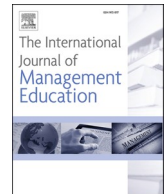




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Entrepreneurial thinking: A signature pedagogy for an uncertain 21st century

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ABSTRACT

This paper outlines a pedagogical approach for entrepreneurship education, with a specific focus on students who do not necessarily identify as entrepreneurial. We advance seven essential and teachable entrepreneurial thinking skills (ET-7) to form future leaders: (1) problem solving, (2) tolerance for ambiguity, (3) failing forward, (4) empathy, (5) creativity with limited resources, (6) responding to critical feedback, and (7) teamwork approach. ET-7 offers an integrative framework that unites previously distinct perspectives of entrepreneurial competencies, and outlines how to teach and develop these skills in a 12-week mandatory entrepreneurship course through an innovative pedagogical approach. This approach to entrepreneurial education was built on the concept of a *signature pedagogy* (Shulman, 2005) and encompasses three components (i.e., the flipped classroom, learning through failure, and access to open educational resources). This pedagogical approach to entrepreneurial education supports entrepreneurial learning through experiential activities that simulate the environment entrepreneurs face. Thus, this paper contributes to the literature by outlining the entrepreneurial thinking skillset (ET-7) required to be successful in today's modern careers, along with considering the methods, tools, and pedagogy that is most likely to support ET-7 skill development.

1. Introduction

Undergraduate students will face a vast and increasing number of open, complex, dynamic, and networked problems in their future careers (Dorst, 2015). For example, new graduates will work in many different sectors such as health care policy, alternative energy, and agriculture – all of which strive to innovate, and thus demand a new type of skillset and ways of thinking (O'Connell, McNeely, & Hall, 2008). As such, new graduates require more than just explicit and procedural types of knowledge in order to be successful in today's changing technological, political, and social climates. We argue that all undergraduates require an *entrepreneurial thinking skillset*, which should not be limited to only nascent entrepreneurs. This will allow new graduates to adapt to the shifting needs of today's markets and industries. As educators, it is our responsibility to (1) identify the key competencies that will be essential for future leaders, and (2) offer the most effective methods of delivering entrepreneurial educational content in order to develop these new competencies.

Shulman (2005) defined the characteristic ways of teaching and learning competencies in a particular profession as a *signature pedagogy*. For a wide range of businesses, however, the previously valued professional competencies and skills are under threat from

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technological innovation as well as social and environmental pressure, which has led to significant disruption in many business models. For example, the impact of artificial intelligence, climate change, as well as global health and disease demonstrate that economic scenarios have radically changed over the past decade. The [World Economic Forum \(2019\)](#) highlighted these changing times, and commented: “Is the world sleepwalking into a crisis? Global risks are intensifying but the collective will to tackle them appears to be lacking” (p. 6). According to [Shulman \(2005\)](#), uncertain social, economic, and environmental challenges provide the ideal conditions for creating a signature pedagogy. Thus, we argue that the time is ripe for refining the necessary entrepreneurial competencies required in the modern world, and for developing more innovative teaching approaches to impart these skills in the next generation of business leaders.

Our contribution is to demonstrate how to equip students with the necessary skills for managing uncertainty. We outline seven entrepreneurial skills (ET-7) and provide a practical pedagogical approach to developing them in undergraduate students. Specifically, the first author identified a set of essential and teachable skills based on a thorough literature review as well as his experience as a serial entrepreneur, angel investor, and post-secondary educator. Using design thinking methods, we continuously tested, refined, and improved learning outcomes for an Entrepreneurial Thinking course at a large North American university over several years. New iterations of the course design were based on student experience and best practices from the scholarship of teaching and learning. The signature pedagogy advanced in the paper adopts multiple methods and tools including a flipped classroom, opportunities to fail forward, experiential exercises that allow for adaptive anxiety, and open educational resources. Briefly, the flipped classroom approach allows for concrete and operational learning through interrelated experiential activities. Failing forward creates a safe opportunity for students to experience failure and learn through it. Third, we developed open educational resources (see <https://failingforward.ca/>), which promotes students’ self-directed learning readiness ([Tseng, 2013](#)), as well as collaboration among a global community of entrepreneurship educators to build free content.

To date, separate streams of research for entrepreneurial skills and pedagogical methods tend to persist. Specifically, when entrepreneurial skills are delineated, pedagogical methods and tools are often not presented alongside, or lack sufficient detail for educators to replicate. Thus, it may be challenging for educators to determine the appropriate methods for developing entrepreneurial skills. We argue that entrepreneurial skills and the pedagogical methods used to teach them are uniquely intertwined, and thus should not be considered in isolation. As such, this conceptual paper aims to bridge the gap between the two, and provide an integrative framework for entrepreneurial education that considers both entrepreneurial skills as well as the associated pedagogical methods and tools used to develop such skills. In doing so, this work builds upon [Boyles’ \(2012\)](#) model for developing 21st century knowledge, skills, and abilities in undergraduate students. This paper also contributes to the debate around the development of a pedagogy for entrepreneurship education ([Bridge, 2017](#); [Hägg & Gabrielsson, 2020](#); [Jones, Penaluna, & Pittaway, 2014](#); [Maritz, 2017](#); [Matlay, 2017](#); [Seow, Pan, & Koh, 2019](#)).

In the subsequent sections we first review pedagogical methods in entrepreneurial education. Next, we review literature on entrepreneurial education and identify seven skills required to form an entrepreneurial skillset in undergraduate students who generally do not identify as entrepreneurial, which we refer to as Entrepreneurial Thinking (ET-7): (1) problem solving, (2) tolerance for ambiguity, (3) failing forward, (4) empathy, (5) creativity with limited resources, (6) responding to critical feedback, and (7) teamwork approach. These seven skills are not tacit knowledge like writing a business plan, but rather focused on skills that are essential for business leadership. Last, we outline how our signature pedagogy is able to develop ET-7 through (1) the flipped classroom, (2) experiential learning activities, and (3) open educational resources (OER), which can be used to disseminate this pedagogy globally at no cost.¹

2. The evolution of entrepreneurship education

In the past, research in entrepreneurship education focused on how to overcome the myth that entrepreneurs are born, not made ([Kuratko, 2005](#)). This debate centered around a trait-based versus a competency-based approach. The trait-based approach argues that entrepreneurs are born with unique, innate traits that cannot be learned ([Farhangmehr, Gonçalves, & Sarmiento, 2016](#)). The competency approach, however, argues that with experience and training, entrepreneurship can be developed and learned ([Kyndt & Baert, 2015](#)). In support of the trait-based approach, some research found differences in entrepreneurs’ personality traits in comparison to managers (e.g., risk propensity, [Stewart & Roth, 2001](#); achievement motivation, [Stewart & Roth, 2007](#); big five personality dimensions, [Zhao & Seibert, 2006](#)) as well as in comparison to a sample of non-entrepreneurs (achievement motivation; [Collins, Hanges, & Locke, 2004](#)). This research suggests that there may be some innate qualities that entrepreneurs possess, however, personality traits do not fully explain entrepreneurial activity and success. As such, factors other than personality can contribute to entrepreneurial activity and enhance entrepreneurial success. For example, individuals are not born knowing how to write a business plan or how to identify opportunities. These skills can be taught and enhanced through education ([Kyndt & Baert, 2015](#); [Man, Lau, & Chan, 2002](#)). Accordingly, the question has shifted from whether entrepreneurship can be taught to *how* it can be taught.

Early pedagogical methods in entrepreneurship education included traditional approaches such as lectures and were aimed at nascent entrepreneurs ([Hägg & Gabrielsson, 2020](#)). Such methods emphasize a behaviorist paradigm grounded on transmission and reproduction of knowledge, encouraging passivity in student learning ([Nabi, Liñán, Fayolle, Krueger, & Walmsley, 2017](#)). Movement away from these passive methods signified greater recognition that entrepreneurs learn from experience ([Rae & Carswell, 2000](#)),

¹ Please contact the first author for access to the OER.

whether positive or negative (Cope, 2011; Politis & Gabrielsson, 2009). As such, more hands-on learning emerged in the 2000s when entrepreneurship education began to emphasize real-world opportunities and experience as an effective teaching method (Hägg & Gabrielsson, 2020). Problem-based learning (Tan & Ng, 2012), student business start-ups, live cases, and simulations (Kassean, Vanevenhoven, Liguori, & Winkel, 2015) were reported as key pedagogical methods. These methods encourage active learning through solving real-life problems, which enable knowledge and learning to be more readily transferable to the real world (Nabi et al., 2017). Furthermore, these methods introduced an experimental element that traditional pedagogies lack. Scholars emphasize that experimentation is important as it allows a learner to test and validate different assumptions, and then learn from the results of these experiments (Brush, Neck, & Greene, 2015). As such, the role of the student becomes increasingly involved with greater use of hands-on approaches and learning by doing, while the role of the instructor becomes more of a facilitator in the student's learning process (Neck & Corbett, 2018).

These active learning methods reflect both a constructivist and experiential learning approach to teaching and learning (Hägg & Gabrielsson, 2020; Nabi et al., 2017). First, the constructivist approach suggests that "learning involves actively participating in the construction of new understanding" (Nabi et al., 2017, p. 280). Relatedly, experiential learning theory defines learning as "the process whereby knowledge is created through the transformation of experience" (Kolb & Kolb, 2005, p. 194). Experiential learning is a holistic integrative perspective that combines experience, perception, cognition, and behavior (Kolb, 2015). In an experiential learning activity, students gain concrete experiences that enable reflective observation of the situation. This reflection is followed by an abstract conceptualization (i.e., thinking stage), which pushes students toward action (i.e., active experimentation stage). Taken together, both approaches emphasize the central role of the learner as being an active participant in learning experiences. Such approaches facilitate "deep learning whereby students develop a personal understanding of the material rather than simply retention of knowledge" (Phillips & Trainor, 2014, p. 106).

Although scholars have advocated for more action-oriented and experiential pedagogical methods in entrepreneurship education (e.g., Jones & English, 2004), the outcome measures used to assess the effectiveness of entrepreneurship education may not be appropriate. For example, previous research has focused on understanding the relationship between entrepreneurship education and the intention or the attitude to engage in entrepreneurial activity (Liñán, Rodríguez-Cohard, & Rueda-Cantuche, 2011; Maresch, Harms, Kailer, & Wimmer-Wurm, 2016; Sánchez, 2013; Zulfiqar, Sarwar, Aziz, Ejaz Chaudhary, & Khan, 2018). Because individuals' entrepreneurial intentions (EI) are frequently used to predict entrepreneurial activity (Dickson, Solomon, & Weaver, 2008), EI has become a key outcome criteria for entrepreneurial courses (Farhangmehr et al., 2016).

Interestingly, findings regarding the impact of entrepreneurship education on students' EI has been mixed, with some research finding increased EI (e.g., Rauch & Hulsink, 2015), decreased EI (e.g., Oosterbeek, van Praag, & Ijsselstein, 2010; von Graevenitz, Harhoff, & Weber, 2010), or no effect on EI (e.g., Fayolle & Gailly, 2015). A meta-analysis examining the relationship between entrepreneurship education and EI found a small positive relationship, which became non-significant when controlling for students' initial EI (Bae, Qian, Miao, & Fiet, 2014). Fayolle and Gailly (2015) argued that initial beliefs and prior exposure to entrepreneurship may have a stronger influence on post EI than the entrepreneurship course itself. As such, EI may not be an appropriate measure of effectiveness. Furthermore, EI does not indicate whether the entrepreneurship education course was able to successfully impart students with the knowledge and skills needed to navigate through complex environments. In other words, the narrow focus on students' EI overlooks the core competencies and skills that are required in order to become a successful entrepreneur (Neck & Greene, 2011). Thus, we argue that other indicators such as skill development, may be more useful to measure, especially in students who do not identify as entrepreneurial.

In order to expand outcome measures beyond EI, we first need to clearly identify and delineate the specific entrepreneurial skills that are required in modern society. Furthermore, we need to recognize that not all students will become entrepreneurs, and many have no interest in doing so. Yet, organizations are continuously innovating and changing, which require leaders and employees to be adaptable, creative, tolerant to change, and have the ability to solve complex problems. Accordingly, it is important to recognize the value of these skills for undergraduate students across all disciplines, not just for those pursuing entrepreneurship. Extant literature has primarily focused on those who have self-selected into an entrepreneurship course (e.g., graduate entrepreneurship courses; Nabi & Holden, 2008), however, our discussion goes beyond current literature by describing how entrepreneurial skills can be developed in students who do not identify as entrepreneurial.

3. Identifying entrepreneurial thinking skills

Through a review of the literature, we identified several skills that previous work has described as necessary competencies for entrepreneurial activity² (e.g., Bacigalupo, Kampylis, Punie, & Van den Brande, 2016; Davis, Hall, & Meyer, 2016; Kier & McMullen, 2018; Morris, Webb, Fu, & Singhal, 2013). More specifically, subject matter experts (i.e., first author and scholars in entrepreneurial education) created an exhaustive list of entrepreneurial skills that were derived from the literature. Next, each skill was sorted into a cluster according to overlapping themes, and these categories were then named according to the content they best captured. This process allowed us to identify both unique and overlapping entrepreneurial skills that have been considered in other work. Thus, ET-7 is based on (a) the most dominant categories that emerged from the literature, (b) underemphasized skills that have the potential to

² Prior to becoming a business school instructor, the first author spent two decades as a serial entrepreneur, starting thirteen companies as well as having participated in an Initial Public Offering (IPO). This provided personal lived experience for what skills were valuable for undergraduate business students to be prepared for any career they chose.

add value in entrepreneurial education, and (c) skills that can be taught to undergraduate business students who are nascent entrepreneurs. In this section, we: 1) link the entrepreneurial competencies identified in the literature with our proposed ET-7 skills, and 2) describe how ET-7 adds value to the entrepreneurial education literature, as well as to educators.

3.1. Emerging themes

We focus on three previous comprehensive descriptions of entrepreneurial skills that have been linked to entrepreneurial activity (i.e., Bacigalupo et al., 2016; Davis, Hall, & Mayer, 2016; Kier & McMullen, 2018). Kier and McMullen (2018) drew upon the concept of imagination as a method of building cognitive skills to drive the process of generating and selecting new venture ideas. They conceptualized three distinct forms of imaginativeness: practical, creative, and social. The second framework we drew from is the Entrepreneurial Mindset Profile (EMP) from Davis et al. (2016), which describes both personality traits and skills. However, we focus only on the skill component outlined by these authors. Lastly, Bacigalupo et al. (2016) presented the EntreComp, which is an entrepreneurial competency framework consisting of 15 skills. After carefully examining and sorting this exhaustive list of entrepreneurial skills, seven major themes emerged, which subsequently formed the ET-7 framework presented here.

Theme 1: Problem-solving. One theme that clearly emerged from previous literature and the aforementioned frameworks was problem-solving. For example, practical imaginativeness describes the cognitive capacity to connect, make inferences, and to solve problems. Related, the EMP describes idea generation, which is the ability to create multiple and novel business ideas, and thus involves the capacity to think of multiple solutions. Problem-solving is further captured in detail within EntreComp (Bacigalupo et al., 2016), which describes three relevant skills that we grouped under problem-solving: 1) spotting opportunities, which is related to imagination and the ability to identify opportunities for creating value, 2) taking initiative, in which entrepreneurs strive to achieve goals, and 3) mobilizing resources, which involves gathering and managing resources. Notably, the EntreComp captures an aspect of problem-solving that is unique but critical: the ability to gather the required resources to execute a solution. Together, these skills describe key aspects of problem-solving (i.e., identifying a problem, coming up with solutions, and executing a plan to solve the problem).

Theme 2: Tolerance for ambiguity. Another theme that emerged from the review is tolerance for ambiguity and uncertainty. Recently, this theme has taken on greater significance for successful business strategy with the Covid-19 global pandemic and the ever increasing challenges climate change has on global economics and business models. Tolerance for ambiguity is clearly reflected in EntreComp's skill "coping with uncertainty, ambiguity and risk," which helps entrepreneurs face unexpected situations that are common in the entrepreneurial context. Furthermore, the EMP describes optimism, which reflects the importance of maintaining a positive attitude, especially in contexts where there is a high level of uncertainty. Thus, tolerance for ambiguity is a skill that entails the ability to cope with and accept an uncertain future as well as the ability to maintain an optimistic attitude throughout.

Theme 3: Failing forward. A third theme that emerged is failing forward, which reflects an individual's ability to learn from their experiences, especially from negative ones. This is reflected in EntreComp's "learning through experience" competency which emphasizes learning by doing. Similarly, the EMP also reflects this theme through two skills: 1) self-confidence, which is belief in one's skills and talents, and 2) persistence, which is the ability to bounce back and keep trying after disappointment. Furthermore, failing forward is also reflected through practical imaginativeness, such that making inferences involves the ability to extrapolate lessons from one's experiences for use in future situations.

Theme 4: Empathy. A fourth theme that emerged is empathy. EMP named this skill interpersonal sensitivity, which is a concern for the well-being of others. Social imaginativeness maps onto this skill because it is related to considering different perspectives, intentions, and emotions of others. Consequently, these skills together describe a larger theme of empathy, which emphasizes the ability to take the perspective of another and consider their needs. EntreComp, on the other hand, does not clearly have skills that map onto empathy. For example, EntreComp delineates a partially relevant competency, "self-awareness and self-efficacy," which reflects our belief in ourselves. While self-awareness may be useful in understanding how one's action has an impact on others, self-efficacy describes a more stable characteristic that has less overlap with one's ability to view others' perspectives.

Theme 5: Creativity with limited resources. Being creative with limited resources was another theme that emerged as a critical competency. EntreComp reflects this clearly through their creativity competency, which involves developing purposeful ideas. Relatedly, creative imaginativeness describes this theme because it entails the creation of new ideas through drawing connections from existing knowledge. Furthermore, EMP's persistence and self-confidence skills are also important to this theme as one must also be willing to try multiple ideas and experiment with the limited resources they have. As such, these entrepreneurial skills together describe a theme of creativity with limited resources through emphasizing the ability to come up with multiple new ideas about how to improve a business model, to quickly and cheaply test these ideas, and not become constrained with the limited available means.

Theme 6: Responding to feedback. The ability to respond to critical feedback was identified as a sixth major theme. The EntreComp captures this theme through two competencies. The first is valuing ideas, which invokes the ability to listen to others' perspectives and decide how best to proceed with the idea. The second is motivation and perseverance, which helps entrepreneurs to stay focused and not give up in situations when they receive negative or conflicting perspectives from others. Importantly, the EMP reflects this theme through: 1) future focus, which emphasizes the ability to think beyond the current context, and 2) execution, which is the ability to implement ideas. Both of which enable an individual's ability to find and act on the feedback received from others. Relatedly, practical imaginativeness is useful for responding to critical feedback by finding connections and

drawing inferences from multiple sources of feedback, and may be particularly useful for feedback that lacks detail or is conflicting. As such, this theme emphasizes the ability to value and make use of feedback received.

Theme 7: Teamwork approach. The last theme that we identified is related to teamwork. In EntreComp, this is reflected in the following skills: 1) mobilizing others, which is a leadership competence that helps entrepreneurs inspire followers to embrace their ideas, and 2) working with others, which is the ability to work collaboratively with others. However, there is less overlap with the competencies in EMP and Kier and McMullen's (2018) work, but nonetheless this theme captures a key skill that is increasingly important as new graduates are required to work in team settings (Riebe, Girardi, & Whitsed, 2016). This theme describes a teamwork approach that emphasizes collaboration, perspective-taking, and a leadership oriented method of working with various individuals.

Table 1 summarizes these different conceptualizations of entrepreneurial competencies from which we shaped our pedagogical entrepreneurial thinking approach and the associated ET-7. We labelled ET-7 clearly to reflect the core underlying feature of each skill. There is not complete overlap in ET-7 and the aforementioned models, but we believe our framework sufficiently captures and summarizes the vast array of competencies delineated in prior work. Accordingly, the ET-7 offers a more all-encompassing condensed set of teachable competencies that will advance the entrepreneurial education literature. It is worth noting here that skills focusing on the managerial competencies or tacit knowledge of a profitable venture (e.g., raising financial capital, writing a business plan), were not considered as the students are required to take multiple courses to develop these skills. While students were required to complete deliverables that covered these technical skills, ET-7 emphasizes the soft skills required to tackle open and complex problems.

3.2. The value of ET-7

While the three frameworks discussed above (i.e., imaginativeness, EMP, and EntreComp) provided a useful overview of entrepreneurial skills, they come with their own set of limitations. First, Kier and McMullen (2018) used imaginativeness to delineate the cognitive skills required of entrepreneurs, however, this was captured using three broad features of imaginativeness. As seen on Table 1, each of them encompassed many different types of skills and thus lack sufficient detail, which leads to ambiguity in both developing and measuring such competencies. Second, while Davis et al.'s (2016) EMP delineate entrepreneurial skills with terminology that is more frequently used across disciplines, their framework also contains personality traits, which focus on innate components that are arguably less teachable. Third, Bacigalupo et al.'s (2016) EntreComp framework includes a comprehensive list that may be too detailed, complex, and nuanced. It may be challenging for educators to develop appropriate and effective methods of teaching this exhaustive list of competencies, which we argue can be trimmed into a smaller set of competencies.

Accordingly, the ET-7 addresses the aforementioned limitations by (a) integrating competencies outlined in previous frameworks, (b) focusing on teachable skills rather than stable individual differences, and (c) delineating a set of skills that are broad enough to capture the competencies required in today's modern work environment, yet offers the specificity needed to target and develop each competency in the classroom. Moreover, we felt that empathy, and teamwork approach, were not well represented in previous research, and therefore the ET-7 improves our understanding of *why* these additional skills are important and *how* they can be taught. In summary, we condensed the number of entrepreneurial competencies represented in past research and identified critical yet underemphasized skills. The resulting ET-7 framework represents teachable skills, which we argue are the cornerstones of entrepreneurial education.

As previously noted, many entrepreneurial skill frameworks lack a consideration of the pedagogical methods needed to develop these skills in students. Although enterprise and entrepreneurship education guides (e.g., QAA, 2018) have recommended action-based and experiential learning strategies, there is a lack of information with respect to the specific tools, activities, and methods used to

Table 1
Entrepreneurial skills.

Entrepreneurial Thinking (ET)	Imaginativeness (Kier & McMullen, 2018)	Entrepreneurial Mindset Profile (Davis et al., 2016)	EntreComp Framework (Bacigalupo et al., 2016)
Problem Solving	Practical Imaginativeness	Idea Generation	Spotting opportunities Taking the initiative Mobilizing resources
Tolerance for Ambiguity	–	Optimism	Coping with uncertainty, ambiguity and risk
Failing Forward	Practical Imaginativeness	Self Confidence Persistence	Learning through experience
Empathy	Social Imaginativeness	Interpersonal Sensitivity	–
Creativity with Limited Resources	Creativity Imaginativeness	Persistence Self Confidence	Creativity
Responding to Critical Feedback	Practical Imaginativeness	Future Focus	Motivation and perseverance Valuing Ideas
Teamwork Approach	–	–	Mobilizing others Working with others

Note: Not all of the competencies from EntreComp mapped onto ET-7 such as financial and economic literacy as these skills are not relevant to ET. Other competencies such as planning and management, are embedded in the coursework and are not formally addressed.

target and teach specific entrepreneurial skills. This highlights a gap between the two streams of entrepreneurship literature that this paper aims to bridge. Next, we describe how these skills can be taught and reinforced in entrepreneurial courses.

4. Teaching entrepreneurial thinking

Above we reviewed previous attempts to describe the competencies required by entrepreneurs, and have linked these skills with ET-7. Although much work has been conducted to identify entrepreneurial skillsets, less work has been done on how these skills can be taught. Despite research claiming that entrepreneurial skills can be taught (Henry, Hill, & Leitch, 2005; von Graevenitz et al., 2010), they are rarely presented alongside methods aimed to teach such skills. For example, active and experiential pedagogical methods are common in entrepreneurship education (Hägg & Gabrielsson, 2020), and incorporating such methods can facilitate skill development (Nabi et al., 2017). However, these pedagogical methods often lack sufficient detail to successfully implement in practice. As such, we address this gap by first describing the course context, then providing a definition of each of the ET-7 skills, which is then followed by an example of a teaching method or activity that targets the development of each skill.

4.1. Course context

The Entrepreneurial Thinking course is a mandatory 12-week course created for all second-year business undergraduate students. This course was not designed to motivate students to become successful entrepreneurs; rather, the goal was to teach them skills that a successful entrepreneur would exhibit. These skills are considered to be increasingly essential across a variety of professional roles that students may assume in their future careers. The decision to create this course was based on industry demand for new graduates to be equipped with skills that included problem solving, adaptability, working with uncertainty, and learning from failures. The challenge to meet these requirements were twofold. First, the scalability of teaching ET-7 presented a significant challenge given that the total enrolment for one academic year, across two semesters, is between 600 and 800 students. Second, many of these students did not consider entrepreneurial skills relevant to their majors (e.g., Entrepreneurship Majors represent approximately 4% of the undergraduate business student body versus Accounting Majors representing 60%). Thus, in addition to developing the ET-7 skills, the course had to be both scalable and of practical relevance across non-entrepreneurship business majors.

4.2. Skill 1: problem solving

We define problem-solving as the ability to follow an entrepreneurial method to solve complex problems and execute innovative, yet practical solutions. For example, we draw on both Kembel's (2007) Design Thinking methodology (empathize, define problem, ideate, prototype, test) and Ries' (2011) Lean Start Up method (build, measure, learn, cycle) to establish a set of steps to guide students through the process of learning and problem-solving.

Undergraduate students will face complex problems no matter what career path they follow. Problem-solving is the process that is used when searching for or creating solutions to a challenge or multiple challenges within a larger system. This skill is vital to entrepreneurs as it allows them to deal with real-life problems that need to be solved, and can ideally be monetized. As stated by Snyder and Snyder (2008), for students to be effective in the work place, they must be able to solve problems and come up with effective solutions. However, this requires defining what is considered to be a *problem*. Mayer (1989) suggested that problems consist of the current state, the goal state, and obstacles between the current and goal states. The complexity and difficulty of the obstacles faced between the current and goal state may be exacerbated by the type of problem a student encounters. For example, Mayer (1989) distinguished between routine and nonroutine problems. Routine problems are familiar and often only require automatic answers or well-known procedures in order to be solved (Mayer, 1989). Nonroutine problems, however, are unfamiliar in which well-known solutions and procedures cannot be applied (Mayer, 1989). Solving these types of problems requires "productive thinking," which involves adopting creative approaches, experimentation, and new ways of thinking. Education has previously focused on challenging students to solve routine problems, rather than nonroutine ones (Mayer, 1989). However, in the business environment, the emphasis is largely on an individual's ability to solve non-routine problems.

Student learning experience. It is important to identify pedagogical methods that allow students to develop problem-solving skills that are transferable to the real world (Nabi et al., 2017). In week one, students are required to identify a problem in society in which a solution does not currently exist, or the solution can be improved. Eighteen worksheets were developed to guide the students over the course, and served as the foundation for a flipped classroom model. The first worksheet is an "opportunity identification" exercise. This activity required students to find a problem, identify who has it, research whether solutions exist, and outline why the solutions are failing. During week two, students present their best problem and receive critical feedback from their peers. As a result of this exercise, students either abandon their problem or significantly improve their problem definition. This activity demonstrates that the process of problem solving is not static, and it continuously evolves with expanded available means (Saravathy, 2001). In the next step, students are required to interview three individuals who have experience with their identified problem. This is guided by another worksheet to ensure students are asking the right type of questions. After conducting these interviews, students may realize that they need to evolve their problem or solution once more, which emphasizes the importance of pivoting. Thus, the focus is to develop an innovative and validated solution that engages and develops students' problem-solving skills.

4.3. Skill 2: tolerance for ambiguity

We define tolerance for ambiguity as students' ability to accept a degree of uncertainty, yet remain motivated to test their ideas and push them forward despite future threats and uncertainty. Students must become comfortable with uncertain outcomes, and be willing to conduct rapid and cheap experiments to gather enough information to make a decision without the certainty that it is the correct decision.

Given that entrepreneurs navigate through uncertain environments, some degree of failure is inevitable. Uncertainty is expected mainly in the early stage of a venture when the product and/or its commercial application are not yet fully developed or explored (Politis & Gabrielsson, 2009). With respect to new graduates, they are likely to experience uncertainty when they begin to enter the workforce and take on new careers. Thus, the ability to adapt and develop a tolerance for ambiguous circumstances has become increasingly necessary in the global workplace (Herman, Stevens, Bird, Mendenhall, & Oddou, 2009).

Other associated concepts are Intolerance of Ambiguity (IA) and Intolerance of Uncertainty (IU), which are both defined as cognitive processes employed in the interpretation of the environment (Grenier, Barrette, & Ladouceur, 2005). For some individuals, uncertainty and ambiguity are more likely to trigger cognitive, emotional, and behavioral reactions such as discomfort, anxiety, and the avoidance of a situation. Importantly, Grenier et al. (2005) explained that IA is related to stimulus in the present ("here and now"), while IU embraces threat components located in the future. Differentiating between these concepts highlight aspects of ambiguity that are essential for students to develop; a future tolerance for ambiguity as well as in the present.

Student learning experience. During week three, students present their problem, solution, and customer segment to multiple external advisors who are business and technical professionals. Prior to this event, the students are given a worksheet to help them prepare a 30-second pitch of their idea. During the event, each student presents their pitch to the advisors and the advisors rapidly ask them questions and challenge the student's idea. At the end of the pitch, the student receives a simple score card in the form of traffic lights. All green lights mean the student can persist with the idea, yellow suggests that the student needs to conduct more research, and red means there are significant flaws. This activity enables students to gather multiple, often conflicting information and advice, which creates uncertainty in how to proceed next. The key element in this experiential activity is that students must make a decision on whether they will pivot their idea, persevere with their idea, or abandon their idea completely and start with a new idea. They then have to write a graded personal reflection on their decision making process and identify next steps.

4.4. Skill 3: failing forward

We define failing forward as the ability for students to learn from their failures, and reflect on how to prevent or minimize the failure from occurring in the future. This skill is developed when students understand how to minimize loss if their idea fails. Learning from failure is crucial because it creates a mindset of perseverance. Politis and Gabrielsson (2009) highlighted the significance of experiential learning as it related to failures, and recognized that failure plays an important role for learning and personal development. Learning from failure, however, cannot be considered an automatic process (Shepherd, 2003). How an individual interprets and responds to failure is an attitude that should be considered in a learning context (Politis & Gabrielsson, 2009). As Shepherd (2003) argued, business failure promotes a negative emotional response (e.g., grief) which delays the individual's learning. To learn from failure, entrepreneurs should recover from the negative emotional response, and use the information about their failure to revise their existing knowledge (Shepherd, 2003).

Muehlfeld, Urbig, and Iitzel (2017) found that when compared to others, entrepreneurs had a higher likelihood of persisting in the face of failures. These authors further discuss that "rather than simply being averse to losses, their persistence when faced with adversity may partially result from accepting losses as an inevitable part of exploratory learning" (p. 535). It is crucial to shift the managerial mindset that links failure with its negative associations (Cannon & Edmondson, 2005); failure is part of what allows entrepreneurs to create their path of learning, and thus fail forward. The classroom can be considered the perfect place to develop the failing forward skill. In the classroom, inexperienced entrepreneurs may find a secure and controlled environment to test and pivot their ideas, without any of the financial, social, and psychological costs associated with business failure (Ucbasaran, Shepherd, Lockett, & Lyon, 2013).

Student learning experience. We have positioned many of our experiential exercises to create student experiences that result in adaptive anxiety. This means that the students are put into situations where they have incomplete information and would ideally like to have more information in order to make a decision about their next step. Every week, we ask the students to conduct a small experiment to learn more about their problem, solution, or customer segment. After the experiment is complete (e.g., building a landing page and getting customers to sign up for more information about the solution), they are asked if they will pivot, persevere, or abandon their idea. This gives students ample opportunity to experience small failures through these weekly experiments, whereby students may realize they have an untenable idea and need to abandon it. This "failure" allows them to learn quickly, move "forward," and re-focus their valuable time and resources on a new idea, which they need to develop immediately. The key learning outcome is that the students reflect on their journey through these failures, and can still achieve a high grade despite failed ideas because the emphasis is on the *process* of failing forward.

4.5. Skill 4: empathy

We define empathy as a skill that allows a student to take the perspective of another person, even if they have different backgrounds or life experiences. Individuals with a higher level of empathy may be more likely to see the perspective of others, and thus may be

more apt to help them (Axtell, Parker, Holman, & Totterdell, 2007). As Wiggins and McTighe (2005) pointed out, empathy “is not simply an affective response or sympathy over which we have little control, but the disciplined attempt to feel as others feel, to see as others see” (p. 98). Based on this description, empathy is an important skill taught in diverse fields that entail human relationships, such as law (Rosenberg, 2002), medicine (Shapiro, Morrison, & Boker, 2014), and social work (Gerdes, Segal, Jackson, & Mullins, 2011). Empathy is also a highly relevant skill needed in the business context. If organizations want to attract and retain customers, they must provide high-quality customer service that is based on the act of perspective-taking (Schneider & Bowen, 2009). Furthermore, empathy is likely to facilitate the ability to design and deliver new products that will be adopted by customers, which is essential for maintaining competitiveness in the market (e.g., identifying the customer’s pain points). The education context has recognized the importance of this skill, and more recent pedagogical approaches have highlighted this skill in the classroom (e.g., Armstrong, 2016).

Student learning experience. We introduce design thinking methodology in week two, during which students complete a 2-hour experiential learning activity called the gift giving exercise, created by the Hasso Plattner Institute of Design at Stanford University (n. d.). We modified the exercise significantly in order to accommodate a class of 80 students. This activity requires students to solve a problem that they have never experienced, which promotes the use of empathetic insight in finding the correct solution. This introduces the importance of asking the correct questions and understanding others’ perspective and experience. Students must then seek an individual from their customer segment to interview. To assist students, we have modified an empathy map worksheet which provides students with a list of questions to ask in order to gain a better understanding of how the customer feels, the problem they are facing, and their perspective. Students must then write a personal reflection on what they learned from this interview, and how it will inform their next steps. Many students pivot their solution, or modify their problem based on their empathy map interview.

4.6. Skill 5: creativity with limited resources

We define creativity with limited resources as the student’s ability to combine their available means (e.g., their social network) to develop their ideas and conduct fast experiments to determine if they are on the correct path. Creativity is more than an innate ability; it can be achieved through hard work, experience, and searching for solutions in innovative ways (Amabile, 1996; Puccio & Cabra, 2010). Within the entrepreneurship literature, creativity encompasses “the development of a novel idea, product or problem solution that is of value to the individual and/or a larger social group” (Eggers, Lovelace, & Kraft, 2017, p. 267). Importantly, creativity with limited resources is also crucial for entrepreneurs in order to overcome initial constraints involved in creating a new venture, which is often associated with a scarcity of resources (Lin & Nabergoj, 2014). Among these scarce resources, capital is often one of the most important resources required to start a new business. Furthermore, resources related to the organizational infrastructure have to be built, such as corporate practices, policies, and routines (Mosakowski, 2002). Consequently, entrepreneurs must be creative in how they gather and use the resources required to initiate their start-up (Ward, 2004).

Based on the importance of this skill, attempts to teach creativity have been described in the entrepreneurship education literature. For example, Baker and Baker (2012) argued that pedagogical methods employed in art schools to promote creativity should be applied in business schools. These methods focus on three strategies: (1) processes that foster a climate of exploration and reflection, (2) a liberal arts education that illuminates personal and societal attributes, and increases scientific knowledge, as well as (3) observational skills that expand the student’s capacity for empathy and enhances problem-solving (Baker & Baker, 2012). By adopting this approach in teaching and learning practices, business schools can develop students’ reflection and promote creativity through exploratory practices and observational skills.

Student learning experience. Students are required to create a prototype of their final idea by week 12 and present it to their customer for feedback. They are not allowed to spend any money, and they are given one week to create the prototype. This lack of available means forces the students to be creative in order to complete this task. Many students will reach out to peers who are in computer science or liberal arts to help them create models. For example, some students have used Lego and duct tape to make a physical representation. Once the prototype is created, students present it to their customer segment for feedback which fosters reflection and empathy.

4.7. Skill 6: responding to critical feedback

We define responding to critical feedback as the willingness and ability to listen to the input and opinions provided by others, and to integrate such feedback to make an informed decision on how to proceed. A consistent element of entrepreneurship is uncertainty; navigating this context requires the ability to be comfortable with receiving critical feedback, and the ability to seek such feedback in order to adjust appropriately to demands. Thus, the development of students’ feedback orientation, or their overall receptivity to feedback (London & Smither, 2002), allows students to “seek, receive, interpret, and use feedback information and indirectly shape the performance outcomes” (Dahling, Chau, & O’Malley, 2012, p. 532). As such, students with higher feedback orientations are more likely to find value in feedback and act on it, and are less likely to ignore feedback from their environment (Linderbaum & Levy, 2010).

Feedback-seeking behavior has been studied as a way to gauge how an individual pursues his/her skill development and explore how it is related to performance or promotion (Crommelinck & Anseel, 2013). For example, Yanagizawa (2008) demonstrated that employees who seek feedback reached higher levels of goal achievement and learning in comparison to employees identified as low feedback seekers. Within the entrepreneurial environment, feedback-seeking behavior is also particularly important as entrepreneurs need to be keen to identify and exploit opportunities found in their environment. Furthermore, Weaver (2006) demonstrated that students find feedback to be valuable, but often require training on how to interpret and use different types of feedback (e.g., peer feedback, investor feedback, customer feedback). As such, developing students’ feedback orientation can facilitate a greater

understanding of the importance of feedback and how to interpret and use it to improve ones' business ideas.

Student learning experience. We have over 250 advisors, mentors, and alumni who guide our students through the 12-week course. Each week students are given the opportunity to give and receive feedback on their ideas. Some of the experiences are formal, where they pitch to a panel of experts and receive written and verbal feedback. Other times, we have an informal event in class. For example, we use a piece of paper that has an image of a flying pig on one side which represents a bad idea, and an image of a rocket ship on the other side which represents a good idea. Each student team presents their idea, and the class provides their feedback by displaying the respective image denoting a bad or good idea. Then the instructors randomly ask four students to give feedback to the students. We instruct them to give one piece of positive feedback followed by an "and" statement on how to improve the idea or pitch. This allows the students to learn how to give and receive feedback.

4.8. Skill 7: teamwork approach

We define teamwork approach as the ability to work with others collaboratively in a situation where there is task interdependence and shared goals. Specifically, this skill encourages students to capitalize on the unique abilities of their teammates, avoiding relationship conflict, and work productively and collaboratively in a team environment. Students will encounter teamwork in their future careers, whether it is a short-term task force or a virtual team spread across the globe, teamwork is a necessary competency for business students to learn (Kotey, 2007). Although teamwork is recognized as a key skill by many employers (Riebe, Girardi, & Whitsed, 2017; Volkov & Volkov, 2015), it should be given explicit attention in entrepreneurship programs (Kotey, 2007). As Neck and Greene (2011) highlighted, "the best opportunity in the world is of little value without a strong team that can execute" (p. 64). Teamwork, however, is often poorly executed in educational settings and is more characteristic of group work rather than highly interdependent teamwork (Volkov & Volkov, 2015). As Volkov and Volkov (2015) pointed out, a team should create synergy towards a shared objective, which is distinct from group work that only requires pooling of, often independently completed, deliverables. The goal of teamwork is to obtain an outcome that is better than what can be achieved by one individual alone (Kotey, 2007).

Student learning experience. We have partnered with the Individual and Team Performance Lab (ITP) to use their free suite of resources to guide students through their teamwork (see www.itpmetrics.com). First, students complete a personality test that provides a detailed report of their personality, and during the first team meeting, students use this report to discuss which of their personal characteristics may be an asset to the team. Second, midway through the project, students complete a peer feedback (O'Neill et al., 2019) and team dynamics assessment (O'Neill et al., 2018), which provides students with an anonymous team-level (i.e., health and functioning of the team) and individual-level (i.e., 360° ratings of team member effectiveness) feedback report. Throughout the semester, students participate in a series of workshops aimed to debrief the reports. This provides the teams with the tools and methods to improve team and individual performance in a manner that targets deficient areas identified in the feedback reports (e.g., team-level – role clarity, team conflict, monitoring goals; individual-level – commitment, communication, task focus). At the end of the term, students are required to complete a worksheet in which points are allocated to each team member, including themselves, based on their contribution throughout the course.

5. A signature pedagogy

Signature pedagogies shape the ways in which future professionals are educated in their field, along with influencing how they think, perform, and behave with integrity (Shulman, 2005). As stated by Shulman (2005) in a foundational paper, signature pedagogies are pedagogies of uncertainty and create a classroom that is unpredictable and surprising. The emergence of new technology, social unrest, as well as the presence of challenging and complex problems are described by Shulman as objective conditions that call for a new approach to learning such as a signature pedagogy. Despite this, a signature pedagogy for entrepreneurship education has not yet been delineated (Jones, 2019). Rather, most articles in the entrepreneurship education literature offer a review of the pedagogical methods used in classrooms (e.g., Hägg & Gabrielsson, 2020; Mwasalwiba, 2010; Sirelkhatim & Gangi, 2015; Solomon, 2007), rather than developing methods and tools used to teach entrepreneurship. As such, this section focuses on comparing our proposed pedagogy against Shulman's features of a signature pedagogy. In doing so, we connect both the literature on entrepreneurial skills and entrepreneurial education, to outline a clear and innovative pedagogy that can be used to develop an entrepreneurial skillset.

We focus on the core pedagogical methods that best reflect our approach to teaching ET-7. Below, we consider each of Shulman's dimensions of a signature pedagogy (i.e., surface structure, deep structure, and implicit structure) to demonstrate that our approach clearly frames and prefigures professional preparation by creating many opportunities for the students to experience adaptive anxiety (Shulman, 2005), resulting in skill development.

5.1. Surface structure - A flipped classroom and experiential learning activities

The surface structure of a signature pedagogy comprise of concrete and operational acts of teaching and learning, which include ways of demonstrating or interacting with learning objectives (Shulman, 2005). This is accomplished through the use of experiential learning exercises, which provide in-class and out-of-class guidance for the students, and support a flipped classroom approach. Our course is designed to promote adaptive anxiety in students, and is necessary for learning ET-7. In other words, our course was designed in such a way that students are immediately faced with a failure, and iteratively advance through the fail cycle, while being encouraged to maintain their perseverance.

To achieve this, the first author developed materials that have a foundation for creating adaptive anxiety in students (Shulman,

2005). In particular, 18 in-class experiential exercises and 13 out-of-class guiding worksheets were developed and form the foundation for our flipped classroom setting. A typical 3-hour class would require the students to come prepared, having completed the reading material and out-of-class guiding worksheets. For example, the “Empathy Map Worksheet” ask students to complete an interview with their early adopter customer in-person. Here, students need to learn about what motivates their customers, who influences them, and which problem they should try to solve through their business venture. This worksheet focuses on the perspective of the customer, not the students. The student and customer perspectives are typically very different, and is likely to result in adaptive anxiety. Next, during class, students share this worksheet in their teams and with the class. The instructor facilitates in-class experiential exercises to help students gain a deeper understanding of the focal concept and associated skills. Accordingly, the instructor acts as a mentor and facilitator when students realize that their original ideas might not work, and when they need to start a new idea generation cycle.

The sample activity described above highlights an important feature of our signature pedagogy, how the student and instructor interact. The combination of experiential learning activities and a flipped classroom approach work together to create an interactive element that shifts the instructor toward the role of a facilitator. Our pedagogy relies on this interaction to help students become more engaged with the learning process. In summary, the experiential learning activities and the flipped classroom approach establish the surface structure that is required for a signature pedagogy in entrepreneurship education.

5.2. Deep structure - adaptive anxiety

The deep structure component of the signature pedagogy proposed by Shulman (2005) lies on “a set of assumptions about how best to impart a certain body of knowledge and know-how” (p. 55). Through rewarding the students in their failures by allowing a high grade for a successful or a failed idea, they learn that failure and uncertainty are manageable. They begin to develop adaptive anxiety, which we argue is a fundamental deep structure that supports the development of ET-7. For example, students start by thinking they have found a problem and solution for a customer, and thus believe their business venture will be successful. However, students may discover that the “pain point” of their customer is not what they originally thought. We insist that every aspect of the student’s business model must be validated in-person with customers or technical experts – a requirement that results in many of their assumptions failing. As a result, students need to “pivot” or “abandon” their ideas quickly. This realization allows them to adapt quickly to the new information, and effectively navigate through the uncertainty of creating a viable solution that addresses the “pain point” of the customer. This continual requirement of validation through primary research results in significant adaptive anxiety. Additionally, students are provided with multiple sources of feedback (i.e., teaching assistants who are peers that have successfully completed the course as well as business mentors), which support the students outside of the classroom. This support structure is essential to ensure students do not become overwhelmed or frustrated.

By the end of the course, the students become comfortable with adaptive anxiety. We believe that this is aligned with Shulman’s (2005) deep structure for pedagogy and facilitates the development of ET-7. Thus, students gain knowledge of why ET-7 is important and learn how to apply these skills in the real-world. Here, deep structure is achieved through critical dialogue that allows the students to learn from instructors, peers, industry advisors, and customers’ personal experiences. Accordingly, knowledge creation and formation that is based on collective experiences and assumptions, which is imparted through adaptive anxiety, from the “know-how” of ET-7 skills.

5.3. Implicit structure - entrepreneurial thinking

According to Shulman (2005), the implicit structure of a signature pedagogy is a moral dimension that “comprises a set of beliefs about professional attitudes, values, and dispositions” (p. 55). This is reflected in what is taught using the signature pedagogy, encouraging a disposition towards entrepreneurial thinking. Specifically, the ET-7 establish a foundation for students to develop the professional attitudes and beliefs that are required in the workforce to become a leader. Indeed, the ET-7 aims to develop individuals who can adapt to uncertainty, solve problems efficiently, and do so with a deep understanding of others’ perspectives.

Additionally, traditional business courses have focused on developing managerial thinking and strategic thinking. This enables students to follow a “cookie-cutter” method of creating a business that drive profits for shareholders. Entrepreneurial thinking does not focus on these areas. Rather, it focuses on skills that transcend the simple profit motive of a business. Critical to this is developing perspective taking in students, and helping them understand that this is a crucial skill to have in their professional roles. Therefore, ET-7 aims to shift students’ mind toward understanding people and their concerns.

5.4. The value of a signature pedagogy for an uncertain 21st century

While we have described a signature pedagogy for teaching entrepreneurial thinking, we drew from existing methods and tools such as a flipped classroom approach, experiential learning activities, and open educational resources. Such methods and tools are not uncommon in other educational settings, however, it is the combination of these approaches and the extent to which this course relies on these methods that make this signature pedagogy novel. For example, other business courses may implement a few experiential activities (e.g., case study methods) but primarily rely on more traditional methods to transmit knowledge. The extent to which such business courses use traditional methods over active methods may signify their signature pedagogy. However, the space in which entrepreneurs operate differs significantly from typical business majors (e.g., accounting or finance) as much of the context revolves around uncertainty. As such, this course utilizes a significant number of experiential activities to simulate a turbulent and uncertain entrepreneurial environment. Indeed, Jones (2019) highlights that signature pedagogies may draw from existing pedagogical

methods, but it is the unique combination of these methods that make it distinctive to entrepreneurship education.

Another important contextual element to pedagogical methods is the scale at which the methods can be delivered. For example, lecture-based methods are classified as a form of mass instruction (Elton, 1977 as cited in [Gibb & Price, 2007](#)) whereas tutorials, which are often held with a smaller group of students, may incorporate active methods more easily. However, due to potential timetabling constraints in higher education, the addition of a dedicated tutorial session for entrepreneurship courses may not be feasible. As such, a unique and valuable feature of our signature pedagogy is the scale at which this can be applied (i.e., the pedagogical methods and tools can be applied to larger classrooms sizes).

6. Value to educators

Our goal is to provide educators with an established method of teaching ET-7 to students. Through placing all our exercises, worksheets, assignments, and teaching methods on our open educational resource at no cost to students or educators, we hope to create a collaborative community that builds and improves on our work. A creative commons licence allows for any educator to access our content and customize it to fit their requirements. To date, we have had over a dozen educators from around the world use our material, and provide helpful feedback to improve the content for others.

7. Discussion and conclusion

This conceptual paper makes two main contributions to the entrepreneurial education literature. First, based on the first author's experience as an entrepreneur and angel investor, as well as evidence from the literature, seven teachable entrepreneurial skills were identified (i.e., ET-7). The ET-7 were selected after an extensive review of the literature, and they capture the ability to solve complex problems, deal with uncertainty, learn from failures, see things from the perspective of another, think creatively, respond to feedback, and work effectively in a team. As argued earlier, these skills are highly relevant for both future entrepreneurs and for those pursuing other career paths. Moreover, we offered examples of student learning experiences as they pertain to each of the ET-7, which allows educators to replicate these activities in their classroom with students who do, and do not, identify as entrepreneurial. Furthermore, the ease of replicating these activities in their classroom is supported by access to the OER.

The second contribution of this paper is our signature pedagogical approach to teaching the ET-7, which is based on [Shulman's \(2005\)](#) recommendations. We designed a signature pedagogy that supports learning through experiential activities, which emulate the uncertain turbulent context faced by entrepreneurs but can be experienced by all undergraduate students. Concrete and operational learning occurs through the use of a flipped classroom and allows instructors to work within a series of experiential activities, rather than just transmitting content. In our pedagogical approach, deep structure is based on the assumption that the best way to convey entrepreneurial knowledge is through adaptive anxiety, which provides students the opportunity to fail forward. Finally, by teaching an entrepreneurial skillset (i.e., ET-7) via the signature pedagogy, the professional attitudes, values, and dispositions of an entrepreneur can be transmitted and practiced by future generations no matter what their career choice.

Given the conceptual and descriptive nature of this paper, one limitation of this research is that we have yet to collect evidence of the effectiveness of our framework for teaching ET-7. However, this would go beyond the scope of this paper, given that our goal was to describe our set of skills, methods, and signature pedagogy. While we theorize that students' ET-7 should be higher after taking a course that follows our signature pedagogy, we have yet to empirically examine this proposition. Thus, future work should seek to empirically examine the degree to which the ET-7 skills change when adopting this signature pedagogy. More specifically, future research could examine whether ET-7 skill levels demonstrate significant improvements in courses that adopt this signature pedagogy. This could be tested using a pre- and post-intervention design with an experimental group and a control group (i.e., students not undergoing the signature pedagogy). In addition to this, it may also be fruitful to examine which experiential activities are most effective at developing specific ET-7 skills. While these are fruitful avenues to explore, we believe that the ET-7 and our proposed signature pedagogy will promote a deeper consideration of the skills and pedagogical methods that are required in order to prepare the future generation to perform well in a wide array of professional roles.

CRedit authorship contribution statement

Houston Peschl: Conceptualization, Writing - original draft, Supervision, Funding acquisition. **Connie Deng:** Writing - review & editing, Resources. **Nicole Larson:** Writing - review & editing, Methodology, Project administration.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijme.2020.100427>.

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