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Entrepreneurial intention development: The contribution of specialized entrepreneurship academic programs

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Abstract: Entrepreneurship Education (EE) programming is being developed at tertiary-level academic institutions, to develop the next generation of entrepreneurs. We collected data from undergraduate students from the Western region of Tecnológico de Monterrey in Mexico (N=25). The aim was to measure entrepreneurial intention by exposing the sample to a new educational structure that engages students in entrepreneurial activities. The Entrepreneurship program is highly specialized with a maximum of 25 students. This allows for students to receive individualized

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attention aiding in the development of their entrepreneurial projects. Tecnológico de Monterrey is number 4 in The Princeton Review's Top Undergraduate Schools for Entrepreneurship Ranking 2023. The school uses process-based approaches to EE. Guided by the Theory of Planned Behavior (TPB), we assessed changes in the students' attitudes toward entrepreneurship, perceived behavioral control, and intentions to become an entrepreneur. Using a seven-point Likert scale, the data was collected using anonymous online links at two points during the semester: the beginning of the semester (T1) and the end of the 1st Period (T2). The data was analyzed with SPSS software and the Friedman Calculator. Our research findings indicate a high score at T1. There was a slight change at T2, but the change was not statistically significant. Consequently, we introduce and review other approaches to Entrepreneurship Education that might be more effective. Noteworthy is that the sample is immersed in an entrepreneurial university context, both within and outside the academic setting, which fosters a strong motivation among students to contribute societal value through entrepreneurial endeavors.

Keywords: Entrepreneurship education; university Students; entrepreneurial intention; theory of planned behavior.

I. Introduction

Entrepreneurship is an important driver in world economies. It is essential for stimulating economic activity and driving economic development. Entrepreneurs through the development of new businesses and improving value-added for existing businesses help increase employment and generate wealth that lifts themselves, their families, and the communities out of poverty (Wu and Gu 2017; Neck, Greene, and Brush 2014; Besterfield-Sacre, Zappe, Shartrand and Hochstedt 2013; Mäkimurto-Koivumaa, Väänänen and Belt 2013; Tessema-Gerba 2012; Weber 2012; Blenker 2011; Gallant 2010). The establishment of new business ventures necessitates significant strategic decision-making. Cooper (1981) and Kuratko and Hodgetts (2014) provide broad-based wealth creation through value-added activities (Elia, Marguerita, Secundo, and Moustaghfir 2011; Lumpkin and Gregory 1996). To expedite the development of entrepreneurs, higher education institutions worldwide have begun to develop Entrepreneurship Education (EE) programs to stimulate and encourage the development of effective entrepreneurs (Nabi, Liñan, Fayolle, Krueger and Walmsley 2017; Thurik, Stam and Audretsch 2013; Greene and Saridakis 2008; Kuratko 2005).

EE is a powerful tool; the World Economic Forum (2009) describes education as the fundamental basis for economic and social development, and Weber (2012) identifies EE as the driving force behind such advancement

in this process. Courses offered in EE programs have two purposes. First, the design focuses on the required competencies, knowledge, skills, and capabilities needed for students to successfully pursue entrepreneurship. Secondly, EE could transform students, allowing them to view entrepreneurship from a different perspective and see the potential that can be derived from engagement in entrepreneurship. EE has the power of, and benefits from, transformational elements associated with EE and the fact that it allows for personal growth and transformational experiences (McGuigan 2016). Students can gain a new worldview that incorporates entrepreneurial thinking, passion, autonomy, and agency which can be applied in all dimensions of their personal and professional spheres. The overall intent of these types of courses is to increase entrepreneurship amongst students, by facilitating the development of entrepreneurial attitude and intention in the anticipation that this will give students the confidence to start engaging in entrepreneurship. These new entrepreneurs will tackle pressing problems in their own lives and their communities (Gedeon 2014).

The development of EE programs has evolved and seen significant growth within the past eight decades; beginning in 1947 at Harvard University, being present in the University of Southern California's and Babson College's MBA and Undergraduate programs in the mid-1970s and, from the late 1980s, due to increased interest, expanding across the US and to other countries (Kuratko and Morris 2019). Today, there is a substantially greater presence of EE across the world, with thousands of colleges and universities offering entrepreneurship majors and minors (Fairlie 2013), and schools worldwide are offering annually a vast array of courses to cater to the educational needs of millions of students (Dobson and Muhammad 2022).

The focus of EE has changed over time. Kuratko and Morris (2019) affirm that the first EE courses offered at Harvard University were centered on cultivating the entrepreneurial mindset among students. Also, the increased EE offerings of the 1980s saw the focus moving away from teaching students to become entrepreneurs to the understanding of entrepreneurship in the small business management context, with the hope that students would acquire the knowledge and skills necessary for initiating and managing a prosperous business venture. In the late 1990s, the focus of EE courses again changed, this time away from the promotion of the dynamics involved in entrepreneurship and the effective management of small businesses (Weber 2012). This new focus was on nurturing the development of capabilities in creative thinking and innovative problem-solving which could be applied in a corporate context (Plaschka and Welsh 1990; Chamard 1989); a focus that was geared towards turning students into

more marketable employees for these existing companies (Kourilsky 1995). In more recent times, Kuratko and Morris (2019) say that the focus has again changed, with the present-day focus of EE courses being to give students the knowledge and skills necessary to establish cutting-edge, rapidly expanding, and scalable ventures based on innovative ideas. Due to the emergence of high-tech companies, the belief here is that this focus would lead to the development of scalable, high-potential ventures derived from technological innovation and viable business ideas.

The evolved foci and goals of EE programs are well-intended, moving parallel to the changing landscapes of the business economy. Government policies and academic institutions are actively developing and expanding EE programs since these programs are seen as a method for fostering entrepreneurial engagement. However, Dobson and Muhammad (2022) confirm that these efforts have not resulted in a corresponding increase in new ventures. In a meta-review of 73 studies that covered more than 37,000 students, Bae, Qian, Miao and Fiet (2014) found that EE did not yield statistically significant effects on entrepreneurship activity. The research outcomes from various studies have proposed potential explanations as to why this may be the case. Kourilsky (1995) noted that there was a lack of teaching methodologies in entrepreneurship, suggesting an opportunity to develop innovative programs that could increase the knowledge, skills, and abilities of nascent entrepreneurs. Naia, Baptista, Januário, and Trigo (2015) found that EE programs have grown in the absence of universally accepted teaching and learning approaches, which leaves significant discrepancies between research and practical application in EE. Weber (2012) explained that EE courses offered by universities are no longer designed to promote entrepreneurship and instead are designed to develop students' corporate thinking, meaning that the focus of EE courses is no longer to create entrepreneurs who can establish new business ventures but is now to provide students with a skill set that will turn them into more desirable employees. Previous studies done by Plaschka and Welsh (1990), and Chamard (1989) show that EE programs do not focus on the creation of students who possess entrepreneurial and growth mindsets and innovative thinking.

In response to the literature that suggests that EE has no impact on student intentions, this research is designed to unpack some of the underlying causes and help identify alternative ways to teach so that we can improve the effectiveness of EE. Therefore, to gain a deeper comprehension of the gap between EE and entrepreneurial intention, we studied students at the Tecnológico de Monterrey who were enrolled in the Bachelor of Arts in Entrepreneurship degree. Past research has shown that individuals are not

inherently born as entrepreneurs but rather can develop entrepreneurial skills and traits through education, emphasizing the vital role of education in fostering entrepreneurial skills and how entrepreneurship is taught. This paper is structured in six parts. Following this introduction, Section Two will focus on the contextual framework including the examination of relevant literature and the establishment of a theoretical framework used in this study. Section Three will present a review of the research methodology, methods used in the design, and the hypotheses of the study. Section Four will present the results. Section Five will present a discussion, with practical and theoretical contributions, and Section Six will be a conclusion accompanied by the study's constraints and potential fields for future research.

II. Contextual framework

II.1. *Application of the theory of planned behavior in the entrepreneurial intention*

The Theory of Planned Behavior (TPB) is a theory that predicts human behavior (Ajzen 1985). TPB indicates that if you aim to enhance a particular behavior, it is necessary to increase in intention. Ajzen's (1985) research identifies three factors that influence one's intention to engage in action: *attitudes, subjective norms, and perceived behavioral control (PBC)*. This theory is widely recognized and broadly used to explicate individuals' actions over a range of fields, such as social sciences, finance, and linguistics (Mykolenko, Ippolitova, Doroshenko, and Strapchuk 2022). Likewise, Do Paço, Ferreira, Raposo, Rodrigues, and Dinis (2011) argue that the TPB is a significant model that focuses on intentions and plays a crucial role in explaining the educational process (Do Paço et al. 2011). Originally derived from the field of psychology by Ajzen, this model has been applied to the context of entrepreneurship by Kolvereid (1996). In terms of the EE research context, if you want students to engage in new venture creation, you need to ensure that the EE programs increase students' intention to become entrepreneurs.

Subsequently, we delineate the three variables as conceptualized within the framework of the Theory of Planned Behavior, providing a comprehensive exposition of their roles:

Attitudes encompass the significant beliefs that individuals hold in their cognition, which are linked to positive behavior. The attitude that one possesses is the result of a previous evaluation of experiences and anticipations of future possible outcomes. In the context of EE, a student's attitude as it

relates to the evaluation of entrepreneurship as a viable career choice, the convictions that he or she holds based on an evaluation of previous experiences, and the benefits that can be potentially gained from taking the action.

Subjective Norms are the general beliefs of a group of people who represent the individual’s peer group or social network. In the context of an entrepreneurship student, he or she will consider what others think of people becoming entrepreneurs. The student will wonder if his or her social peers will perceive entrepreneurship as a favorable and esteemed career path, or will the social peers see this option as something negative. This variable can be seen as social or peer pressure, which, in turn, can impact a student’s inclination to pursue entrepreneurship.

Perceived Behavioral Control (PBC) serves as a potent intermediary between intention-behavior and the relationship of attitude and norms with intention. When a person considers his or her behavior to be under control and has the capability of doing business, the person can be successful if choosing to be an entrepreneur. These social pressures are contrasted against one’s willingness to comply (Krueger, Reilly, and Carsrud 2000). Studies have shown that levels of PBC exert the most significant influence on the enhancement of intention and eventual action (Fishbein 2007).

Research has shown that an increase in intention can stimulate the propensity to act. Increasing the three factors – attitudes, subjective norms, and PBC – will lead to increased entrepreneurial intention, resulting in increased levels of entrepreneurial action (Ajzen 1991). This is illustrated below in Figure 1.

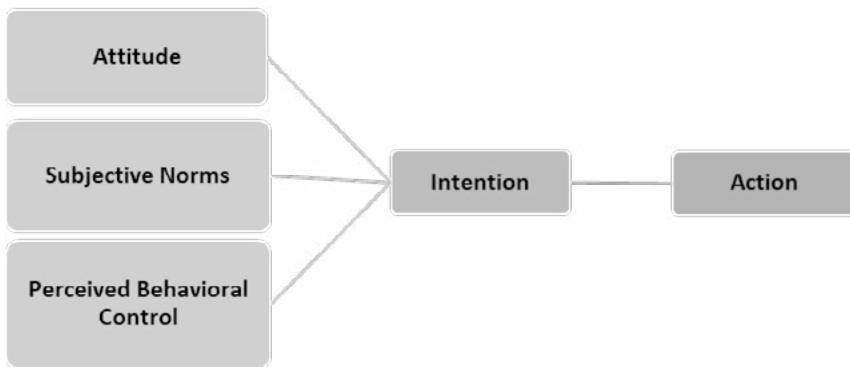


Figure 1

Adapted from Theory of Planned Behavior Ajzen, 1985

II.2. Entrepreneurship education approaches

EE has become a topic of interest to academic researchers, policymakers, academic institutions, and students. This interest has led to more research being carried out on aspects related to the existence of EE in academic settings. The focal points of EE research have varied; Fernández-Nogueira, Arruti, Markuerkiaga, and Saenz (2018) analyzed university ecosystems in Spain. Avila-Merino (2019) investigated the influence of extracurricular activities on students in UK Business School, whereas Eryanto, Swaramarinda, and Nuralmasari (2019) looked at the influence of EE that was developed as a facet of professional training in Indonesia. Research on EE has explored various activities that are representative of EE including business plans, business models, simulations, games, lectures, and case studies. Despite the varied research that exists, none of the studies have identified how entrepreneurs are created. The efforts that have been made towards investments in EE at universities have failed to develop actual entrepreneurs. The issue is academic because the pedagogical framework focuses on teaching students about entrepreneurship instead of on helping students embrace the entrepreneurial spirit (Dobson, Castro-Nieto, Dobson, Moros-Ochoa 2019). Those programs focus on hypothetical coursework instead of action learning through concrete experiences that are designed to develop entrepreneurial problem-solving skills (Dobson and Dobson 2023).

There are different types of programs related to EE. Based on a review of EE-related programs, Liñán (2004) proposed an entrepreneurship taxonomy, presenting different approaches used in EE. In his findings, it was observed that most available programs primarily utilized theory-based approaches, emphasizing the cultivation of students' understanding of entrepreneurship in the realm of small business management. However, he also identified the existence of process-based approaches that centered on educating students about the practical steps involved in launching a business. These process-based approaches encompassed topics such as formulating business models, developing business plans, exploring potential funding sources, and understanding legal structures. Details about these approaches are presented below in Table 1.

Building upon the Liñán (2004) taxonomy, Dobson et al. (2019) incorporated the theory-based and process-based approaches into one taxonomy, a Process/Theory-based learning approach, because the focus is placed on writing hypothetical business plans and models. Introducing the steps to starting a business. The syllabus for these types of courses tends to focus on a series of sequential stages required to start a business. It often

begins with writing a vision and mission statement ending with an exit event such as selling the business. Through this approach, students can demonstrate their knowledge of the entrepreneurial process including entrepreneurial traits and events of opportunity recognition (Dobson et al. 2019). In comparison, Problem-based courses focus activities on active learning where students take responsibility for their learning. This involves inquiry-based learning (Kolb and Kolb 2008) in which students do not know if their ideas are going to work (Dobson et al. 2019). Under the problem-solving approach, students engage in experiences where they reflect, conceptualize, and experiment allowing for the development of entrepreneurial skills through entrepreneurial actions. Dobson et al. (2019) presented a comparison between the Process- and Problem-based learning approaches highlighting teaching methodologies, student roles, activities, learning outcomes, and types of assessments. Table 2 compares the two approaches of EE allowing for a deeper understanding of the methods allowing faculty to reflect on how best to put these approaches into practice.

Table 1
 Entrepreneurship Education Taxonomy in Universities by Liñán (2004)

Type	Methodology	Contents and Characteristics
<i>Education for entrepreneurial awareness</i>	Theory-Based Learning	This type of program focuses on teaching general knowledge about entrepreneurship, which is very common in university academic programs, where the courses that students take are not compulsory. The objective is to promote general knowledge about small businesses, self-employment, and entrepreneurship.
<i>Education for Start-Up</i>	Process-Based Learning	The objective is to promote the legalization of business models that people have been evaluating for a while. The objective of this programming is much more practical and promotes the formalization of the business plan (e.g., financing, legal regulations, formalization of the Start-Up) and the development of entrepreneurial skills, as a fundamental part of the understanding, development, and start-up of the studied enterprise.

Table 2
Process-based vs Problem-based approaches (Dobson et al., 2019)

Course type	Hypothetical-based Courses	Concrete Experience Courses
	Process-based	Problem-based
Assumptions of the Nascent Entrepreneur Learner	Start a hypothetical new venture. Courses teach about the process of starting a new venture.	Solve (market) problems. Active self-directed learning-students decide on how to develop their ideas. Concrete experiences are essential.
Teaching Methods	Theoretical lecturing.	Concrete experiential learning (Dobson & Dobson, 2022).
Role of the Student	Passively taken through a linear process of how to start a hypothetical business or develop a hypothetical business model in relation to management.	a self-directed learner who constructs their nonlinear journey of entrepreneurship and actively seeks experiences to become self-determined in their learning.
Activities	Write a hypothetical business plan, conduct marketing analysis, assess financial feasibility, read case studies, and use simulations.	1. identify and analyse a real problem; 2. determine prior knowledge of the underlying and related concepts to solve the problem; 3. identify and address knowledge gaps related to solving the problem; 4. outline and evaluate possible solutions; 5. attempt to solve the problem; and 6. report the findings. 7. Repeat and Iterate to improve the outcome. (Dobson & Dobson, 2023).
Learning Outcomes	Learning about entrepreneurship.	How to learn to be an entrepreneur.
Assessments	Summative and formative assessments based on predetermined best practices of teacher-centric activities.	Time spent working on own venture, self-reflection, journaling, incorporating feedback to improve their idea, iterating the business idea, and demonstrating learning.

Crispin, Dibben, Hoell, McAuley, and Miles (2018), in their study analyzing various university EE programs in the Australasia region, identified three alternative approaches: a “teaching” approach which incorporates academic-based courses; a “try” approach, which incorporates participatory experiential projects and consultation-driven methods that allow students to “try” entrepreneurship; and an approach which combines aspects of both the “teaching” and “try” approaches, combining the best elements of both approaches. Information about these approaches is presented in Table 3:

Table 3
Approaches to Entrepreneurship Education
in Australasian Universities (Crispin et al., 2018)

EE Approach Type	Characteristics of the EE Approach
<i>Teaching about Entrepreneurship</i>	<p>Programs incorporating this approach typically build on the “foundations of entrepreneurship” and business planning classes. Entrepreneurship theories and concepts are provided to many students in an efficient manner.</p> <p>These programs use the traditional lecture, textbook, and test approach. Instructors lecture on the topics, reinforce the materials provided in textbooks, and use tests to assess the students’ learning.</p>
<i>Trying Entrepreneurship</i>	<p>Programs using this approach incorporate an active learning approach to entrepreneurship which allows nascent entrepreneurs (entrepreneurs who engage in creating new ventures) an opportunity to decide if they have an interest in being proactive and taking the risk to use innovation to exploit opportunities.</p> <p>These programs are based on a very active hands-on approach which focuses on Jones’s (2011) 4Cs of entrepreneurship education, where students (1) conceive, (2) create, (3) capture, and (4) critique value in engaging and reflective activities or “trying entrepreneurship”. Under this approach, student learning assessment is often more subjective.</p>
<i>Teaching and Trying Entrepreneurship</i>	<p>Programs use a blended approach that incorporates the best elements of the Teaching and Trying approaches.</p> <p>Under this approach, students are first taught core entrepreneurship and business fundamentals, and then they “try” entrepreneurship, either by applying their knowledge in consulting with small businesses on real problems, or by becoming involved in starting new enterprises.</p> <p>These experiences reinforce the “taught” knowledge and allow students to reflect on what they need to know and provide students with additional classes that help to reinforce their skill and knowledge deficiencies. For example, a marketing student who takes a class in international business to understand the process of exporting.</p>

From their research findings, Crispin et al. (2018) found that in the Australasia region, the most prevalent learning approach used is the “teaching” approach, which presents the question of the intended goals of EE programs in this region and the impact academic institutions want to create through their students.

Drawing upon the foundational research conducted by Dobson et al. (2019), as well as previous research conducted by Peterman and Kennedy (2003), Souitaris, Zerbinati, and Al-Laham (2007), and Oosterbeek, Van Praag, and Ijsselstein (2010), which illuminate the heterogeneity in teaching methodologies and their consequent differential impacts on student outcomes, this study underscores the imperative for an in-depth examination of these variances. It articulates the need for educational strategies to be meticulously tailored, to optimize learning effectiveness. This discourse catalyzes the call for augmented research into EE, with a specific focus on elucidating the multifaceted roles played by various stakeholders within the academic entrepreneurship ecosystem in the design and delivery of training programs aimed at university students. Moreover, the pursuit of pedagogical innovation within entrepreneurship education emerges as paramount. This encompasses a comprehensive understanding of extant educational paradigms, the anticipatory needs of emergent generations, and the development of pedagogies that are congruent with the contextual realities and exigencies confronting students. Such an approach is pivotal in fostering an entrepreneurial ethos and enhancing entrepreneurial intentions, notably through the integration of problem-based learning methodologies.

EE has been thoroughly examined across various cultural contexts, underscoring the need for tailored pedagogical approaches. Studies like those by Moriano, Gorgievski, Laguna, Stephan, and Zarafshani (2012) explore the Theory of Planned Behavior’s predictors across nations such as Germany, India, and Spain, finding universal effects of attitudes and perceived behavioral control on entrepreneurial intentions, with subjective norms varying by culture. Research has evolved from teaching how to start businesses to recognizing entrepreneurial opportunities, including digital ventures, reflecting a shift towards experiential learning as highlighted by Ferreira (2020). This emphasizes the importance of a blended learning approach. Lastly, the role of EE in developing entrepreneurial competencies is crucial for long-term success. Lans, Verstegen, and Mulder (2011) highlight the importance of identifying opportunities and leveraging social networks and resources effectively. A systematic literature review by Shabbir, Batool, and Mahmood (2022) highlights this evolution, revealing an

increasing focus on outcome-oriented factors of entrepreneurship education, such as fostering innovative mindsets and practical skills among students

Given the importance of entrepreneurial activity to world economies, EE programs must ensure that students' intention increases for students to act and to encourage new venture creation. It is therefore essential that academic institutions are aware of the different learning approaches applied in EE programs and understand the impact that these approaches can potentially have on intent. This research emanates from the DYME Institute and various universities as an integral component of an established research line in the field of entrepreneurship. Its objective is to study entrepreneurial intention within the academic context, using the Theory of Planned Behavior and EE as theoretical frameworks. Understanding what occurs within the classroom regarding entrepreneurial intention helps academics grasp the foundation of the subject and enables them to implement more effective and tailored strategies to meet students' entrepreneurial development needs. This implies that academics gain a clear insight into the strengths and challenges students face concerning entrepreneurship, allowing them to design more focused and relevant educational programs. Improving the quality of entrepreneurship education contributes to the development of skills and competencies necessary for entrepreneurial success, thus positively impacting the academic sphere and the formation of future entrepreneurs.

III. Research methodology

III.1. University context

This research study was conducted at Tecnológico de Monterrey (Tec de Monterrey), an esteemed educational institution founded in Mexico in 1943 under the visionary leadership of Don Eugenio Garza Sada and a collective of entrepreneurial individuals who established a non-profit association known as Enseñanza e Investigación Superior, A.C. As a private, non-profit organization, Tecnológico de Monterrey is deeply committed to delivering high-quality higher education in the country. It operates autonomously and remains unaffiliated with any political or religious entities. The university and its various campuses receive substantial support from civil associations comprising a distinguished group of influential leaders from across Mexico. These civil associations share a common dedication to the advancement of excellence in higher education. Annually, the board members of these associations convene to establish the strategic objectives that will guide the university's major decisions and initiatives, aligning with its overarching

mission of driving societal and national development. Through this research project, conducted in adherence to formal and rigorous academic standards, Tec de Monterrey aims to contribute valuable insights to the field of education and advance the knowledge base to enhance educational practices and benefit both local communities and the nation at large.

Tec de Monterrey is a well-recognized Mexican university, with twenty-six main campuses throughout the country, which has recently implemented a new educational approach. Also, it is part of the international rankings, for example, in the Princeton Review's Top Undergraduate Schools for Entrepreneurship Ranking 2023, where it is ranked in 4th place. Hence, it is deemed a highly significant university to be included in the examination of entrepreneurship and the programs they cultivate.

The undergraduate program of the business school at Tec de Monterrey is designed for students to experience all areas of business before deciding on the area they would like to specialize in. This program lasts for eight semesters. Students take these various courses, along with a choice of general educational courses, in the first three semesters of the program. During the third semester, students select their degree majors, which they then begin in the fourth semester and end in the eighth semester of the program. Each semester is divided into three periods, each period lasting for five weeks, and students take two to three courses per period. The degree of focus for this research study – the Bachelor of Arts in Entrepreneurship – is offered at select campuses of the university.

III.2. About the program and its participants

The Bachelor of Arts in Entrepreneurship at Tec de Monterrey is a specialized program where the focus is on providing individualized attention to students to help with the development of their entrepreneurial projects. As a result, the program accepts a maximum of 25 students to maintain this individual attention. While it is not as common to use a small sample size it is a valid research method (Scheaffer, Mendenhall III, Ott, and Gerow 2011, 60-63; Yin 2013). The new educational model consists of two types of courses: Subjects and Blocks. A Subject is a set of content and learning activities whose aim is to provide students with theoretical and practical training which is generally linked to a discipline. In some cases, several disciplines could be incorporated. The Subject is taught by one professor. A Block, on the other hand, is a training unit that is comprised of modules and challenges, which together are aimed at the development of mastery levels of sub-competencies that are associated with disciplinary competencies – knowledge, skills,

attitudes, and values considered necessary for professional practice – and transversal competencies – competencies that are useful for the life of the graduate which have a direct impact on the quality of the exercise of the profession. The challenge is carried out in collaboration with a Training Partner, which is an existing company that the university partners with that is typically looking for help in business development or business expansion. Each module as well as the challenge is handled by a different professor, resulting in Blocks being taught by multiple professors. The subjects are independent of the blocks that are studied in parallel during the same academic period. Students take one Subject and one Block over the five-week duration of each period. It is noteworthy that student participants in the class experienced two types of EE teaching methodologies: theory-based and process-based.

To conduct this research, 25 students enrolled in the 4th semester of the Bachelor of Arts in Entrepreneurship program in the Western Region of Tec de Monterrey were studied. The idea behind structuring the program in this way was to create an immersive and holistic experience for the students; the institution wanted students to be able to benefit from having more one-on-one relationships with the professors, where students felt comfortable enough to discuss their projects, obtain advice, experiment, and overall, not be afraid to engage in the entrepreneurship process. In addition, students would be able to engage in self-reflection and achieve personal development, gaining a deeper understanding of who they are as entrepreneurs. The environment created allows students to network and develop an entrepreneurial family, in a sense, involving other students, professors, and alumni. These goals would easily be accomplished by having a small size, in comparison to the larger groups of the other business school undergraduate degrees, where this dynamic, according to the students of the other programs, is not present. The focus of the 4th semester, which is when students officially begin the Bachelor of Arts in Entrepreneurship, is on Opportunity. It is noteworthy that student participants in the program's courses experienced two types of EE teaching methodologies: theory-based and process-based. Table 4 shows the courses students took during the 4th semester and the associated learning objectives.

In compliance with ethical standards, this study underwent a comprehensive ethical review to ensure the welfare of the student participants. We meticulously designed our research protocols to eliminate any form of coercion. The voluntary nature of participation was emphasized, and students were informed they could withdraw at any time without any consequences. Informed consent was obtained from each participant, ensuring they were fully aware of the study's purpose, procedures, and potential impacts. Anonymity and confidentiality were upheld rigorously to encourage open and honest responses.

Table 4

The 4th Semester Courses and Associated Learning Objectives of the Bachelor of Arts in Entrepreneurship Program at Tecnológico de Monterrey

Course Name	Period Offered	Course Type	Learning Objectives
High-Impact Exploration	1	Block	<p>to detect entrepreneurial opportunities through the analysis of market trends found in technological and prospective observatories.</p> <p>to perform micro and macro analyses of markets.</p> <p>to support the information obtained with the use of data analysis tools.</p> <p>to establish strengths, weaknesses, opportunities, and threats in the context of a company using specialized methodologies.</p>
Corporate Entrepreneurship Opportunities	1	Subject	<p>to understand the basic concepts of Corporations and Family Business.</p> <p>to gain knowledge and understanding of the business environment of Corporations and Family Businesses.</p> <p>to properly identify opportunities for Corporate Entrepreneurship.</p> <p>to detect in a timely, accurate and simple way situations that allow innovation, and boost competitiveness, seeking to ensure sustainable growth and permanence in the market.</p>
Evaluation and Communication of Opportunities	2	Block	<p>to evaluate opportunities within current trends as a line for the flourishing of companies.</p> <p>to evaluate opportunities through impact measurement methodologies.</p> <p>to seek to avoid resorting to entrepreneurship out of necessity.</p> <p>to prevent sacrificing the impact and level of innovation that can be achieved by the urgency of keeping the company alive.</p> <p>to develop a relational capital strategy with the main stakeholders considering benefits and risks.</p> <p>to argue the key points of an entrepreneurial project, through oral and written language, according to the interest of the audience and the objectives of the communication process.</p>

Course Name	Period Offered	Course Type	Learning Objectives
Innovation in the Value Chain	2	Subject	to identify innovative opportunities in an organization’s value chain. to propose entrepreneurship through the reconfiguration of the organization’s resources, taking social megatrends, demographic factors, and technological factors as a reference.
Opportunity and Solution	3	Block	to analyze opportunities, determining desirability, viability, and feasibility. to define solutions that a company can implement, based on selected opportunities. to validate proposed solutions.
Entrepreneurial Leadership	3	Subject	to gain a conceptual and practical understanding of entrepreneurship ecosystems, stakeholders, and entrepreneurial leaders. to be able to incorporate the human talent appropriate to the needs of an entrepreneurial project.

The data was collected via an anonymous link sent to the students. This survey used a seven-point Likert scale designed to test the variable found in the TPB. The data was collected at the beginning of the semester (T1) and the end of Period 1 (T2), enabling us to assess the influence of the courses taken during the period on students’ entrepreneurial attitude, perceived behavioral control, and intentions as the students progressed through the courses. Following the previous publication by Mykolenko et al. (2022) and as part of the scope of this research, we considered the two independent variables that are more willing to indicate the potential towards the intention – attitudes and PBC – to construct our hypotheses (See figure 2).

As part of this study, we analyzed the correlation between the independent variables (attitude towards entrepreneurship and insight of behavioral control) to the dependent variable (intention to become an entrepreneur) prior to the start (T1) and after their exposure (T2) in the academic entrepreneurial environment. The methodology of this investigation is under the theoretical framework of the TPB. Conversely, subjective norms, which constitute a third component of the TPB model, often exhibit no significant influence on entrepreneurial intentions (Barba-Sánchez 2018). This case is explained by the following variables: the attitude towards entrepreneurial conduct, perceived autonomy in implementing entrepreneurial behavior, and the intention to adopt an entrepreneurial role.

III.3. Hypotheses

This research is based on 5 hypotheses, which include:

H1: Prior to the period (T1), students’ attitudes will be correlated with the intention to become an entrepreneur.

H2: Prior to the period (T1), students’ perceptions of behavioral control will be correlated with the intention to become an entrepreneur.

H3: At the end of the period (T2), students’ attitudes will be correlated with the intention to become an entrepreneur.

H4: At the end of the period (T2), students’ perceptions of behavioral control will be correlated with the intention to become an entrepreneur.

H5: At the end of the period (T2), there will be no statistical change in students’ attitudes, perceptions of behavioral control, and intentions to become an entrepreneur.

These hypotheses are illustrated below in Figure 2:

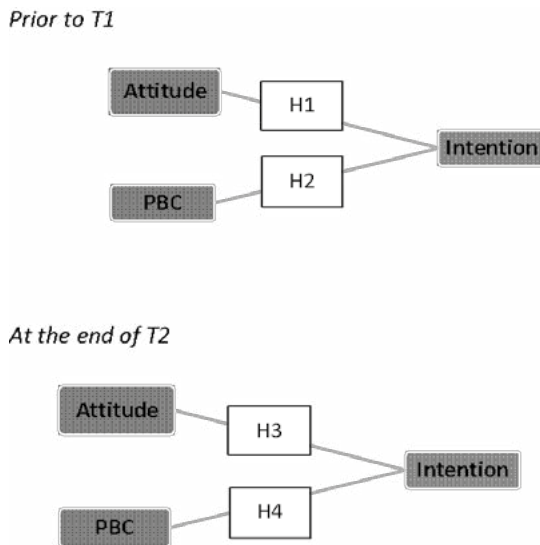


Figure 2
Research Hypotheses

III.4. About the methodological instrument

Students responded to five questions that measured their attitudes toward entrepreneurship. Specifically, participants were posed the following: *A career as an entrepreneur is attractive*; *If I have the opportunity and resources, I'd like to start a business*; *Being an entrepreneur would entail great satisfaction for me*; and *Among various options, I would rather be an entrepreneur*. They were asked to indicate responses using a 7-point scale (1 = completely disagree and 7 = completely agree).

In terms of PBC, participants were asked to indicate responses on a 7-point scale (1 = completely disagree and 7 = completely agree): *I am ready to start a viable business*; *I can control the process of creating a new business*; *I know the practical details necessary to start a business*; *I know how to develop an entrepreneurial project*; *If you tried to start a business, you would have a high probability of succeeding*; *I have enough knowledge to be a successful entrepreneur*; *I have the necessary skills to be a successful entrepreneur*; and *I have the necessary skills to be a successful entrepreneur*.

And the last variable was entrepreneurial intention with five statements that were assessed. They indicated responses on a 7-point scale (1 = completely disagree and 7 = completely agree): *My professional goal is to become an entrepreneur*; *I will make every effort to start and run my own business*; *I have very seriously thought of starting a business*; and *I have a strong intention to start a business someday*. For the within-group comparison, responses were averaged into indices of entrepreneurial intention at T1 ($\alpha = .70$) and T2 ($\alpha = .72$).

Dobson et al., (2019); Dobson, Jacobs, and Dobson (2017); and Do Paço et al., (2011) applied and validated the survey instrument used to test the sample in this research. Cronbach's alpha was used to test reliability (α). Next, the statistical description (Table 5) of the variables at each time (T1, T2) was presented. Then, the data was analyzed using the Shapiro-Wilk test (Table 6). A Spearman correlation test (Table 7) was used to confirm whether there was a relationship between the study variables (H1, H2, H3, H4). Finally, a Friedman test (Table 8) was used to identify the statistical significance of the changes in the independent variables (Attitudes and PBC) and the dependent variable (intention) (H5) over time.

To get the descriptive data results, we based our methodology on the literature and applied SPSS software (Hinton, McMurray, and Brownlow 2014). We used the Shapiro-Wilk test to measure the normality, the Spearman correlation for the variable intention, and the Friedman calculation (Subramanian 2018; Thomas and Santha 2018; Ajayan and Santha 2018), which measures the continuous distribution of the origin of non-parametric statistics and was selected because there were two points of data collection.

IV. Results

In our analysis, responses were aggregated to calculate Cronbach’s Alpha (α) for various constructs: attitudes toward entrepreneurship at T1 ($\alpha = .94$) and T2 ($\alpha = .65$); Perceived behavioral control (PBC) at T1 ($\alpha = .91$) and T2 ($\alpha = .77$); and Entrepreneurial intention at T1 ($\alpha = .70$) and at T2 ($\alpha = .72$). This analysis revealed a discernible decline in the reliability of scales from T1 to T2 within this specific cohort. Notably, while initial responses suggested a high level of confidence among participants at T1, the statistical analysis indicated a lack of consistency in these perceptions at T2. The observed decrease in Cronbach’s Alpha values from T1 to T2 signified a reduction in participants’ self-reported perceptions across the measured variables, highlighting a statistically significant shift in expectations and self-assessment over the study period.

The initial analysis of the dataset involved descriptive statistical measures, as detailed in Table 5, utilizing SPSS software for the normality tests. This table presents a comparative overview of the pre- and post-evaluation changes across the studied variables. Specifically, the attitude towards entrepreneurship recorded a slight decrease, from a mean of 6.90 at the outset of the study (T1) to 6.88 at its conclusion (T2), though this variation is not statistically significant. Conversely, the perceived behavioral control (PBC) witnessed a modest increase in its mean value, from 5.76 at T1 to 6.10 at T2. Additionally, it was observed that for PBC, the median is between 5 and 6 at both T1 and T2. Similarly, for entrepreneurial intention, responses remained consistent around a mean of 6 at both observation points. This analysis underscores subtle shifts in the variables, indicating nuanced changes in students’ perceptions over the study period.

Table 5
Descriptive Statistics for Attitude, PBC, and Intention

Outcomes	T 1		T2	
	M	SD	M	SD
Attitude	6.90	0.30	6.88	0.38
PBC	5.76	1.26	6.10	0.73
Entrepreneurial Intention	6.78	0.64	6.80	0.49

In Table 6, we selected Shapiro-Wilk as the normality test, since our sample is not greater than 30. The normality test identified that the only

normal variable is PBC at T1 and T2. Therefore, the treatment of the data was run using a correlation for non-parametric tests. The degrees of freedom were 25 and the level of significance (p-value) for most of the variables was greater than 0.05, which means that they are normal. However, the subjective norm variable in each T was not normal, with significance values less than 0.001.

Table 6
Test of Normality

Normality Tests			
	Shapiro-Wilk		
	statistic	gl	Sig.
AttitudeT1	,270	25	<,001
AttitudeT2	,476	25	<,001
PBCT1	,906	25	,025
PBCT2	,975	25	,776
IntentionT1	,505	25	<,001
IntentionT2	,675	25	<,001

Table 7 presents the Spearman correlation. For the group that was evaluated, it can be affirmed that there is some relationship between the variables:

Table 7
Spearman's Correlations at T1 and T2

	Spearman's correlations	Dependent Variable	
		Intention	
		T1	T2
<i>Independent Variables</i>	Attitude	0.326	0.423*
	PBC	0.385*	0.238

* The correlation is significant at the level 0.05 (bilateral).

Based on Spearman's correlation (Table 7) we were able to identify the level of correlation between the variables at each point in data collection. The data analysis indicates a strong correlation between Attitude and Intention at T2. Interestingly, there is a correlation between PBC and Intention at T1, but the correlation decreases at T2. A positive association existed between the independent variables and the dependent variable, indicating a positive relationship between these constructs. Therefore, the attitude concerning the intention increased once exposed to the courses (T2), and when identifying the realities once immersed in the courses, the correlation of PBC with respect to the intention decreased (T2). Thus, with Spearman's correlation, we were able to determine the following:

H1: Prior to the period (T1), students' attitudes will be correlated with the intention to become an entrepreneur – There is not enough evidence to accept this, therefore this study does not reveal it.

H2: Prior to the period (T1), students' perception of behavioral control will be correlated with the intention to become an entrepreneur – Accepted.

H3: At the end of the period (T2), students' attitudes will be correlated with the intention to become an entrepreneur – Accepted.

H4: At the end of the period (T2), students' perception of behavioral control will be correlated with the intention to become an entrepreneur – There is not enough evidence to accept this, therefore this study does not reveal it.

H5: At the end of the period (T2), there will be no statistical change in students' attitudes, perception of behavioral control, and intention to become an entrepreneur – Accepted.

The analysis employed the Friedman test, a non-parametric statistical test that extends the Wilcoxon test to evaluate data from repeated measures on the same subjects across more than two time points. This method is particularly suited for groups comprising three or more matched subjects, as detailed in Table 8. According to the Friedman Test Calculator (2021), the test scrutinizes the variables' distribution by analyzing the data's range at each measurement point. Its objective is to ascertain whether the variables exhibit a consistent distribution from a common origin. From the analysis of the data spanning from T1 to T2, the outcomes derived from the Friedman Test Calculator indicated that the variations observed in the variables under study did not reach statistical significance at the $p < .05$ level, as illustrated below:

Table 8
Friedman Calculation of the Variables at T1 and T2

Variables	T1 – T2	
	X2r	p-value
Attitude	0.8167	.36616
PBC	0.2667	.60558
Intention	0.8167	.36616

Below, in Figure 3, data showing the impact of hypothetical-based courses on students’ attitudes, PBC, and entrepreneurial intention was presented as a flatline. From T1 to T2 the scores are statistically similar across all measures, indicating that taking an EE course has no discernible impact on students’ intentions to pursue an entrepreneurial path.

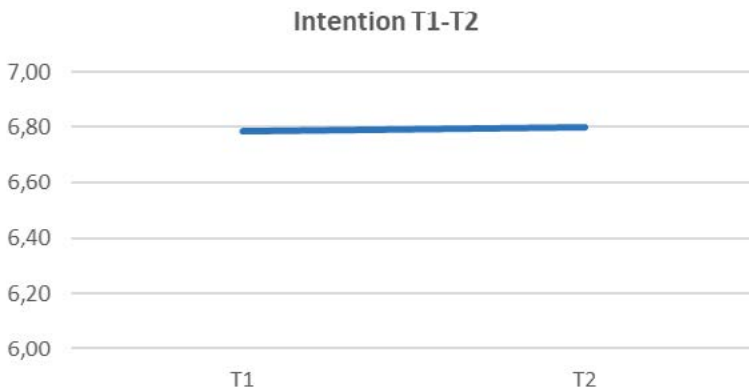


Figure 3
Pre- and Post-Changes in Student Entrepreneurial Intention

Even though the courses experienced both theory-based and process-based teaching methodologies, the results showed higher self-confidence at the beginning with a high intention (T1). However, the courses allowed participants to have a greater understanding in a way that a statistically significant change is not evident.

Based on the data analysis derived from the student surveys at the beginning and end of the first period, results indicated subtle yet significant

shifts in attitudes, PBC, and entrepreneurial intention. These shifts suggest that even within a limited timeframe, the EE program can influence key psychological constructs related to entrepreneurship. This empirical evidence addresses how changes in student perceptions, as captured through the surveys, can inform the continuous improvement of the program's structure and execution. Furthermore, the correlation between attitudes and PBC with entrepreneurial intention underscores the importance of these constructs in shaping the entrepreneurial ecosystem within the university. By closely examining these changes, we can better understand the specific aspects of the entrepreneurship education program that are most effective, as well as areas that may require further refinement. This approach aligns with a deeper exploration of how the identified elements impact program development.

V. Discussion

The results of this study, based on a sample from Tec de Monterrey, are not generalizable to the entire Mexican population. However, they provide valuable insights for the university to continue developing strategies for EE. By examining the impact of EE on students' entrepreneurial intentions within the specific context of the institution, strengths and areas for improvement can be identified. This study represents a step towards optimizing strategic decision-making and fostering enhancements in educational programs. The small sample size, inherent to the customized course structure aimed at facilitating direct engagement between instructors and students, underscores the tailored approach to teaching and learning in entrepreneurship. This research contributes to the field, offering a framework for future studies within such personalized learning environments. While the results may not be applicable on a national scale, they contribute to the growth and development of future entrepreneurs within the student community at Tec de Monterrey. Furthermore, this study's findings may serve as an initial reference for broader and more representative research in the future.

The study identifies valuable opportunities for refining EE programs through detailed statistical analysis encompassing Descriptive Statistics, Normality Tests, Spearman's Correlations, and Friedman's Calculations. It highlights how subtle adjustments in attitudes, PBC, and intentions, stemming from educational interventions, can significantly enhance the effectiveness of educational programs. This approach does not point to flaws in current practices but instead illuminates pathways for innovation and continuous improvement, encouraging a reflective and adaptive review of pedagogical

strategies. This work contributes to the field, prompting a collaborative effort to explore and expand the boundaries of teaching and learning entrepreneurship.

This research helps expand our understanding of the role that the academic entrepreneurial environment has on students' attitudes, perceived levels of behavioral control, and intentions to become an entrepreneur. It appears that combining both theory-based and process-based courses has no statistically reliable change in student intention. It also appears that there is dissonance in teaching approaches that focus on coursework that relies on hypothetical assumptions about the viability of a business idea, learning about other experiences, and the stated goal of EE to develop the next generation of entrepreneurs. It is required to change the assumption that university students are job seekers instead of the next professional with an innovative mindset to create new business models that change behavioral consumption in the market. To begin this change in the academic entrepreneurial environment, scholars and administrative managers must change the way they conceive entrepreneurship and not be afraid to implement new andragogy learning approaches in the academic environment that boost students who trust in the academic environment and choose the university as a safe place to make mistakes while they are learning to track their entrepreneurial paths.

During the period researched, the students' attitudes, PBC, and intentions about entrepreneurship did not change. While there was a slight increase in intention to become an entrepreneur, this change was not statistically significant. We accepted hypotheses H2, H3 and H5. Universities, entrepreneurship courses, and entrepreneurship programs are being challenged by a new generation of students, and university directors, deans, provosts, and professors must work collaboratively and cooperatively to respond to the changes that entrepreneurship requires within the university and meet the new needs of each academic context. Dobson et al. (2019) contemplated the educational approaches used in EE programs as the main issue in the ineffectiveness of developing entrepreneurs, indicating that hypothetical coursework removes the excitement and uncertainty of real entrepreneurship and replaces it with the triviality of business plans and models, which do not reflect how entrepreneurs learn to become entrepreneurs. If the purpose of EE programs is to increase entrepreneurial intentions and ensure creativity, innovation, and the creation of new ventures, programs must be structured in a way that will guarantee that students indeed learn how to become the entrepreneurs that world economies require.

The factors of the TPB can be used to analyze entrepreneurial programs; in the context of this study, attitudes and PBC. Students must have positive

attitudes about entrepreneurship and for this to occur, they must have a deeper experience of the process of entrepreneurship and the contextual factors in which it operates. Developing a more favorable attitude towards entrepreneurship could also be stimulated by a student's group or network. It is vital for students to have the capacity to proficiently communicate and establish connections with peers and mentors, as this enables them to exchange ideas and seek valuable advice. Universities must help to establish these networks – ones consisting of, for example, university professors and others in the university ecosystem, business advisers, mentors, external entrepreneurs, and university alumni – while encouraging students' informal networks consisting of family members, friends, and peers. The role of these networks is for the students to learn more about the realities of entrepreneurship, obtain feedback on potential ideas, make connections, and ultimately acquire a potentially positive outlook on what it is like to be an entrepreneur.

Previous research on the TPB has shown PBC levels to have the strongest influence on increased intention. In the context of EE, it is important that students, in simple terms, believe that they can engage in entrepreneurship. Participation in entrepreneurship courses can change how the students perceive the control of their behavior with regards to entrepreneurship – they have control over their ideas; they have control over their business models; and they have control over the projects that they want to develop. Since existing literature has shown that universities are essentially creating job seekers who use their skills in employment within existing companies, EE programs need to identify student needs based on the “current reality”. Considering the importance of entrepreneurship to the enhancement of world economies, through business creation and job creation, students must understand the existence of entrepreneurship both in the context of corporations and in the context of small businesses. For students to efficiently engage in entrepreneurship, students must receive all the knowledge, tools, and skills necessary to function as entrepreneurs and problem solvers in any capacity.

In thinking about the elements above, it is essential to keep updating and working on the syllabus, enhancing activities and methodological teaching to consider how students' entrepreneurial intentions can be increased, which is the case for Tec de Monterrey, working on proposed new methods implemented by professors in class. Hence, it is imperative to comprehend the context to fully grasp the significance and implications of the sample. We noticed that the students in this study began with high entrepreneurial intentions. These students decided to select this degree. They wanted to participate in the EE programs, which demonstrated the interest of the students to become

entrepreneurs and learn how to be entrepreneurs, which explains the high mean at T1 in the entrepreneurial intention variables. Besides the undergraduate business school, where students are required to take entrepreneurship courses at any point during the first three semesters, elective courses in entrepreneurship are also offered to the other schools of the institution including, for example, Engineering, Creative Studies (such as Architecture and Communication), and Law. Non-business school students select these elective courses because they identify entrepreneurship as being important to them and their future careers. Taking elective courses is one way of incorporating entrepreneurship into student learning. However, other schools of the institution can consider the learnings acquired by the business school and use this information to develop EE options that could benefit their students and help them obtain the knowledge, skills, and competencies that they require.

Entrepreneurship takes different forms and students want content that relates to their career goals. Communication is key – we need to listen to the students and identify and outline what they are looking for. In understanding the students and what they are seeking, we will be able to ensure that EE programs are structured in a way that provides these, creating courses based on the different entrepreneurship scenarios available. In the case of Tec de Monterrey, we acknowledged that the methodologies being used are good and appropriate because there is no change, the students keep their entrepreneurial intention from the beginning of the period until the completion of the courses in the first period. However, there is a need for more action-oriented methodologies – methodologies that are more “realistic”. Implementing problem-based learning could potentially generate a significant change in entrepreneurial intention through increased positive attitudes and PBC levels. Combined educational approaches could generate the required increased entrepreneurial intentions within students – it just requires continuous review and incorporation of students’ views and needs.

The results not only shed light on the initial efficacy of the EE program but also prompt a reevaluation of its components in light of the minimal changes detected between the commencement (T1) and the conclusion (T2) of the period. Through this exploration, we aim to contribute to the ongoing dialogue on optimizing EE to foster robust entrepreneurial intentions among students within a highly entrepreneurial academic ecosystem.

VI. Conclusion

In conclusion, the TPB is a well-known and tested tool to measure the intention to become an entrepreneur. In this sample, we were able to find the

correlation in two cases (H2 and H3). In this study, it was found that students' perceptions of behavioral control (H2) were positively correlated with their intentions to pursue entrepreneurship. Furthermore, at the conclusion of the study period, students' attitudes were also found to be positively correlated with their intentions to become entrepreneurs (H3). Also, the Friedman Calculator let us evaluate the statistical change from T1 to T2, the results show that the variables studied did not statistically significantly change with a value of $p < 0.05$. The findings from this research study show that a combined theory- and process-based educational approach in class did not statistically change student entrepreneurial intention; this was despite previous research showing this combined approach incorporates the best elements of both approaches, where students learn about entrepreneurship and engage in the entrepreneurial process. For this reason, Tec de Monterrey is actively focused on augmenting the entrepreneurial ecosystem for students, encompassing both the educational environment within the classroom and the external opportunities available to them, which promotes, in the students, the desire to create value for society through entrepreneurship.

Throughout the study's duration, the research participants' entrepreneurial intentions remained essentially unchanged. It might be helpful for the program to make some necessary adjustments to courses to increase entrepreneurial intention. It is important to explore whether university-based EE is creating entrepreneurs. Further research should explore how higher-education institutions are evoking the entrepreneurial mindset through effective EE approaches, using the findings as a model or guide. Additional areas of research should focus on the impact of EE programs that employ active learning with concrete experiences for students (Dobson and Dobson 2022), and the impact of EE programs that incorporate the blended approach at the undergraduate level in universities on entrepreneurial intention; with the elements of the Theory of Planned Behavior – Attitudes, Subjective Norms, and PBC – all being explored. This could provide us with an investigation into the “right” balance of theory and practice if we are to effectively create and develop entrepreneurial students.

Limitations

There are limitations to this research since the sample corresponds to students in a personalized program. Therefore, the results of this study are not extrapolatable to the population of Mexican university students. Also, as the study was for a short period of five weeks, we are not certain if there would have been a different impact for the entire semester. We are in the

process of collecting data to track the long-term impact of these courses; for example, what the difference would be in entrepreneurial intention if students were followed for an entire semester. A further limitation is that we only looked at a subset of the students in the Bachelor of Arts in Entrepreneurship degree. As a result, it would be interesting to increase our sample size and repeat the study to have an overview of the impact of the entrepreneurship degree at this university, exploring whether there is an overall statistical change in the entrepreneurial intention of the students.

Future research

The findings from this study underscore the imperative for expansive research endeavors within the realm of Entrepreneurship Education (EE). A nuanced exploration is warranted to comprehend the multifaceted roles of stakeholders within the university's entrepreneurial ecosystem. These actors, through various capacities, contribute to the conceptualization, development, and implementation of academic entrepreneurship training programs tailored for university students. Such research is pivotal in delineating the dynamics and influences that shape the effectiveness and reach of EE initiatives.

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