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MEETING THE SUSTAINABILITY CHALLENGES: AN ASSESSMENT OF ENTREPRENEURIAL EDUCATION

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Abstract

The importance of sustainability and entrepreneurship education is highlighted in this study. The world economies are facing significant challenges as they try to enable the transition towards more sustainable economic and business models. Therefore, at the centre of the transition process, it is critical to consider the role that business education can play and, more specifically, the role of business schools in integrating and supporting the development of skills and competencies that align with our contemporary society's needs. In this paper, we initially assess the need to connect entrepreneurial and sustainability education by exploring the educational offerings at Technological University Dublin, the first Irish Technological University created in 2019 due to merging three institutes of technologies with a long teaching history and connection to industry. The research findings indicate that the University's educational offer is defined by its wide range of entrepreneurship programmes, with a diverse offer available to students focused on fostering the development of creativity, design thinking, and sustainability. The importance of Education for Sustainable Development as part of business education programmes is highlighted in the study to support the need for educational models that provide guidelines that connect business practices with the United Nations Sustainable Development Agenda to promote economic growth, social inclusion and environmental protection.

1 INTRODUCTION

Today, entrepreneurial education focuses on the development of critical competencies, including entrepreneurial self-efficacy, system thinking, problem-solving, innovation, and interdisciplinarity ([1], [2], [3]). This paper examines Entrepreneurial programmes offered by the Faculty of Business at Technological University Dublin, in the Republic of Ireland. The newly created University emerged as the first Technological University in the country where Dublin Institute of Technology, Institute of Technology Blanchardstown, and Institute of Technology Tallaght amalgamated on the 1st of January 2019, leading to the first public technological University in the country. The history of the University dates back to 1887 with the foundation of the City of Dublin Technical Schools. The University structure has undergone a significant organisational design process. Today, the Faculty of Business includes six Schools [4]: The School of Global Business, the Graduate Business School, the School of Marketing and Entrepreneurship, the School of Management, People and Organizations, the School of Business Technology, Retail and Supply Chain and the School of Accounting, Economics and Finance. The Faculty of Business is an essential network of more than 6,000 students and 300 lectures. It is characterised by applying best practices in teaching, learning, and research and defined by a teaching and learning model characterised by its proximity to its students. The programmes offered by the Faculty include all levels and lengths, from short CPD courses to doctorate level, in close cooperation with industry, governance, and society to ensure that students are well prepared and equipped with all required skills and expertise to be highly competitive in the labour market.

TU Dublin Faculty of Business's entrepreneurial educational offer addresses new business requirements by providing high-quality education and making efforts to keep its educational offer updated and connected to industry needs. The core research findings indicate that TU Dublin has a generous offer of entrepreneurial programmes, from a short learning intervention for continuous professional development (CPD) to workshops, internships, and competitions. Moreover, the University's educational offer extends to postgraduate education with established Higher Certificates, Diplomes, Masters, and doctoral programmes emphasising the importance of sustainability and the United Nations 2030 agenda well integrated as part of its educational offer. A wide range of modules

are well represented in the University Virtual Learning Environment (VLE) Brightspace, which covers the development of a wide range of entrepreneurial skills. The limitation of the study has become a search through Brightspace without covering Moodle system. The next section provides further insights on Entrepreneurship Education resulting from a comprehensive review of the University VLE and its programme catalogue to help map existing programmes and modules supporting entrepreneurship education.

2 TU Dublin Entrepreneurship Education

Overall, the development of entrepreneurial programmes, curriculum revision, continuous professional development for staff, and attraction of students has become a high priority for all third-level institutions in Ireland and at the global level. TU Dublin is one of the leading Irish universities with a clear vision to provide high-quality entrepreneurship education, and it has a well-established and demanded range of programmes. The University is in alignment with the Irish National Action Plan 2022-2028 [5], the European Commission, and TU Dublin Strategic Intent 2030 [6], aiming to become the largest provider of lifelong programmes accessible for everyone with further development of alumni engagement. However, adequate and up-to-date EE remains a concern regarding how current entrepreneurial education can help address Ireland's entrepreneurial sector sustainability challenges and how it can help diversify the country's dependency on the activities of large multinationals. The following sections will analyse the importance of promoting education for Sustainability in HEIs and identify the essential link between entrepreneurial education and sustainability challenges.

2.1 Mapping Entrepreneurship Education at TU Dublin

The first step to revise existing entrepreneurial programmes was based on a simple search on the main page of the TU Dublin website. The keywords used for the search were *"entrepreneurial"* and *"entrepreneurship"*. This preliminary step returned one programme - TU312 (MSs in Business and Entrepreneurship), which emphasises the significance of EE, allocated in the outstanding Master's programme and considering the range of modules embedded as a part of relevant content in most major Bachelor's and Masters's courses. The second step of the analysis includes a manual programme research through all schools' main websites.

The manual website search of the programme revealed that the Faculty of Business runs 146 different programmes, with 69 representing undergraduate: 56 Bachelor programmes and 13 Certificates and Diplomas, and 77 postgraduate programmes, including 64 Masters programmes and 13 Certificates and Diplomas. The School of Marketing and Entrepreneurship mainly represents entrepreneurial programmes in close collaboration with the Graduate Business School. The research continued with a dedicated analysis of entrepreneurial programmes throughout the University Akari curriculum software. As a result, the following programmes were identified:

- Masters in Business and Entrepreneurship;
- Entrepreneurship and Innovation (for women);
- Digital Entrepreneurship;
- Design Thinking, Entrepreneurship and Innovation.

Each programme offers 5 to 14 modules, as illustrated in Table 1, and the available educational offer covers all essential knowledge and skills to run a business successfully. Some modules are interconnected in the different programmes and made of the foundation of entrepreneurial knowledge and skills.

Table 1. Entrepreneurial programmes at the School of Marketing and Entrepreneurship

Title	Modules	School
Design Thinking, Entrepreneurship and Innovation	6	Marketing and Entrepreneurship
Digital Entrepreneurship	5	
Entrepreneurship and Innovation (for Women)	6	
MSc Business & Entrepreneurship	14	

Source**:** Authors (Adapted from TU Dublin Website and VLE, 2023)

Modules like Creativity and Design Thinking were identified as compulsory for all programmes, highlighting the importance of a creative mindset that fosters the development of critical skills that contribute to the development of an Entrepreneurial mindset. At the same time, Agile Project Management, Disciplined Innovation Process, Personal Entrepreneurial Capital, and Venture Validation are obligatory for three out of four programmes, as illustrated in Fig. 1 below.

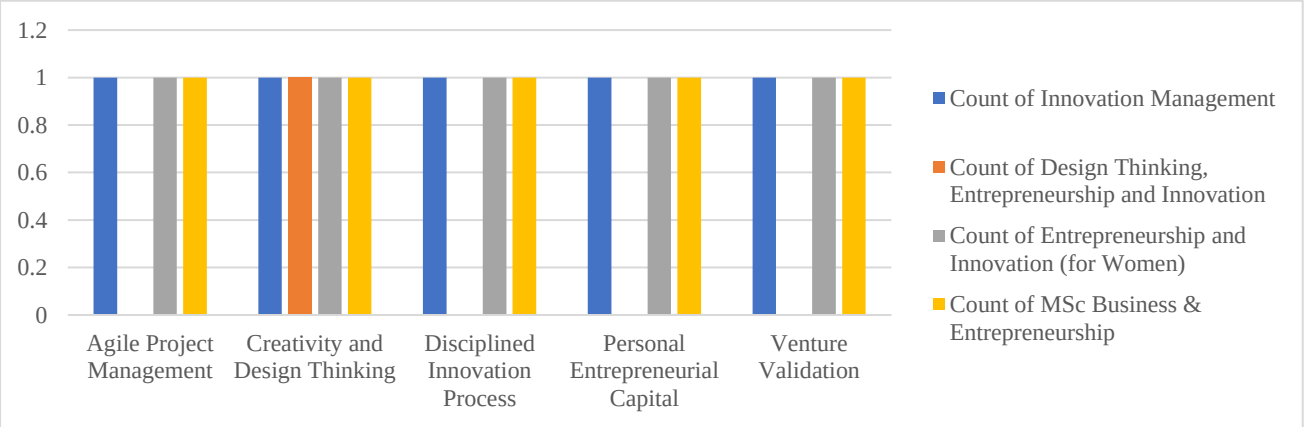


Figure 1. Interconnected modules in the Entrepreneurial Programmes

The programmes aim to give participants practical business planning and situation analysis instruments and relevant skills to design a business development plan. This enables them to contribute as a start-up creator or to identify entrepreneurial possibilities in existing businesses. The offered programmes align with the curriculum requirements of entrepreneurial programmes aiming to develop critical thinking, problem-solving, risk-taking, and innovation [7]. Critical thinking in the EE context encourages students to move from *"knowing"* to *"thinking"* and *"problem-solving"* – the ability to find solutions; risk-taking is an ability to act despite unforeseen circumstances, while innovation is concerned about putting an idea into practice [8]. Regarding teaching methods and delivery approaches, EE combines lectures, case studies, and simulation practices [9], which might offer a well-balanced theory-practice approach.

Apart from the programmes mentioned earlier, TU Dublin *"helps to explore the opportunities through growth thinking and entrepreneurial behaviour"* [4] through its GROWTHhub project. The University GROWTHhub intends to work with all students and staff to open new possibilities in growth thinking and entrepreneurial courses designed to facilitate the implementation of different types of social, green, and digital entrepreneurship skills and competencies. The project aims to provide robust support to every TU Dublin student and staff members, aiming to encourage entrepreneurial thinking, network design skills, and starting and running new businesses by integrating new educational approaches and techniques. Thus, GROWTHhub provides additional support to students and academics as it seeks to offer and develop entrepreneurial skills directly by embedding cutting-edge teaching curricula and technologies into the EE. The primary goal is achieving deep engagement in entrepreneurial skills development by fostering collaboration among students, researchers, staff, and industry representatives and promoting innovative approaches.

Furthermore, GROWTHhub offers participants a range of programmes and connections to industry that help to illustrate real-life scenario creating a variety of possibilities to students and academics. Among educational systems, students can choose CPD in Entrepreneurial Education, a 5 ECTS module equal to a level 8 certificate; moreover, allowing students to expand their knowledge and skills in social, green, cultural, and business directions as illustrated in Table 2 below.

Table 2. Critical skills for EE and TU Dublin answer

Skills	GROWTHhub Offer	Methods/Approaches	Activities
Critical Thinking	Encouraging an entrepreneurial mindset for new ways of thinking, education, research, and engagement.	Create an environment with a stimulating idea generation, exploration, and implementation culture.	ClimateLaunchpad VentureLab Competitions at TU Dublin President's Challenge
Problem-Solving	Promoting collaboration and innovative approaches to identifying and	Being open to all students and staff	
Risk Taking		Design thinking workshops	

	solving needs and problems.		
Innovation	Promote innovative approaches to identifying and solving needs and problems.	Talks, Ambassadors, Alumni	

Source**:** Adapted TU Dublin (2023), Schultz (2022)

The last step in the research process sought to map the university educational offer focused on analysing module content through the TU Dublin virtual learning environment (VLE) Brightspace. The search was initiated by using the keyword *"entrepreneurship," which returned 34 course names, and by the keyword "entrepreneurial," which led* to 9 results. After course names were divided, the current active modules for 2022 – 2023 represent 17 modules that can be taken independently or as a part of a programme, as outlined in Table 3 below. The research findings highlight the University's diverse offerings supporting the development of entrepreneurial skills with modules that integrate innovation, digital skills, and media presence that are critical to developing the entrepreneurial mindset. The educational offer also integrates courses that support project management and the development of financial skills.

Table 3. Entrepreneurial programmes search results through VLE Brightspace

Entrepreneurship/Entrepreneurial		
Entrepreneurship	5	29.41%
Innovation and Entrepreneurship	3	17.65%
New Product Development	1	5.88%
Entrepreneurship for Engineers	1	5.88%
Media Entrepreneurship	1	5.88%
Food Entrepreneurship	1	5.88%
Digital Entrepreneurship	1	5.88%
Project Management and Entrepreneurship	1	5.88%
Corporate Entrepreneurship	1	5.88%
Personal Entrepreneurial Capital	1	5.88%
Managerial Finance and Entrepreneurship	1	5.88%
Total	**17**	100.00%

Source**:** Adapted TU Dublin (2023)

The findings indicate that current courses cover many required skills and competencies, including design thinking, innovation, project management, and new product development, that are closely connected with the needs and demands of the corporate world and nurturing personal competencies.

A limitation of searching opportunities in Brightspace is that it is accessible only to existing staff and students. However, all identified modules in Brightspace are aligned with the AKARI curriculum management system, which will assist in making programmes and module categorisation publicly available. In addition, the results show that despite entrepreneurial programmes, they are still quite a new trend. However, the University's Faculty of Business can offer various possibilities, starting from short workshops, continuing professional development, and leading to postgraduate education up to the Master and doctoral levels. The following section provides insights examining students' voices and their understanding of sustainability education.

3 Sustainability Education – Students Voice

The research study progressed with the analysis of Sustainability Education at the University Faculty of Business. This phase of the study sought to provide an exploratory insight into doctoral students' understanding of sustainability and how it is integrated into their research practices. The data used in

this study was collected through a survey conducted by a team of PhD students that sought to examine to which extent their peers understand sustainability. The survey was administered to active PhD students from various disciplines during the 2022/2023 academic year. This survey investigated the significance of addressing students' perspectives to achieve a sustainable future. It emphasised the importance of developing educational systems and models that support and enable individuals to take actions that promote sustainable growth, development, and progress. This study emerges as the first to examine students understanding of sustainability and evaluate their involvement in sustainability while integrating their voices in developing and designing education systems that implement sustainable goals in higher education. The research provides a novel approach as doctoral students led the research process based on their own initiative and their interest in understanding to what extent sustainability and entrepreneurial skills can support the development of a more sustainable future. The survey was based on an earlier survey from the Students Organizing for Sustainability SOS 2021/22 survey, which looks into the students' experience of teaching and learning on sustainable development [10]. After simplifying and further developing the questions, the survey was circulated and shared electronically with 90 active doctoral students. The engagement and response to the survey were quite poor as the sample used within this analysis only included nine participants, and one of the participants was one of this paper's co-authors who agreed to participate in the study's pilot phase. As a result, the outcomes from the study are minimal and cannot be generalised. The data collection method used in the present study was primarily a survey conducted through Google Docs. Potential participants were invited to participate in the survey via email, which included a summary of the study and a hyperlink to the survey. The survey was designed to facilitate data collection and comparison with minimal interpretation.

3.1. Research Sample

The study utilised qualitative methods, which involved a population of identifiable, small, and readily accessible members, making sampling unnecessary. The analysis of the respondents and the sample questionnaire can be found in the appendix. The participants voluntarily responded to the questionnaire with the exception of one participant that was part of the pilot study. The hyperlink used to send the survey facilitated this process by redirecting users to the survey with a single click.

3.2 Respondents background and demographic data

Of the respondents, 56% were females and 44% males. The majority age group was 25 to 34, occupying 78%, as illustrated in Fig. 2 and 3 below. The other age groups were equally represented, with 11% each.

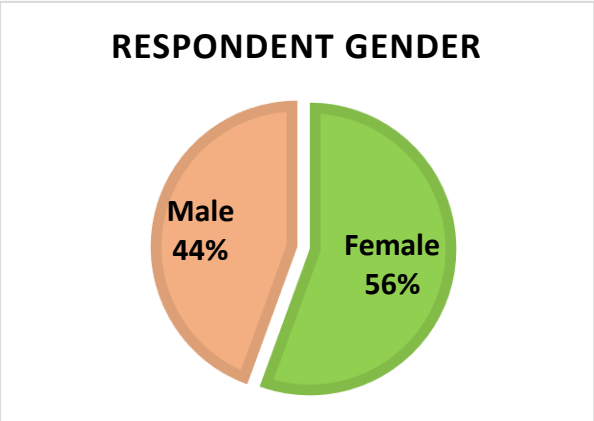


Figure 2. Respondent gender

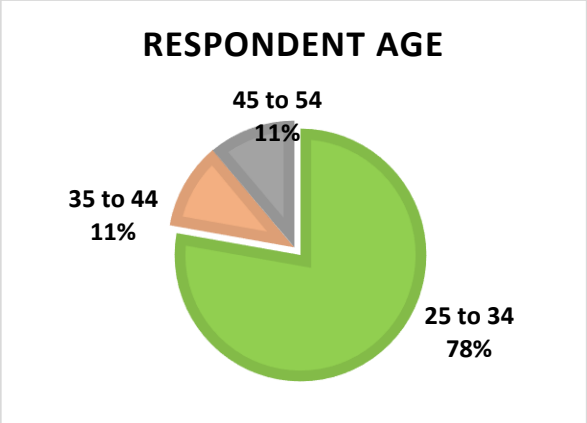


Figure 3. Respondent age group

Source: Authors (2023)

The research findings provided interesting insights that came from the attempt to understand the significant motivation for students in completing their doctoral journey. The leading aspiration is a career tenure in academia for four respondents with a motive similar to knowledge sharing and career advancement. Despite these obvious reasons, two candidates identified societal impact and assistance to people as their career choice, as illustrated in Fig. 4. These views might help them build impactful careers and work in the sustainability goals achievement framework.

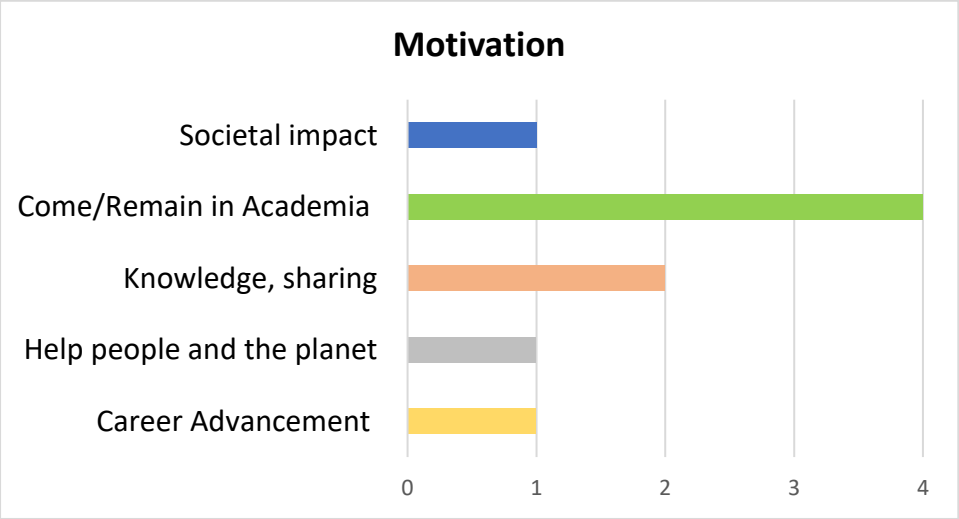


Figure 4. Respondent Motivation
Source: Authors (2023)

As a result of the motivation described above, 63% of students see their academic careers as lecturers, researchers, or consultants, 25% desire to shape policies and influence higher education on the national and international levels, and 13% see their voice as an important one in academia. It was interesting to identify that at the doctoral level, students do not seem to make a connection with entrepreneurial skills.

3.3 Sustainability Awareness

Education for sustainable development is essential for building a safe future and reacting to challenges people face today [11]. Despite the comprehensive promotion, various educational interventions and possibilities offered by educational institutions, a question emerges: are we aware of what sustainability is and what goals we should achieve? The analysis of familiarity with the term sustainability shows that almost all respondents know or have heard about sustainability, wherein 67% consider themselves very familiar with sustainability, while 22% are somewhat familiar and 11% are not so familiar, respectively. These results support the idea of further sustainability promotion and embedding sustainable goals into our everyday lives. Besides, half of the respondents perceive sustainability as a core value and a mission in their lives, while the other half consider the impact of their actions on the future.

Answering the question about their personal perception of sustainability, most respondents considered that all efforts to implement sustainability now might affect our near future, being vital for the next generations, our way of life and the whole Planet. The necessity of acting today has become evident and is not considered specific or unimportant anymore.

The United Nations has developed a very ambitious agenda that identified 17 Sustainable Development Goals, which cover all essential aspects of our planet and life resiliency [11]. Seven respondents out of nine answered that there are 17 SDGs, showing general awareness of these goals. The top four most known goals are the following: goal 1, no poverty with 14%, 10% equally between goal 2, no hunger; goal 3, good health and well-being; and goal 4, quality education, as per details in Fig. 5 below. The results show a vital tendency that, except for the basic needs of avoiding poverty and hunger and having a good healthcare system, education has become an essential fundamental need and is no longer seen as a privilege for the chosen. The results are a good reflection of the University's efforts to communicate the significance of the United Nations Sustainability Agenda and its developmental goals.

Name of the goal	Number	Percentage
Goal 1 NO POVETY	6	14%
Goal 2 ZERO HUNGER	4	10%
Goal 3 GOOD HEALTH AND WELL-BEING	4	10%
Goal 4 QUALITY EDUCATION	4	10%
Goal 5 GENDER EQUALITY	3	7%
Goal 6 CLEAN WATER AND SANITAION	2	5%

Goal 7 AFFORDABLE AND CLEAN ENERGY	3	7%
Goal 8 DECENT WORK AND ECONOMIC GROWTH	2	5%
Goal 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	2	5%
Goal 10 REDUCED INEQUALITIES	2	5%
Goal 11 SUSTAINABLE CITIES AND COMMUNITIES	1	2%
Goal 12 RESPONSIBLE CONSUMPTION AND PRODUCTION	3	7%
Goal 13 CLIMATE ACTION	1	2%
Goal 14 LIFE BELOW WATER	2	5%
Goal 15 LIFE ON LAND	1	2%
Goal 16 PEACE, JUSTICE AND STRONG INSTITUTIONS	1	2%
Goal 17 PARTNERSHIPS FOR THE GOALS	1	2%

Figure 5. Respondents SDGs awareness. Source: Authors (2023)

The students' understanding of the concept of sustainability was further explored as doctoral students were offered a choice of 4 definitions to decide which one can best describe sustainability. The best-fitted definition, chosen by four students or 44% of respondents, is *"Sustainability is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* [11]. This choice correlates with students' perceptions and concerns about the future. All nine respondents believe they can contribute to sustainability, making it more than just words or awareness. To understand the real actions of respondents in practising sustainability, they were offered some options to help identify how they connect their daily routines with actions that contribute. The answers were divided equally between the options: 3 respondents tend to attend sustainability workshops or webinars widely available within the University that actively provides webinars and workshops to inform students about the sustainability agenda. The University is making significant efforts to raise awareness among its students, academic community and relevant stakeholders. Some of the most practical initiatives to help promote sustainable behaviours can be identified in the University initiatives to support schemes, such as cycling to campus, research, and engagement in sustainability initiatives, using less plastic and attempting to fight food waste. The research findings indicate that students' creativity helped them to go beyond and consider that sustainability should become a part of their mindset and everyday life.

3.4 Students role in sustainability promotion

Developing and embedding sustainability into everyday performance is challenging for every company, individual, and educational sector. However, doctoral candidates see their role in the promotion of Sustainability in HEI as creating and lobbying awareness through participation in different campaigns (44%), deepening and engaging in research targeting sustainability issues (33%), and putting into practice concepts and skills that are taught and learned within the University courses and supporting initiatives (22%). Students also gave recommendations to the University on Sustainability implementation and its development. Among the dominant recommendations were teaching and explaining how to become sustainable in practice, what it means and which actions stakeholders should take. One respondent proposed designing sustainable decisions depending on the campus location and avoiding the centralised approach. Another exciting proposition included focusing on specific guidelines for decision-making called framework; any decisions which go beyond this framework should be adequately explained. Finally, one proposal included the broad embedding of sustainability modules into various programmes as a part of the interdisciplinary approach to university development.

Analysing the level of embeddedness of the sustainability component in their current programmes, only a third of doctoral students said that there is no such component at all, as illustrated by Fig. 6. At the same time, 11% of respondents found the extensive presence of sustainable components in their studies, 34% - moderate and 22% slight, respectively. Regarding promoting and practising sustainability in the University, answers have been divided into the following proportions: 56% believe that performance is good, 11% stay neutral, and 33% see it as poor and insufficient. Despite this difference in previous responses, the whole sample supports that sustainability should be integrated into the curriculum of all disciplines, not just those directly related to environmental studies.

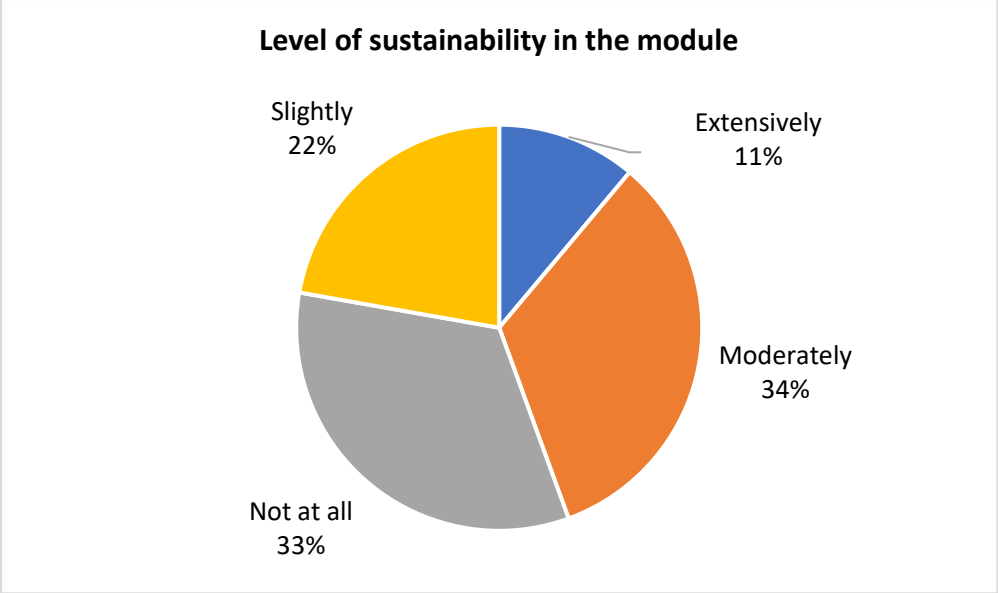
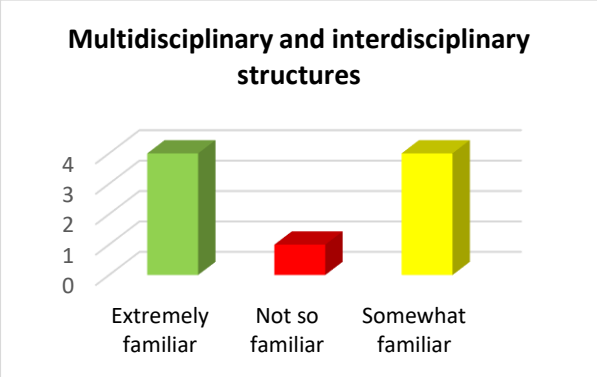


Figure 6. Sustainability Education in Doctoral Programme
Source: Authors (2023)

Considering the broad usage of the multi and interdisciplinarity approaches in the curriculum design and education in HEIs, doctoral students had a question looking for their familiarity with these definitions. The results showed that only one respondent was not so familiar with multi and interdisciplinary approaches. In contrast, all other respondents were aware of different levels of extent (Fig. 7). However, six respondents have come across the SDGs' use in any multidisciplinary and interdisciplinary structures for research, education, and policy development on sustainability issues as shown by Fig. 8.



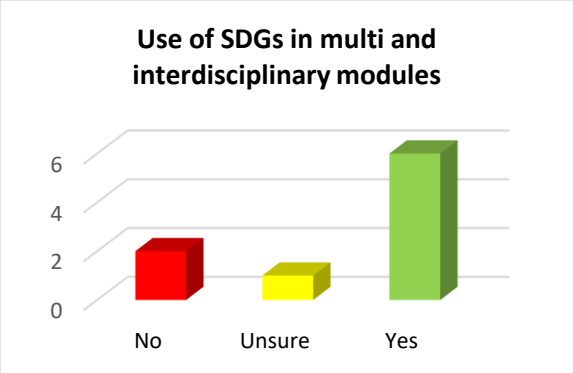


Figure 7. Awareness of PhD students

Figure 8. Use of SDGs in approaches

Source: Adapted by author (2023)

Overall, the research findings show that the research participants are aware of the sustainability agenda and the necessity of broad actions in promoting and supporting Sustainability within HEIs. Numerous steps have already been taken by HEIs in sustainability implementation, including embedding some components in the curriculum design of some targeted modules delivered in the University. However, it is still necessary to continue this thorough work to create more awareness and provide specific guidelines for action and impact. The research findings provide interesting insights into the importance of connecting the development of entrepreneurial and sustainability skills that will contribute to creating well-informed students as they link their significance to supporting sustainable economic growth and development.

CONCLUSION AND REFLECTION

The research findings outline the importance of supporting the development of entrepreneurial and sustainability skills to help TU Dublin students navigate a very complex reality that puts pressure on the development of new skills and competencies that are driven by the growing pressing needs of our ever-

evolving society. Education for Sustainable Development can help build a link that allows the transition between business models that contribute to the creation of global inequalities and the erosion of our environment towards models that are more attuned to the need for more sustainable practices, as discussed by Kioupi & Voulvoulis (2019). Through this reasoning, the development of the skills needed to make the transition to a sustainable future must be seen within a systemic perspective, in which educational institutions develop a clear vision where Sustainability and Entrepreneurship education are connected as through them, it would be possible to create synergies that contribute to multiply knowledge and facilitate the transfer of skills that support transforming individuals to become active social agents as they become more aware of their significant role to support the development of a sustainable socio-economic and environmental model that works for all.

The following steps can exemplify the road map of this transition through the students' lens:

1. Generation of a participatory vision of sustainability;
2. Enabling conditions for sustainability;
3. Identification of the conditions and skills necessary for citizens to achieve sustainability;
4. Pedagogies to assist in ESD competency development and;
5. Monitoring indicators to assess progress towards sustainability.

This research study provides some initial insights highlighting the importance of Entrepreneurship and Sustainability Education to help support the transition towards more inclusive and diverse societies that work together towards the development of alternative economic models that are more aware of the Planet's scarce resources and the need to develop alternative business models that are cognisant of the challenges posed by a continuation of their *"business as usual"* practices.

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