on the business needs	Biotechnology	UAB „Satimed", UAB „Thermopharma Baltic", UAB „Diagnolita", UAB „Spila", UAB „Droplet Genomics", MB „Sekos", UAB „Baltymas", UAB „CasZyme", UAB „Experimentica".	https://www.vu.lt/verslui/inovacijos-ir-moksliniai-tyrimai/verslumas-universitete/biotechnologiju-verslo-inkubatorius
Vytautas Magnus University	To help develop new companies and to increase business performance	Students and businesses	Methodology training, case studies, team building, enterpreneurship academy, summer internship programme. Main tools: Design Thinking sessions, Strategyzer, Method Kit, Lego Serious Play, Points of You, Business Model You, narrative Therapy Approach	Smart practice - four-week internship programme, which offers students the possibility to explore the world of ideas, using interactive and creativity techniques by solving the real challenges of organizations.	N/A		https://www.vdu.lt/lt/inovaciju-savaiteje-kurybiskumo-mokino-verslo-praktiku-centras/
Kaunas University of Technology	Department for facilitation of science-business relationship	Scientists, researchers, students and entrepreneurs	Research, consultations, development of new products, partnership in the international projects, hackatons organization, patent analysis	Business mentorship, businesses can use the research services provided by the centre, participation in joint activities of the development of new products with the European Institute of Innovation and Technology	Industrial innovations	N/A	https://nivc.ktu.edu/
Siauliai University	Create innovative products for learning and teaching processes.	N/A	Scientific seminars	N/A	Teaching and learning innovations	N/A	http://www.su.lt/index.php?option=com_content&view=article&id=20805&lang=lt
Klaipėda University	N/A	N/A	N/A	N/A	N/A	N/A	https://www.ku.lt/locations/ku-verslo-inkubatorius/

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4. Are there any statistics on the number of (doctoral) students that become entrepreneurs during/after their studies? Are there any data about how many of them are successful, failed and about which products or services they offer?

There are no official statistics in terms of how many students and doctoral students have become entrepreneurs in Lithuania. Neither Department of Statistics nor HEI do not track such information. Although we have been looking for research papers that would address this issue in Lithuania, we have not found anything related.	https://www.stat.gov.lt/en

5. Do HEI in your country use any recognition/validation systems to assess entrepreneurship, innovation and/or creativity competences?

Some official papers describe the innovation of investment projects (see the links of the documents (in Lithuanian only). *However, these papers do relate to HEI in no way*.	http://vadyba.asu.lt/130.pdf http://www.in-folex.lt/ta/320618?nr=1)
The biggest university in Lithuania - **Vilnius University (VU)** encourages innovative entrepreneurs in the	https://naujienos.vu.lt/tag/ino-vatyvaus-verslo-kurimo-skatini-mas/

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business of technologies development (the link in Lithuanian only).	
This HEI has established VU Tech Hub – a platform for collaboration that seeks to combine three main areas: students, scientists and business to promote an increased entrepreneurship and innovation. This newly-born initiative already runs a lot of projects primarily related to startups' development. *However, still, there is no report on the assessment of entrepreneurship, innovation and/or creativity.*	https://www.evaf.vu.lt/en/for-business/vu-tech-hub https://www.techhub.vu.lt/en/home-2/
Almost four years ago, Vilnius University opened its Business School that serves as an entrepreneurship teaching facility. There are no requirements for some knowledge of economics. Therefore it is attractive for non-economists also. *However, this school has not provided any separate official report of its activity.*	http://www.vm.vu.lt/en/

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Kaunas University of Technology (KTU) has created an innovative/creative workplace for their graduate students. *However, there is no official information on how they assess performance thereof* (the link is in Lithuanian only). Also, this HEI has established the National Innovation and Entrepreneurship Centre (NIEC) that serves as a link between science and business. This centre performs R&D projects, runs Santaka and Nemunas Valleys – integrated centres of science, studies and entrepreneurship. The KTU INVESTed program facilitates the cooperation of business and research institutions involving the most talented students. KTU STARTUP SPACE serves as an incubation place for the early startups. This HEI also runs a program of "Innovative workplace for graduate students" together with JSC Selteka (the link in Lithuanian only). *Although this HEI has developed a lot of incentives to facilitate entrepreneurship and innovation, there is no indication of any recognition/validation systems in place. If it exists, it is not for public attention.*	https://eef.ktu.edu/news/magistranturos-studentams-inovatyvios-darbo-vietos/ https://niec.ktu.edu/ https://business.ktu.edu/ https://startupspace-en.ktu.edu/

	https://eef.ktu.edu/news/mag-istranturos-studentams-ino-vatyvios-darbo-vietos/
Vytautas Magnus University (VMU) has established the Centre for Enterprise Practices that include the Entrepreneurship Academy, Creative Lab, Partners 4 Value and the Summer Internship Program. These initiatives target the development of entrepreneurship skills, the ability to act independently, and to create and carry out business ideas. *Although this HEI has developed some incentives to facilitate entrepreneurship and innovation, there are no official reports of how all these activities have been successful.*	https://vpc.vdu.lt/en/about-us/
Vilnius Gediminas Technical University (VGTU) has established the Knowledge and Technology Transfer Centre that aims to encourage entrepreneurship and innovation (the link in Lithuanian only).	https://www.vgtu.lt/ver-slui/ziniu-ir-technologiju-perdavimo-centras/480

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This HEI has not provided any official reports of these programs. However, this HEI participates in many projects initiated by Sunrise Valley (see below).	
Sunrise Valley (Science and Technology Park) is a nationwide project that features long-standing traditions in the development of entrepreneurship, promotion of business and science collaboration, provision of infrastructure and other innovation support services to young, innovative enterprises as well as to other knowledge-intensive business. This park is located nearby the main facilities VGTU, and the faculties of Economics and business administration and Physics of VU. The newly built library of VU is the closest building. *Each year Sunrise Valley provides annual reports (the link in Lithuanian only). The last one of 2018 indicates that it employed students/alumnus of HEI as follows: 107 from VU; 81 from VGTU and 208 from other HEIs.* *Also, it reported about the 2nd International Program of Entrepreneurship Promotion "Futurepreneurs" that took place that year. In various initiatives of this program, Sunrise Valley accepted 150 – 300 of the most talented students (almost half of them were young women) that*	https://ssmtp.lt/en/about-us/

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were learning entrepreneurship and innovation from lecturers that arrived from various foreign centres of innovation and startups. *Besides, this park initiated the "Hei makers" program (for 2017 – 2019) that aimed for the facilitation of HEIs with business in terms of encouragement of entrepreneurship and innovation.* *Other projects:* *ABCities – a smart city project;* *INNOCAPE - innovation ecosystem project.*	https://issuu.com/vaivad-eksnyte5/ docs/ataskaita_2018

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2.3.5. Portugal

1. Which (study) programs related to entrepreneurship, innovation and creativity education exist within higher education institutions (HEI) of your country?

In Portuguese HEI the entrepreneurship, creativity and innovation study programs are present in many curricular units of the undergraduate and graduate courses. Some examples are presented in the following table (names in Portuguese):

Curricular Units	Course	Degree
Criatividade e Inovação	Enfermagem	
	Gestão de Recursos Humanos	
Empreendedorismo e Inovação	Gestão de Empresas	
	Animação Turística	
	Turismo	
Gestão e Empreendedorismo nas Artes	Artes Performativas e Tecnologias	
Empreendedorismo de Base Tecnológica e Inovação	Engenharia e Gestão industrial	
Criatividade em Marketing	Marketing Turístico	
Criatividade e Experiência em Eventos	Gestão de Eventos	

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		Licencia-tura
Empreendedorismo e Casos de Sucesso	Comércio e Negócios Internacionais	
Empreendedorismo	Solicitadoria	
Inovação e Qualidade	Design de Produto	
Processos criativos	Comunicação Aplicada: Marketing, Publicidade e Relações Públicas	
Métodos da criatividade	Realização e Produção Cinematográfica	
Gestão e Empreendedorismo	Estudos Europeus e Relações Internacionais	
Projeto de Inovação e Criatividade	Audiovisual e Multimédia	
Serviço Social, Criatividade e Inovação	Serviço Social	Mestrado
Empreendedorismo e inovação	Engenharia mecânica	
	Indústria alimentar	
	Gestão	
Empreendedorismo	Applied Biotechnology	
Criatividade e Food Design	Gastronomia	

Entrepreneurship is generally present in the courses related to management/ business and economy while creativity and innovation is generally present in the degrees related to arts/marketing and engineering. There are also complete courses related to entrepreneurship, creativity and innovation, like the ones presented as example in the following table:

Degree	Name of the course	Institution

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Licenciatura	Criatividade e Inovação Empresarial	ISCAP
Licenciatura	Criatividade e Inovação Empresarial	Politécnico do Porto
Licenciatura	Empreendedorismo	Instituto superior Miguel Torga
Mestrado	Gestão, Empreendedorismo e Inovação	Universidade do Algarve
Mestrado	Gestão, Empreendedorismo e Inovação	Politécnico de Bragança
Mestrado	Empreendedorismo e Criação de Empresas	Universidade da Beira Interior
Mestrado	Ciências da Educação – Inovação Pedagógica	Universidade da Madeira
Mestrado	Economia e Gestão da Inovação	Universidade do Porto
Mestrado	Gestão e Empreendedorismo	ISCAL
Doutoramento	Governação, Conhecimento e Inovação	Universidade de Coimbra
Doutoramento	Currículo e Inovação Pedagógica	Universidade da Madeira

There are also transversal projects, sometimes named "Academias" ou "Centros de Desenvolvimento da Criatividade e Inovação", like in the following examples:

- Universidade de Lisboa – develops in the Tech Labs a centre for Innovation that supports spin off companies, proto - companies and start-ups.
- ISCTE, Instituto Universitário de Lisboa – has the AUDAX, the centre for innovation and entrepreneurship that promotes the entrepreneurial attitude in the transformation of ideas into business.

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- Universidade Nova - Develops an entrepreneurial ecosystem within the university with conferences and workshops, like the European Innovation Academy.

- Universidade de Évora – for knowledge transfer to the companies, supports projects related to innovation and entrepreneurship and cooperation (GAITEC).

- Politécnico de Lisboa – develops entrepreneurship programs in the ACE, Academy for Innovation, Creativity and Entrepreneurial mind set.

- Politécnico de Leiria with the CTC – *OTIC has his Centre for Sharing and Valorise knowledge within a regional network of municipalities and enterprises.*

- Poliempreende – A national challenge to support creative and innovative projects within the Portuguese Polytechnic network.

A final mention in this question for the most popular Entrepreneurship programmes for international students offered in Lisbon, has been found in:

https://admissiontestportal.com/studyabroad/portugal/lisbon/entrepreneurship

- **Entrepreneurship and Studies of Culture, ISCTE - University Institute of Lisbon;**
- **Management with Specialization in Strategy and Entrepreneurship, Catholic University of Portugal;**
- **Innovation and Entrepreneurship Engineering and Management, IST- Lisbon University;**
- **Technological Changes and Entrepreneurship, IST – Lisbon University;**
- **International Ventures, Catholic University of Portugal;**
- **The Strategy and Leadership Summer Academy, Catholic University of Portugal;**
- **Pós-graduação Em Empreendorismo e Inovação, ISCTE - University Institute of Lisbon;**
- **Tec Labs – Fac. of Sciences of the University of Lisbon, ciencias.ulisboa.pt/en/entrepreneurship**
- **ENTREPRENEURSHIP at Nova, Universidade Nova de Lisboa, www.unl.pt/en/entrepreneurship/entrepreneurship**
- **Innovation and Entrepreneurship, Nova School of Business and Economics – U. Nova de Lisboa**

2. Are there any specific Start-up centers within HEI of your country? If they appear in a ranking list, please indicate the 10 higher education institutions that perform best in promoting entrepreneurship, innovation and creativity. If there are less, please indicate as many as existing institutions.

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Almost every HEI has an incubator centre or participates in start-up centres with companies to foster entrepreneurship, to provide the good environment and tools for the newborn companies to survive after the incubation period.

It was not possible to find a updated ranking nor a list of start-up centres related to HEI in Portugal, the Benchmarking of Business Incubators carried out by the Centre for Strategy & Evaluation Services (CSES) for the European Commission's Enterprise DG in 2002, mentioned 23 incubators in Portugal at that time. Nowadays, the number grew to about a hundredth incubation or similar structures.

As all HEI are related to innovation centres and there are several university rankings published a university rankling related to innovation can give an image of the best performing Portuguese Universities in innovation. One ranking was found to measure innovation specifically, the Scimagoir innovation ranking at **Fehler! Linkreferenz ungültig.**. This ranking can be filtered by country. For Portugal the 10 best HEI in the innovation ranking 2019 were: Universidade de Lisboa (1st PT, 373 World)/ Universidade do Porto (2nd PT, 382 World) / Instituto Politécnico de Lisboa (3rd PT, 404 W) / Universidade de Coimbra (3th PT, 404W)/ Universidade Nova de Lisboa (5th PT, 405W)/ Universidade do Minho/ Universidade de Aveiro/ Universidade Católica Portuguesa/ Cooperativa de E.SUP. Politécnico e Universitário / Universidade Fernando Pessoa / Instituto Politécnico de Bragança (10th PT, 433 World). In this ranking the Instituto Politécnico de Leiria comes in 18th in Portugal and 463 in the world.

The desk research about innovation and start-ups in Portugal has to mention the "Startup Portugal" that is supported by several partners and has great dynamism and also the Web Summit conference that happened in Lisbon for the first time in 2016 and annually since then bringing worldwide innovation leaders to Lisbon. The Analysis of the Portuguese Research and Innovation System Challenges, strengths and weaknesses towards 2020 work (https://www.fct.pt/esp_inteligente/docs/SWOT_FCT_2013_En.pdf) must also be mentioned as well as the "Higher Education, Research and Innovation in Portugal, Perspectives for 2030" document (https://www.dges.gov.pt/pt/noticia/higher-education-research-and-innovation-portugal-prespectivas-2030).

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3. Which concepts and (learning) formats do these programmes or Start-up Centers apply in order to foster entrepreneurship, innovation and creativity competences out of HE? List them and bring them into an overview within the attached excel-template.

Conferences and workshops are the most used learning formats within this start-up and incubation centres. The informal learning and the close contact between them help the information exchange and the cooperation or partnership to solve company's problems. There are also learning trips to foreign similar centres for inspiration and networking. Some post graduation courses in cooperation with HEI can also be identified, and those run under the general learning formats for master degrees has mentioned in question 1.

4. Are there any statistics on the number of (doctoral) students that become entrepreneurs during/after their studies? Are there any data about how many of them are successful, failed and about which products or services they offer?

No information was found about the number of PhD that become entrepreneurs in Portugal during or after their studies nor about their success. The published numbers about entrepreneurship in Portugal are some how disperse and have some diversity, nevertheless it is considered that approximately 20% of the entrepreneurial companies fail in the first year and only about 50% reaches the 5th year.

Most recent numbers obtained are from 2018 within the GUESSS ("Global University Entrepreneurial Spirit Students' Survey") that involved 54 countries and 208000 students and 3000 HEI where Nova University was representing Portugal). This study mentions that the areas with more Entrepreneurial spirit students are the management/business/economy (24,7%) followed by the engineering (16,2%) while the domains with less entrepreneurial spirit students are mathematics and art's.

From the sample of 23414 Portuguese students that were considered some statistics can be presented: 9% of the students consider becoming entrepreneur immediately after the course;

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34,7% plans becoming entrepreneur 5 or more years after finishing the degree; 63,8% intends to own their own business; Among the students that intend to be entrepreneurs 5 or more years after the graduation, 75% plan to have a job first and then become entrepreneur.

It is also interesting that more than half of the students that were sampled don't have an entrepreneurship course, nevertheless 20 to 25% had obligatory or optional curricular units and 7,1% studied in a specific entrepreneurship program.

5. Do HEI in your country use any recognition/validation systems to assess entrepreneurship, innovation and/or creativity competences?

Recognition and validation systems in Portugal are not generally used in HEI, since the Bologna process HEI in Portugal use the ECTS for regular degrees and each curricular unit. In complement to the regular degrees, in summer courses, workshops, challenges and other academic activities recognition is generally present and can even be mentioned in an annex to the diploma. Specifically, in Creativity competences, some short courses and workshops were developed in Portuguese HEI. About innovation, several challenges and prizes are promoted every year involving generally HEI, companies, banking institutions, risk capital companies and sometimes municipalities. Well known is the AUDAX related to ISCTE and Poliempreende related to the Portuguese Polytechnic Institutes.

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3. Online Questionnaire

3.1.   Introduction and questionnaire

The online research was carried out in early 2020, the total number of respondents was 257, of which 137 fully completed the questionnaire.

The main research questions of the online research were:

- What is the relationship between universities offering appropriate support measures and the actual competence development of their students?

- Through what kind of programs and measures do students really feel supported with regard to their competence development in the field of creativity, innovation and entrepreneurship at their university? What obstacles do students actually see that prevent them from becoming an entrepreneur?

- What concrete learning approaches underlie appropriate measures and (how) are learning outcomes as well as competence gains validated at the universities?

The questionnaire consisted of the following specific questions:

Please indicate your level of competence by choosing the statement that suits you best.

1. Do you consider becoming an entrepreneur?

   Yes/ Uncertain/ No/ No answer

2. Have you already realised an idea or an innovative project on your own?

   Yes/ Uncertain/ No/ No answer

3. Do you think, it is important to foster creativity, innovation and entrepreneurship competences within higher education?

   Yes/ Uncertain/ No/ No answer

Please answer the following questions regarding the efforts of your higher education institution on entrepreneurship, creativity and innovation management.

4. Are competences related to **creativity** promoted at your university/ higher education institution (HEI)?

   Yes/ Uncertain/ No/ No answer

5. Are competences related to **innovation** promoted at your university / HEI?

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Yes/ Uncertain/ No/ No answer

6. Are competences related to **entrepreneurship** promoted at your university / HEI?

    Yes/ Uncertain/ No/ No answer

7. Does your HEI provide any resources (i.e. time, funding, information, materials) to support student activities related to entrepreneurship, creativity and innovation?

    Yes/ Uncertain/ No/ No answer

8. Is there an organisational unit or person within your HEI that is responsible for the development of entrepreneurial, creativity and innovation related competences?

    Yes/ Uncertain/ No/ No answer

9. Does your HEI use a tool or a validation system to assess competences related to entrepreneurship, creativity and/or innovation?

    Yes/ Uncertain/ No/ No answer

10. Is the acquisition of competences related to entrepreneurship, creativity and/or innovation being certified within your HEI?

    Yes/ Uncertain/ No/ No answer

11. Should the programmes regarding entrepreneurship, creativity and innovation that your university offers be made more transparent?

    Yes/ Uncertain/ No/ No answer

12. Which obstacles or challenges do you see in terms of becoming an entrepreneur?

    Comment only when you choose an answer.

    1. lack of information/ councelling
    2. financing
    3. time
    4. lack of idea/ idea not developped
    5. lack of entrepreneurship competences
    6. no desire to become an entrepreneur
    7. other

13. What exactly would support you in a self-employment project?

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Questions on demographic data

1. Your age:
2. Your gender: female/ male/ diverse
3. In which country are you based?
4. At which university are you studying?
5. Do you currently have an occupation (besides your studies)? If so, please specify.
6. Are you interested in being informed about the project results? If yes, please enter your E-Mail address.

In the following result part we will (beginning with some analytical description) give insights about the relationship between students who rated themselves higher in terms of their entrepreneurship skills and the offers of the universities they are studying at. Thereby we specifically looked at whether there is a statistical difference between the competence ratings of students at universities with many offers and measures to promote PITCH competences and universities that do not. In the next steps we are going to list learning approaches related to high self-assessment of entrepreneurship competencies by the students.

3.2.   Results

3.2.1. Descriptive analyses

The total number of respondents is 257, of which 137 fully completed the questionnaire. The age of the respondent varies from 18 to 69 years with a mean age of $M = 24.70$ ($SD = 7.82$). The gender distribution is as follows: 86 (62, 8 %) were female, 44 male (32,1 %) and 7 (5,1 %) indicated their gender as diverse.

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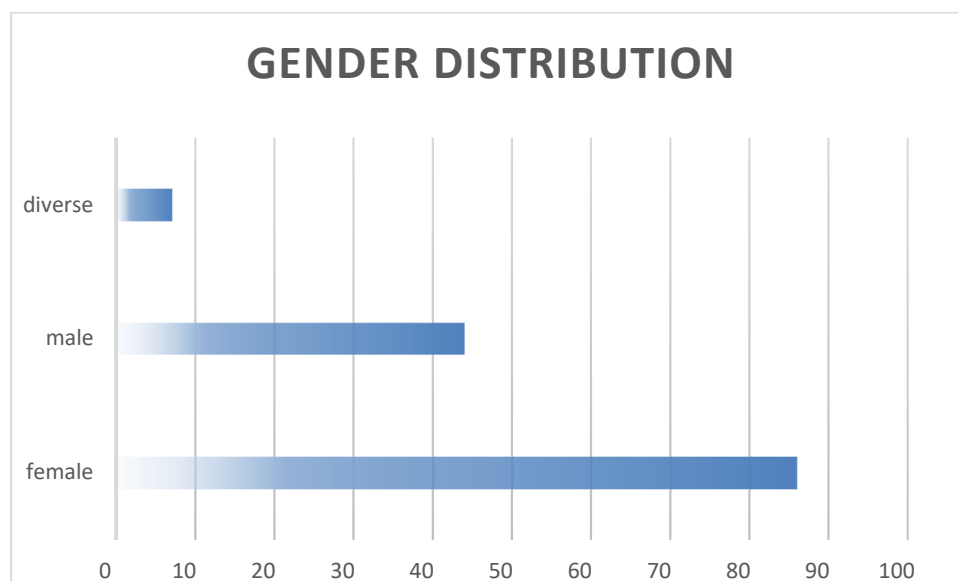
Figure 1. Gender distribution of survey participants (absolute numbers)

The six partner countries of the PITCH project also took effort to collect data from other European countries, if possible. However, this was not easy, so that there were few students from additional countries that participated in the survey. In the table below the different countries the respondents indicates are listed.

Table 1. Indicated countries of survey participants.

Country	Absolute number	Percentage (%)
Germany	14	10,2
Greece	34	24,8
Italy	7	5,1
Lithuania	42	30,7
Portugal	26	19,0
Spain	1	0,7

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N.N.	11	8,0
Total	137	100

Figure 2 presents this very important result that contributes to the answer of the question whether students do consider being an entrepreneur as a professional fields.
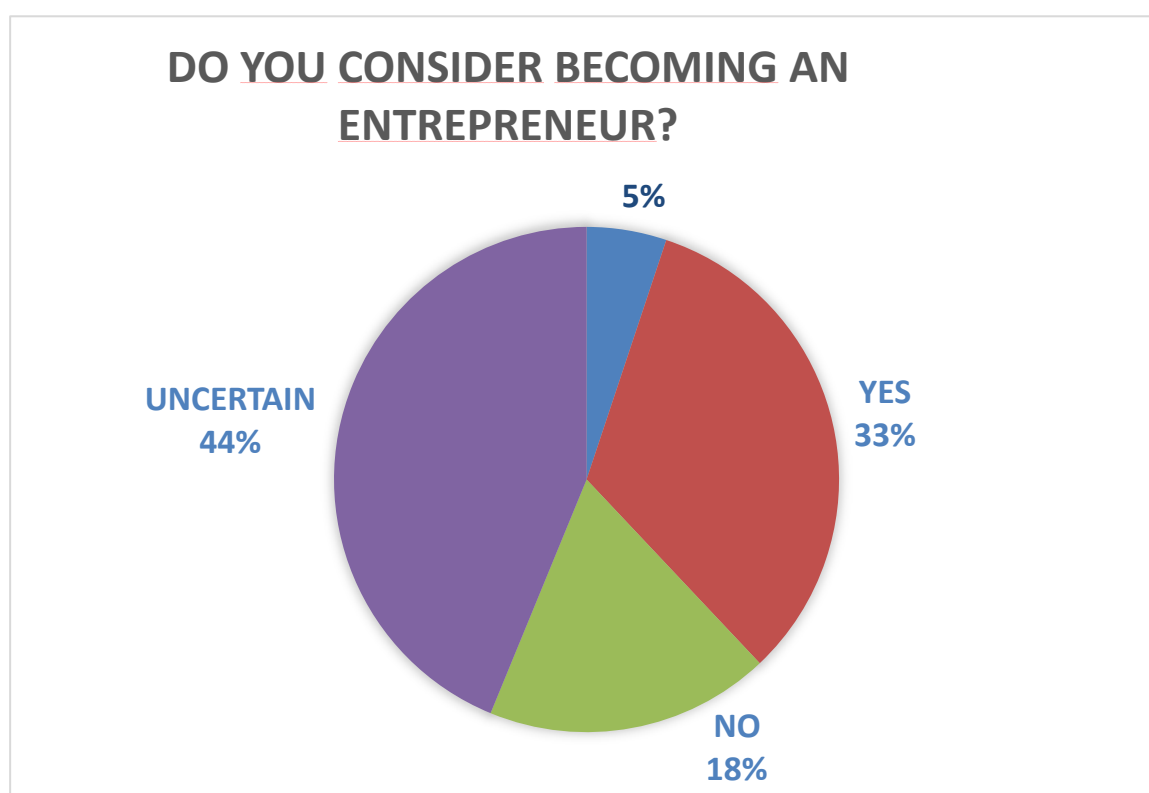
Figure 2. Proportion of students considering self-employment.

The following table informs about the mean score of self-assessed competence ratings. As an indicated competence level of 1 describes the lowest possible level of competence, a level of 5 describes the highest possible one. The mean score lies at *M* = 2.77 and indicates a rather average level of self-assessment.

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Table 2. Descriptive statistics

Total Score	
Mean	2,7648013
Standard Error	0,06624847
Median	2,72222222
Mode	2,77777778
Standard Deviation	0,77541842
Sample Variance	0,60127373
Kurtosis	-0,2958357
Skewness	0,20185324
Range	3,72222222
Minimum	1
Maximum	5
Sum	378,777778
Count	137

Figure 4 informs about how many respondents report that their universities promote competences related to creativity. More than half of the universities the respondents are enrolled in (55 %) do promote creativity, every fifth students denied and almost one quarter does not have information about this fact.

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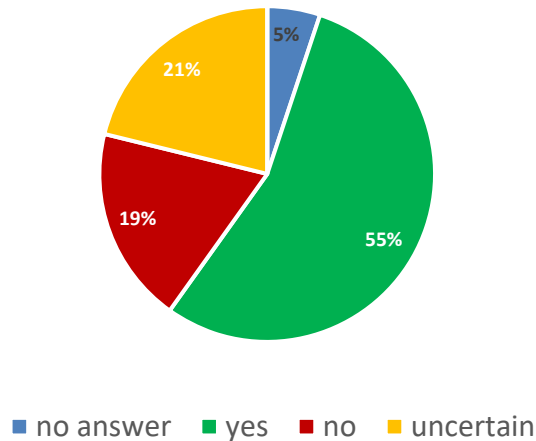
Figure 3. Distribution of answers on whether creativity competences are promoted.

A very similar picture is presented by figure 5 for innovation competence.
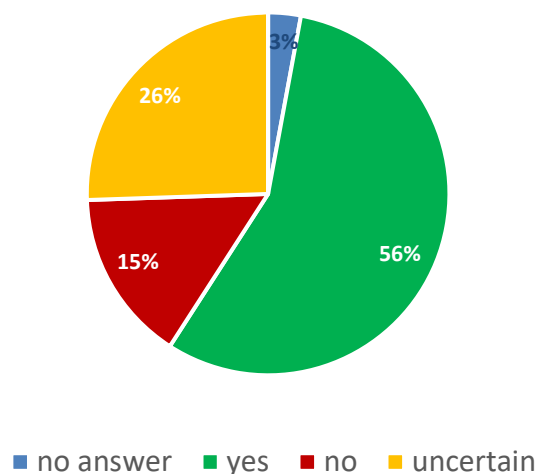
Figure 4. Distribution of answers on whether innovation competences are promoted.

Again, just over a half of the respondents indicate that their universities are promoting competences that support the acquisition of entrepreneurship competences (52%), 21% do not and approximately one quarter is not sure about whether their universities do or do not (see figure 6).
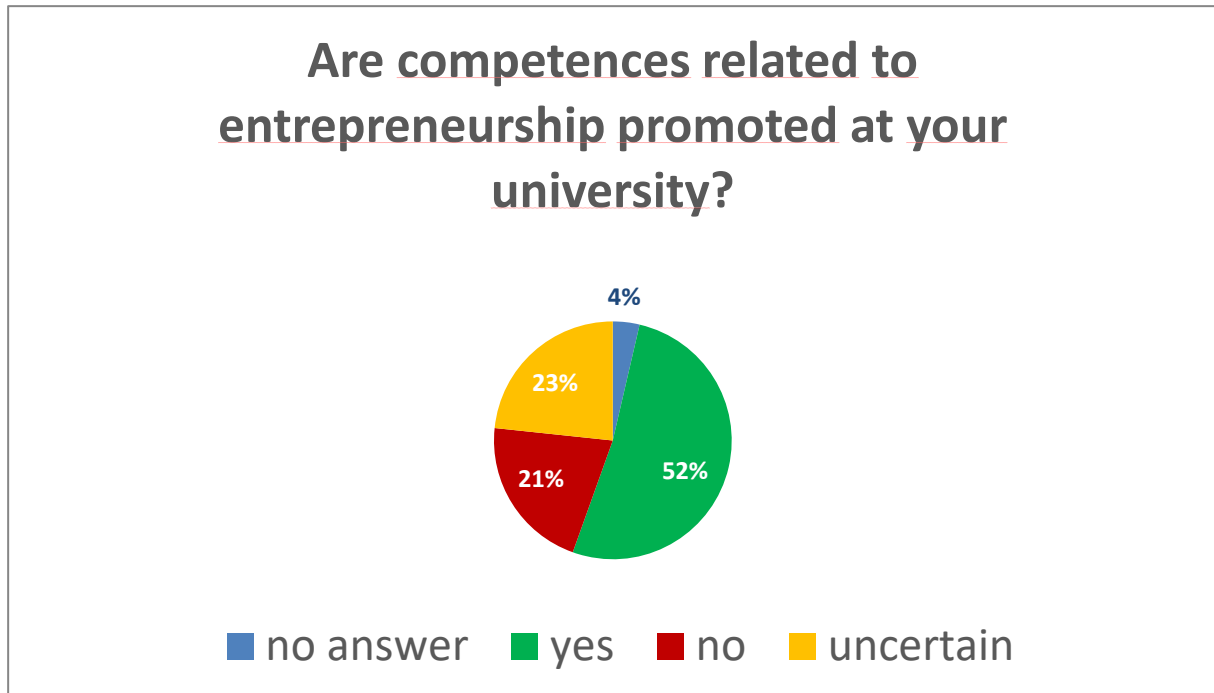
Figure 5. Distribution of answers on whether entrepreneurship competences are promoted.

3.2.2. Inferential statistical analysis

The second research question is about the relationship between universities offering appropriate support measures and the actual competence self-assessment of their students. The focus is on whether there exist a statistical difference between the self-ratings of students that are enrolled in universities with offers (group 1) and those who study at universities without or uncertainty about offers (group 2) in entrepreneurship, creativity and innovation education. Therefore, we conducted a two-tailed t-test (see table 2). The results show that there is no statistical difference between the self-rated competence levels of both groups (T = .68, p > .05)

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Table 3. Results of a two-tailed t-test

t-Test: Two-Sample Assuming Equal Variances

	HEI with offers	HEI no offers/uncertain
Mean	2,78650794	2,69351852
Variance	0,60499514	0,60540821
Observations	70	60
Pooled Variance	0,60518554	
Hypothesized Mean Difference	0	
df	128	
t Stat	0,6794261	
P(T<=t) one-tail	0,24904736	
t Critical one-tail	1,65684523	
P(T<=t) two-tail	0,49809472	
t Critical two-tail	1,97867085	

3.2.3. Analysis of open answers

What exactly would support you in a self-employment project?

The first research question aims at finding out through which offers students really feel supported. The open answers within the survey do give a lot of references and information on that. There was high agreement between the respondents from different European countries.

For example, an expert consultant would help them, especially if he or she is experienced in finance issues. Easily accessible networks and/or mentorships are considered helpful as well

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as support from family and friends. Besides financial and informational aspects, other fields of desirable information are law, risks, opportunities, technology, human resources and tax.

Very often, there is still no clear and safe ideas, goals and respondents would also welcome reliable team partners that would start a new business with them together. Furthermore, an appropriate entrepreneurial surrounding was mentioned as a supportive factor. However, this was not specified. Also feedback and opportunities to pitch the own idea in front of an audience are seen as very critical.

Some respondents mentioned that they would feel supported by a step by step support program, courses targeted to teach the basics of entrepreneurship, classes of how to keep balance between family life and business. Exchange possibilities with successful entrepreneurs as well as training on thinking and creativity skills are considered to be key support factors.

All in all, getting professional informational support and knowledge is an important factor for the surveyed students.

What obstacles do students actually see that prevent them from becoming an entrepreneur?

Another question related to possible challenges or obstacles students see that would prevent them from becoming an entrepreneur, was also part of the online questionnaire. The most frequently mentioned answers were the following.

Table 4. Open answers on obstacles of becoming an entrepreneur

Category	Example citations of respondents
Lack of information & counselling	*"Especially when it comes to finance"* (GE) *"Surprising information can lead to challenges, self-doubt and quitting. Knowing more information will help to be prepared. Counselling can help by providing these information and in coping with new situations."* (GE)

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	"One has to search to find opportunities like this and some times they're not made completely public or open." (GR)
	"I do not feel that I have been taught the basic principles of entrepreneurship in any educational unit. And I also haven't understood if they can be applied to the field of humanitarian careers as well." (GR)
	"It is not clear where to start to become an entrepreneur." (LT)
	"The need for more open-minded people around, who would work with university." (LT)
	"Uncertain about the opportunities available to support start ups." (IT)
Financing	*"A lot of young people with an idea don't have enough money to implement it. The access to serious and well prepared information is not transparent enough."* (GE)
	"Few financial programs, bureaucracy, very expensive business consulting" (GR)
	"IT IS HARD TO ATTRACT FUNDING ONLY BASED ON A CREATIVE IDEA" (GR)
	"The cost of work is too high, taxation is heavy" (IT)

	"Not certainly, but could be. I am aware of many financing opportunities, but without actually trying it is hard to assess how reachable and efficient they are." (LT) *"Science / Microbiology is one of the areas that needs more investment, but the resources made available are not enough due to the lack of general interest in long-term development projects."* (PT)
Time	*"You need plenty of time and might quit your job or other things to be able to start as an entrepreneur. It is something you need to consider."* (GE) *"Time is of essence especially when you need to commit to develop your idea and stick to it"* (GR) *"Nowadays young people in HEI have to work and to study at the same time. In most cases, there isn't much free time left for other activities."* (LT) *"As a student I don't have time for much more than studying."* (PT) *"Usually the amount of time needed to create and develop a business idea is not clear. So when a person needs to create a new idea, it can be quite time consuming and frustrating. We, young people, are expected to start working to create value. Not to be creative and try new ideas."* (PT)

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Lack of idea/ idea not developed:	*"I guess you need an idea to start in someway, but I think if you have the right team, the idea will come or be developed."* (GE)
	"I am trying to find a niche for law specialists." (GR)
	"Because of lack of information and councelling you are banned from coming up with creative ideas or you become unable to recognise a good idea due to your own ignorance." (GR)
	"We are not taught to think entrepreneurialy. I am not used to think in an entrepreneural way." (IT)
	"No big interest in developing new innovative ideas." (LT)
	"Hard to come to really "Golden idea" for the entrepreneurship that could generate enough revenues to be profitable." (LT)
Lack of entrepreneurship competences:	*"Especially, when you just have the idea, but no know-how."* (GE)
	"I do not know what competenecs I need to have." (GR)
	"We need to learn more skills about entrepreneurship." (IT)

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	"In order not to waste money and time, it is necessary to be well educated before starting." (LT)
No desire to become an entrepreneur	*"As an entrepreneur you have to be passionate about your project, focus on it completely."* (GE)
	"Sticking to the idea and endurance even with failures" (GE)
	"It is not for everyone to be a successful entrepreneur, it requires specific personality." (LT)
	"There are way too high taxes compared to reveneues possible to generate for normal self-employement businesses in Lithuania." (LT)
	"Nowadays what we learn in school is to get a degree and start working on a 9 to 5 schedule work. I didn't hear anything more than this in every school where I studied." (PT)
Other	*"Fears of the existential threat and the risk."* (GE)
	"Judgement of my surrounding." (GE)
	"More courage or leadership to take action." (LT)

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4. Offline Questionnaire

4.1. Description, objectives, procedure & key questions

Expert interviews in all countries were conducted to gain a better understanding of the status quo and the experiences and needs in entrepreneurship education. Students as well as lecturers were interviewed. To have a good scientific base for the continuous work on the project, quantitative and qualitative research methods were used. The experts interviews provide a way to deepen the understanding of findings of the questionnaire and desk research and open up new aspects for *consideration.*

4.1.1. Selection of participants

All project partners were asked to lead interviews, if possible, with both groups: students and lecturers. Due to Covid-19 most of these interviews were conducted digitally.

4.1.2. Key interview categories & interview guide template

Two different interview guide templates were developed. Overall, they address the same issues but have some alterations to be modelled to the target groups. Key interview categories are:

- Entrepreneurship education in HEI
- learning approaches and methods to promote entrepreneurial competences (including digital learning and mobility)
- validation and assessment strategies for entrepreneurial competences

In total 14 interviews were carried out in Germany, Greece, Italy, Lithuania and Portugal.

See below an extract of the interview guide template. The full guide can be found in the appendix.

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PITCH Interview Guide Lecturers

Section 1 – General information

Location/portal of the interview	via Zoom
Date of the interview	2020-06-
Name of participant	
Profession and expert fields of participant	

Section 2 – Interview guide / questions

Start & brief introduction

Welcome and thank you for participating in this interview. I'm glad we met here today. My name is (...) and I am (profession). I am working on European research projects. You have already been informed about the aim and topic of the interview when we invited you. Let me briefly explain you the main points and the reasons of conducting the interview again as well as the following procedure.

The European Commission sees the promotion and implementation of creative and innovative ideas in products and services that generate growth and employment as a central objective to be achieved. The following interview is part of the ERASMUS+ project "Promoting and Implementing Training on Entrepreneurship, Innovation and Creativity in Higher Education" and deals with the question which different approaches exist in the acquisition and validation of the competences „entrepreneurial thinking", "creative thinking" and "innovative thinking" within Europe and between the higher education and business sectors. In this way, you are supporting a scientific project that has a very high and direct practical relevance.

Before we continue, I will ask you to please inform me during this interview, if any question or term is not clear. Please let me inform you again that this interview is going to be recorded. The interview will be evaluated as part of a qualitative content analysis and treated absolutely anonymously. If you are not okay with that, please inform me now.

For those who conduct the interview via Zoom: "You have already received the general interview questions in advance. During the interview I will show them on slides and share my screen with you. In between I will also ask subquestions which are not on slides and which will contribute to the answering of the general questions. So let me share my screen with you."

Now, I am very excited to hear from you, your professional focus and so on.

Great, thank you. Then we are going to start with more general interview questions (show slide):

Research category	Questions and sub question(s)
Personal questions	• If not answered yet in the introduction: Which subjects do you teach? • Is your learning target group studying for a Bachelor's or Master's degree? • What is your teaching philosophy?
General questions on changed competence requirements	• Economy, society and the market are changing: What do you think, which competences will be the most critical regarding the current big changes? Why? • Job profiles are also going to change, people have to practice lifelong learning in order to maintain their employability. Do you think, the current study subjects respond to the need to future job profiles?
	In the following, we are going to talk about entrepreneurship education. Entrepreneurship is when you act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural, or social. This definition focuses on value creation, no matter what type of value or context. It thus embraces different types of entrepreneurship, including intrapreneurship, social entrepreneurship, green entrepreneurship and digital entrepreneurship. So we consider multiple possible forms of entrepreneurship that apply to different disciplines and topics. This is what we are going to keep in mind when we refer to entrepreneurial activity during this interview.
Adaptability of Universities in general	• Which role does education play in the development of Entrepreneurship as a 21st century skill? • Is your university responding quickly enough to the mentioned changing needs? • Do you think, universities prepare their students for the changing requirements of the future? Do you think, universities prepare their students for becoming entrepreneurs? • Does the university you are working for promote the path to independence/entrepreneurship for students or doctoral candidates?
Concept of Entrepreneurship Competence	• What competences does a good entrepreneur have in your opinion? • Do you think, entrepreneurship competences can be taught? • Which (pre-)knowledge, skills and attitudes are advantageous for the development of entrepreneurial competences? • Which roles do creativity and innovation play in entrepreneurship education? • How do theses constructs relate to each other? • Besides professional independence: For which areas do you think entrepreneurial skills could still be useful?
Entrepreneurial Mindset & Culture	• How would you describe an entrepreneurial mindset? • To what extent do the students at your university already have this mindset? From your point of view: Are they interested in becoming entrepreneurs? • Do you think, everybody has an entrepreneurial potential? • If yes, how could one identify his or her entrepreneurial potential? What do you / does the university do to strengthen such a mindset?

4.2. Results – students

4.2.1. Participants

Interviews with 7 master students were conducted. They study various different subjects, namely: informatics engineering, education/ community development, human rights/ international relations, biotechnology and innopreneurship.

4.2.2. Entrepreneurship education in HEI and entrepreneurial mindset

Role of HEI in (entrepreneurship) education in changing times

Students pointed out that, education builds a base on which they can build further and discover new projects and an understanding of what can be done for society. But education is not enough to be an entrepreneur, especially in a constant changing world, you need to be actively looking for new technologies and opportunities to develop new, useful things.

It's hard to say if universities adapt to the changing needs, it often varies from course to course.

Creating entrepreneurs not as a main objective of the university but for interested, pro-active and motivated students, some optional courses exist. The level of innovation and room for creativity depends on the study subject. However, the student highlighted that entrepreneurship can be taught in all subjects if the teaching style is adapted to give precedence to skills, ways of thinking and fostering curiosity. Self-reflection from the student is also important. With the changes in society and the workplace the role of education also branches from the traditional foundational skills of Numeracy and Literacy.

Competences & entrepreneurial mindset

Gain competences is more and more important to stay employable in new career paths.

Competences relevant for entrepreneurship education that the students discussed are: communication, proactivity, creativity, finding opportunities and having problem solving capacities, Informatics, Problem Solving and Auto learning, flexibility, critical thinking, adaptability, teamwork, persistence, question yourself, handle negative feedback, positive approach to problems, initiative, learn to deal with failure, self-reliance, innovation and self-awareness to recognise and follow their own strengths and styles of learning.

Some of these can be taught, or techniques that go along with them (e.g. looking for opportunities, finding solutions). Students talk about courses and projects in their curricula were competences were developed (e.g. creativity and innovation). Other competences, e.g. proactivity, are more dependent on the individual and therefore harder to teach.

Creativity and innovation play an important role in entrepreneurship education. There is a need to look to the future and to improve things by innovating and creating new things. This also applies to education. If teaching is stuck on old methods and content it minimises the chances of developing in innovative and creative ideas.

Entrepreneurial skills are needed in most of the workplaces nowadays. Especially adaptability, flexibility, digital and technical skills were viewed with increasing importance. Also, the social competences are helpful in all areas of life.

Several competences gained at university that the participants expected to be useful after graduating: communication, coordination and teamwork.

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For the students an entrepreneurial mindset consists of wanting to create new ways to help the world improve and at the same time make a rentable business. This mindset includes openness, empathy and curiosity. A passion for something and the drive behind it was mentioned. Everyone has the potential but not everyone wants to be an entrepreneur. Duties and worries can outlaw the benefits.

Even students that weren't interested in becoming entrepreneurs mentioned the importance of creativity, innovation and other competences that are part of an entrepreneurial mindset.

4.2.3. Learning approaches to promote entrepreneurial competences

Learning experiences

Higher education continues to teach in a very traditional way by focussing on transferring knowledge rather fostering curiosity and skills development for problem solving. Curricula need to be constantly updated to address contemporary issues and make use of the latest technology to teach in innovative ways which inspire students.

For some students the most useful approach to teaching includes theoretical introduction, then application in concrete problems

Another student expressed enthusiasm or becoming an entrepreneur but would prefer an integrated and practical/ experiential way of developing the necessary skills over a traditional training course.

Some supportive/ detrimental conditions at HEI for entrepreneurship education that came up in the interviews were: group for entrepreneurial development but not very accessible for students. Even highly reputable universities don't adopt to a point of satisfaction innovative techniques, up to date technology and contemporary issues.

Role of digital learning and mobility

Online tools and blending learning are more flexible and accessible but there is a preference for face to face learning experiences. Others mentioned that they already used a lot of online ressources, but it has increased and was adjusted with Covid-19. Digital learning demands more discipline and it is harder through that format to transport excitement for the topic or to lead a discussion.

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Digital tools and formats that are used are: Zoom, Moodle, Fenix, GitLab, Skype, Mural, Miro, Webex, Trello and Adobe Connect.

Mobility experiences helped in developing entrepreneurship competences, also through the contact with other cultures and different approaches and answers to the same problems. Personal and social competences are in demand. Initiative and openness is needed in such an experience. Students are confronted with different mindsets and mentalities and experience failure and learning from that.

Besides mobility programmes multiple students talked about work experiences and internships and their big impact in competence development.

validation and assessment strategies for entrepreneurial competences

In their studies the participants haven't experienced validation, assessment, or reward of their competences at most in form of the grade you receive. Students miss self-reflection. Some students participated in competitions and view this positively.

4.2.4. Conclusion/ take away for the following phases of the project

For many respondents entrepreneurial skills are considered equal to being/becoming an entrepreneur. There needs to be a better understanding what is part of an entrepreneurial mindset and that it is desirable to gain these competences regardless of becoming an entrepreneur or not.

For a good level of engagement, we will need to promote the relevance of entrepreneurship skills amongst all subjects and that this is what students want or feel they need. Carrying out or promoting research in this regard may help.

While developing the learning modules consideration should be given on how to integrate the competence development and mainstream entrepreneurship skills into mainstream subjects (rather than seeing it as a separate topic).

More mobilities should be promoted, even in short or virtual formats. They are extremely important in teaching new ways of thinking. Mobility experiences helped in developing entrepreneurship

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competences, also through the contact with other cultures and different approaches and answers to the same problems.

Most students didn't know or experience any form of validation, assessment or recognition of their competence development. Grades were mentioned or self-reflection of the students.

Certain teaching approaches, like working on projects or in teams help developing entrepreneurship competences. Students must also be aware of their competences and might need help being aware of the changes and progress they make.

The LEVEL5 framework will be useful because the 3 components (knowledge, skills and attitudes) capture well the combination required for entrepreneurship. Higher education tends to focus only on the knowledge, skills are given varying levels of importance and the attitude component is highly neglected. From an engagement perspective it will therefore be important to raise awareness and increase the understanding of the theory behind the framework.

Self-reflection is an important element and experiential learning is preferred.

4.3.   Results – lecturers

4.3.1. Participants

Interviews were led with 7 lecturers. They teach in the fields of financial consulting, Computer science (focus AI and robotics), Technology & Innovation Management, Employment and Career Structure, Innovation and Entrepreneurship, Latin, Design & User Experience and Marine & Environmental Sciences.

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4.3.2. Entrepreneurship education in HEI and entrepreneurial mindset

Competences

Despite uncertain times and the pandemic lecturer sees resilience and creativity among students who additionally make proposals how to respond to new challenges.

Design and Design Thinking play key role to meet new needs and challenges in various fields by providing a different view, taking chances, new approaches and creating.

Competences that the lecturers associated with entrepreneurship and that are useful in today's society: creativity, thinking laterally, empathy, creating and rebuilding connections, openness towards new approaches, flexibility, problem solving, creativity, communication, innovation, emotional intelligence, and critical thinking, resilience, networking, responsibility (good ethics) and a positive attitude.

Employability requirements often overlap with the skills and competences associated with entrepreneurship.

To the teachability of entrepreneurship competences the participants said that these include components of a person's character which are very abstract for teaching. But it is important to insert a critical, methodological approach into each discipline.

Another lecturer said that these competences can be taught and should be taught even before entering HEI.

Implementation, practices and needs in HEI for promoting entrepreneurial skills

Universities need to do more to promote creative thinking amongst student of all fields. It is already taking place in some contexts but still a long way to go. Proposition to include cultural heritage and social value in the entrepreneurship term and not solely focus on economic value. This opens the gate for other faculties (e.g. humanities) to focus more on entrepreneurship.
Other propositions mentioned were to rethink the educational process in order to accommodate new and creative approaches; open the classroom to the local community; create awareness for real problems in order to solve them; integrate design thinking, entrepreneurship and innovation skills among

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the curricula, despite the field of expertise; engage in social problem-solving projects, aiming the higher good; just to name some examples.

University is a quick responder in some areas, but a lot must be done in the near future, mainly in the critical thinking domain. Some Universities and some degrees prepare students to become entrepreneurs, mainly in management degrees, in other degrees some work is being done but it is hard to exchange main scientific subjects to make room for new subjects, many times the entrepreneurship reference is made within the scientific subject itself and not as a different curricular unit.

Teaching in HEI focuses too much on knowledge. When graduates enter the workplace, they are confronted with all the competences that are required but not specifically taught.

There are some programmes for aspiring entrepreneurs in HEI that help with startup's, project development and project in relation to society issues.

To foster competence development in HEI it is important to build networks between basic research, applied research and businesses.

Another lecturer pointed out the difficulties that come from the political and social environment. Even if the HEI would want to enhance entrepreneurship, it's hard to do when there are no resources available. Being an entrepreneurial and innovative higher education institution depends, to a large extent, upon individuals and innovative ways of doing things, and a supportive organisational culture (e.g. policy innovation of organization often lags behind technology). Often these are not labelled as such. Promoting the entrepreneurial higher education institution is not about relabelling these, it is about recognising and building – in innovative ways – on what already exists.

With the continuous digitalization IT Innovation is a key category of innovation management.

4.3.3. Learning approaches and methods to promote entrepreneurial competences

Learning approaches and experiences

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Teaching approaches that the lecturers deemed helpful include: giving opportunity to think out of the box, experimenting, engage in different perspectives, give a chance to others point of views, collaborate in multidisciplinary teams, and trying to solve real problems for the local (or global) community. Learning environments and teaching strategies that offer students opportunities to experience and exploit tacit knowledge and that encourage them to take ownership of the learning process.

This process involves valuing classroom dynamics with students, bringing in real world challenges as starting point to a deep knowledge development. The relation between research as knowledge production and knowledge application to the society challenges is also underlined.

Further elements that were labelled important regarding learning and teaching were mentoring, feedback and students taking on responsibility for own learning process.

One lecturer pointed out that universities don't teach the functioning of enterprises or funding. Students enjoy hearing the experiences of entrepreneurs and discuss with them.

Interdisciplinarity, digital learning and mobility

An interdisciplinary point of view to teaching at the university could help implement competences more. Especially the concept of entrepreneurship is often restricted to the adding of economic value and not recognised as relevant to all subjects.

Interdisciplinary projects help students develop competences (e.g. an innovation lab where students from different faculties go through a project simulation for a start-up).

The importance of digital innovation for entrepreneurship and training in this area was mentioned.

Borderless education through globalisation and digitalisation changes learning and knowledge creation (e.g. availability of information, learning with AI).

Digital tools and methods that lecturers use in their teaching: Teams and Moodle.

Digitalisation comes with new challenges. Digital transformation covers more than the online delivery of content.

F2f is still the preferred mode of teaching. Even though digitalisation increases relational and communication competences are still essential.

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Mobility initiatives and internships are fundamental but require careful planning and supervision to make them worthwhile.

Validation and assessment strategies for entrepreneurial competences

There is a need for validation systems. Self-assessment is seen as a useful tool to become conscious of personal learning and potential.

4.3.4. Conclusion/ take away for the following phases of the project

Entrepreneurship turns ideas into value for others. This value can be financial, cultural or social and applies to individuals and organisations. Yet in HEI entrepreneurship is still considered more relevant in faculties such as engineering and economics. Extracurricular activities exist to promote these skills but with regards to humanistic faculties, the teachers are less interested so less likely to promote opportunities to students. How can entrepreneurship training be integrated more widely across all disciplines in a way which engages the less obvious faculties?

It should be considered how to show the relevance and how to get professors on board to promote opportunities.

Entrepreneurship study modules have to start from the needs and challenges of a society and develop study and learning pathways based on necessary competences to spot ideas and opportunities.

Everyone is an entrepreneur in private life (problem solving, communication etc.). This can be used to transfer and improve these competences for professional life.

Innovation culture moves into the focus on a planned management of innovation (innovation culture in organisation necessary for its ability to innovate).

Building innovation communities through cooperation, idea-competitions, co-creation is increasingly important. → How to build these networks and links between HEI (and businesses).

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5. Summary Stocktaking of PITCH

5.1. Background & Objectives

IO1 of the PITCH project consisted of an extensive stocktaking phase that used mixed methods of quantitative and qualitative research to gain an overview of the current situation of innovation and creativity within HEI in all partner countries. Together the PITCH team analysed the results of this stocktaking process which highlighted gaps and needs. The next steps within the project should be adjusted accordingly to meet these needs.

This summary highlights the research process and some key findings.

5.2. Components

Desk Research
First, all partners conducted a Desk Research for their country according to the questions UDE provided. These questions guide the partners to portray the status quo and to specify what to find out in the questionnaire and interviews. The overall goal is to answer the above-mentioned PITCH Research Questions.

Online questionnaire
An online questionnaire that is targeted on students was distributed to students from all over Europe to find out how specific educational institutions and companies implement measures to foster and assess creativity, innovation and entrepreneurship competences. The questionnaire was answered by 137 respondents.

Qualitative questionnaire
To deepen the findings from the online questionnaire each partner conducted 2-3 interviews with students and/or with lecturers. The interview guiding questions were based on different topics that are relevant for the development and assessment of the competences of interest.

Needs analysis

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After having collected all desk research results from each country as well as collected the answers on the online questionnaire we conducted a synthesis meeting to consolidate all results and to plan the next work packages.

5.3.   Key findings and conclusions

Most European Higher Education Institution (HEI) do provide their students or future entrepreneurs with offers like incubators, Start-up centres, learning opportunities or consultation. The focus lies more on giving information about opportunities to start a new business than on strengthening the underlying competences. Entrepreneurship is often associated with Economics or Engineering studies. Many courses are then also located in these faculties. There are scattered extracurricular activities to promote these skills. In humanistic faculties less opportunities are provided for students to learn in this respect.

Hence what is missing is a modular approach to equip students with these important skills and competences; not only in dedicated courses for those who explicitly want to become entrepreneurs but for those who might want to acquire these skills whilst studying in their domains.

The survey clearly revealed that students who do not have the goal of becoming entrepreneurs, but who would find the acquisition of competences useful, are lost as a target group because the courses are neither addressed to them nor do they feel addressed. A better understanding of an entrepreneurial mindset - regardless of becoming an entrepreneur or not - is highly needed. Lecturers see the need for these competences in their students as well but struggle to find ways to include it in the given curriculum. The conducted analyses of the different quantitative and qualitative surveys supported the respective findings from the desk research carried out by the partners.

Responding to Research Question 1 (what is the relationship between universities offering appropriate support measures and the actual competence development of their students?) this means that there is no big difference between the competence self-assessment of students that are enrolled at universities with lots of opportunities aiming at fostering

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Entrepreneurship and those that study at universities that do not. These offers do not address competences in a systematic manner.

This is also consistent with the lack of validation systems at most HEI in Europe, which would enable the targeted measurement of relevant competences (Research Question 3: which concrete learning approaches support the acquisition of entrepreneurial competences and (how) are learning outcomes as well as competence gains validated at the universities?). Competence validation in HEI is (still) not anchored in any of the partner countries. Occasionally there are pilot projects or competitions. Hence, in order to monitor the own progress and competence development it is important that students are aware of their competences in the first place. These findings support the plan to integrate (summative and formative) validation in following stages of the project to help students, as well as HEI staff monitor their competence development. It should provide a profound perspective on the competence development of students (and facilitators). Higher education tends to focus only on the knowledge, skills are given varying levels of importance and the affective component of learning is mostly neglected. From an engagement perspective (which is especially important in all competences relating to Entrepreneurship, Creativity and Innovation) it will therefore be important to raise awareness and increase the understanding for a more "competence Oriented way of learning and validation instead of a subject-orientation.

Research Question 2 aimed at finding out through what kind of programmes and measures students really feel supported with regard to their competence development in the field of creativity, innovation and entrepreneurship.

In the HEI context more mobilities in connection with entrepreneurial learning should be promoted, even in short or virtual formats. They are extremely important in teaching new ways of thinking. Mobility experiences helped in developing entrepreneurship competences, also through the contact with other cultures and different approaches and answers to the same problems.

The results showed that students prefer learning in projects or with rather practice-oriented methods. Many of them desire a learning experience that does not focus solely on

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knowledge transfer. If project-based or competence-oriented learning is already taking place, they see this as positive. The advancing digitalisation requires a rethinking of learning and teaching formats also at universities. This development was intensified and accelerated by the pandemic. In its further development the PITCH project should focus on innovative learning methods that allow collaboration with remote participation. The digital format should not detract from the exchange and creativity.

Hence, we recommend addressing the following questions from the conducted analyses in the next PITCH-project phases:

1. How can creativity, innovation and entrepreneurship training be integrated more widely across all disciplines in a way that also engages the less obvious faculties?

2. How can the relevance of these competences amongst all subjects be made more obvious and how can students benefit from a meaningful validation?

3. How to build networks and links between HEI (and businesses), in order to accomplish the success factor of building innovation communities through cooperation, idea-competitions and co-creation?

4. What kind of (virtual) mobility projects could be developed that support the development of the aforementioned competences?

5. How can entrepreneurship education can be promoted by transnational and interdisciplinary models.

6. How can academic learning designed in a more attractive and practical way, also by using innovative approaches in digitally supported formats?

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