Research Article

Success Through Failure: Towards a Problem-Based Approach to Entrepreneurship

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Abstract

Investments in entrepreneurial education have failed to develop educational programming that increases entrepreneurial activity. We hypothesize that foundational issues reside within the pedagogical approaches used in entrepreneurial education programming specifically as it relates to millennial students. Using the theory of planned behavior as a theoretical framework, we investigated the effectiveness of process-based learning such as courses that focus on developing business plans and models against problem-based learning that uses action-learning methodologies in the development and delivery of an Introduction Entrepreneurship course. We use both within-group and between-group research designs. We collected data at three points: at the start of the course (T1), mid-term (T2), and the end (T3). Results support our hypothesis. First, after exposing students to the challenges of entrepreneurship in the problem-based course that there is a statistically significant decrease in attitudes, subjective norms, perception of behavioral control, and intention to become an entrepreneur at midsemester (T2) and that scores will rebound by T3. Second, the students in the process-based course will have a statistically significant decline in attitudes, subjective norms, and intentions after the course. Implications for the design of entrepreneurship curricula are presented and discussed.

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Introduction

The benefit of increasing entrepreneurship to spur economic growth and employment is well understood within academic, business, and policy making communities around the world (Kuratko, 2005; Wu & Gu, 2017). Business dynamism in the United States, however, has been declining since the early 2000s (Decker, Haltiwanger, Jarmin, & Miranda, 2018; Fernald & Jones, 2014). Entrepreneurial activity has fallen by nearly 50% since 1978 according to Hathaway and Litan (2014). During the same time frame, there has been a dramatic increase in entrepreneurship education (EE) programming in the United States (Morris & Liguori, 2016). In the 1970s, only a handful of schools offered entrepreneurship courses (Katz, 2003). In 1987, entrepreneurship became a formal field of study under the Academy of Management (Hindle, 2015) and in response, academic institutions rapidly added programming; by the early 2000s colleges offering EE numbered 3,000 (Torrance et al., 2003). A recent study found that more than 600 universities have launched entrepreneurship centers or institutes (Morris, Kuratko, & Pryor, 2014).

More recently, government calculations found EE has not resulted in increased levels of new venture creation. In fact, the opposite is happening: The rate of new venture creation is at historic lows. According to U.S. government data, there are 4.8 million missing businesses[1] in the United States (Keating, 2016). Furthermore, the survival rates of the businesses that were started have not improved in spite of increasing levels of EE (Bureau of Labor Statistics, 2016). As an example, a firm started in 1994 had a 35.7% chance of surviving 10 years, whereas a firm started in 2006 had a similar chance of surviving 10 years at 34.9%. The growth in EE does not appear to have had a positive impact on the number of new ventures nor on the survival rates of those that are started.

The lean start-up, development of business models, and writing of business plans have become the default teaching methodology for EE across the United States. Unfortunately, this growth in programming has occurred without a universally accepted approach or pedagogy, leaving many gaps between research and practice of EE (Naia, Baptista, Januario, & Trigo, 2015). Thus, our research question is how best to create an EE program that stimulates and encourages students to start new ventures as well as increase the likelihood of success. In this study, we compare two different approaches to EE: process-based versus problem-based.

The scope of the research question is significant, since the millennial generation, those born between 1986 and 2000, is much less entrepreneurial, measured through business creation and ownership, than the baby boomers or generation X were in their 20s and 30s (Campbell, Twenge, & Campbell, 2017). This lack of entrepreneurial activity will have a long-term negative impact on economic growth, employment, and poverty reduction. Accordingly, many private sector organizations and public institutions believe that EE is an effective tool in developing new entrepreneurs (Neck, Green, & Brush, 2014; Piperopoulos & Dimov, 2015; Solomon & Matthews, 2014). In response to this goal of spurring entrepreneurship, academic communities have focused on EE as a means to reignite entrepreneurial dynamism (Greene & Saridakis, 2008; Kuratko, 2005; Nabi, Liñán, Fayolle, Kruger, & Walmsley, 2017; Thurik, Stam, & Audretsch, 2013).

There have been substantial efforts in the form of time and money in the development of EE programming (Kamovich & Foss, 2017). Higher education continues to create curricula and establish entrepreneurship centers based on the belief that promoting entrepreneurship will create economic development and jobs (Liñán, Rodriquez-Cohard, & Rueda-Cantuche, 2011; O'Connor, 2013). This has resulted in the development of curriculum in the form of minors, majors, and master's programs and, more recently, in the development of PhD programs in entrepreneurship. In addition, many cocurricular activities such as "pitch nights," business model competitions, hack-a-thons, mentoring programs, and internships have been utilized. The efforts to create entrepreneurship workspace have included the establishment of maker spaces and coworking spaces on campus. Despite these efforts, entrepreneurship continues to stagnate; a meta-analytic investigation reviewed 73 studies of 37,285 students and found no statistically significant impact of EE on entrepreneurial intention (Bae, Qian, Miao, & Fiet, 2014).

Disagreement continues about what activities and competencies are needed to build effective EE programming (Edelman, Manolova, & Brush, 2008; Middleton & Donnellon, 2014; Mwasalwiba, 2010). In addition, a macro review noted ontological confusion and methodological issues in how EE is researched and taught (Wu & Gu, 2017). A 15-year review of the impact of EE up to 2015 revealed that minimal attention is paid to the impact of teaching approaches and methods (Kamovich & Foss, 2017). These points suggest a large gap between the growing supply of EE and our understanding of how best to approach teaching and learning (Morris, 2014). Finally, Fayolle (2013) suggested EE needed to be reinforced with robust intellectual and conceptual underpinnings as well as sound reflection on practice and applications on the part of educators, instead of simply relying on "taken for granted" (p. 692) methods.

From a pedagogical view, entrepreneurship terms, methods, content, and context vary (Wu & Gu, 2017). As a point of clarity for this exploratory research article, we will use the Harvard Business School definition of

entrepreneurship: ''the pursuit of opportunity without regard to resources currently controlled'' (Stevenson, 1983, p.2). This definition clarifies the separation of entrepreneurship from the practice of small business management. Entrepreneurship involves the development of opportunities. Entrepreneurship is not a small business management, nor is it the purchasing of a franchise, nor the opening of a new business as a similar or replica of another. Rather, entrepreneurs use their own knowledge, skills, and abilities in developing something new with the anticipation that this novel idea will create and capture value in unexpected ways (Stevenson, 1983).

This article is organized as follows: After the introduction, the upcoming section details literature review. Then the theoretical framework is introduced in the next section, which is followed by a section detailing the research design and methods. Further sections present the findings, conduct an analysis, and discuss the findings (present the practical) and theoretical implications as well as limitations to this research. The final section concludes the study.

Literature Review

We focused our literature review on two distinct approaches to EE: process-based learning and problem-based learning. Process-based learning is the most common approach to EE; curriculum is focused on following a prescribed process of sequential steps in starting a business. It begins with developing an idea and ending with launching a business (or in some cases selling that business or a liquidation event). This approach is present in numerous leading textbooks (e.g., Kuratko's Entrepreneurship Theory, Process, and Practice, 2005, or Vesper & Gartner's New Venture Experience, 1997). Process-based outcomes in EE focus on demonstrating knowledge of the various steps in the process such as traits of entrepreneurs, understanding opportunity recognition, knowledge of the various forms of venture funding, and so on.

The second approach reviewed is problem-based learning (Svinicki & McKeachie, 2011), which is focused on identifying and solving real problems. This approach avoids prescribing learning outcomes or ''best practices.'' This focus allows students to construct their knowledge and, through experiential problem-based learning, to test novel solutions for real market problems.

After examining the literature, we argue that part of the failure of EE to develop entrepreneurs may rely on the pedagogical techniques focused on process-based learning approaches, which are ineffective and do not resonate with the majority of today's students. Today's generation of students are different, in significant ways, than those of previous generations (Twenge, 2009). These differences have influenced higher education; the well-documented phenomenon of grade inflation is but one example. These students have a high sense of entitlement (Harvey & Martinko, 2009), an inflated sense of efficacy, yet cannot cope with uncertainty or failure (Marston, 2010; Twenge, 2009).

Research with millennials found that they personally want to change the world (Johnson, 2015) but seem unable to actually start, and they desire feedback, but more importantly peer feedback (Bye, 2018). Furthermore, their low levels of empathy (Grijalva & Zhang, 2016) and high levels of narcissism (Metz, 2014) help explain their unwillingness to take ownership of the entrepreneurial process, and why millennials are unwilling to actually spend the time in many of the menial tasks (Tulgan, 2009) required to become an entrepreneur.

The above personality sketch of the millennial suggested by these researchers is, in our opinion, incompatible with the required entrepreneurial *grit*, defined by Syed and Mueller (2014) as maintaining interest while facing adversity and competing opportunities when working toward one's goals. We believe that grit is a necessary trait of entrepreneurs. Moreover, a lack of empathy will make it difficult for millennials to understand their customers if they cannot connect with the experiences of others and with the broader community or world (Adler, 1927).

The entrepreneurial journey has so many ups and downs that grit appears to be a fundamental reason why some persist and others give up under the pressure of adversity and unpredictability (Baron & Shane, 2004; Cardon, Wincent, Sing, & Drnovsek, 2009; Syed & Mueller, 2014). EE should reflect mindfulness that today's student lacks grit, has an inflated sense of their abilities, are risk-averse, are unable to cope with struggle, and have insufficient appreciation for the value of struggle on the road to success. Critically, we believe that knowledge, skills, and abilities in the domains just listed are the essential competencies of learning for success in entrepreneurship. Thus, if EE is to produce successful entrepreneurs, it may rest upon curricula that develop such knowledge, skills, and abilities necessary to navigate the inherent ambiguity and uncertainty of the entrepreneurial marketplace. Unfortunately, at a curricular level, EE is often taught through a process-based focus in which students are exposed to and then tested on their ability to understand theory-laden curricula. This approach presents entrepreneurship as a *linear* process, and instructors are usually using discipline-specific models (Neck et al., 2014). This process-oriented approach remains focused on theoretical constructs aligned with key elements of best practices (Goldsby, Kuratko, Matthew, Marvel, & Nelson, 2017; Morris, 2014). Such activities include developing business plans, business modeling, reviewing case studies, creating 5-year pro forma income statements, developing marketing plans, operating within simulation systems with the intent on building the necessary management skills, and having students develop an understanding of the process needed to successfully launch and run a business.

The value of process-based learning appears at first glance, theoretically, to be an obvious approach for EE since students are taught all elements of launching and running a successful business. However, real entrepreneurship functions as a messy phenomenon with uncertain outcomes along a variety of economic, political, social, and cultural dimensions overtime (Morris, 2014; Nabi et al., 2017;

Neck et al., 2014; Pittaway & Cope, 2007; Syed & Mueller, 2014). Entrepreneurs develop innovations prior to and in anticipation of market acceptance. This approach runs counter to process-based learning, which relies heavily on the assumption of market acceptance, resulting in courses focused on the basic functions of management which overlook critical unpredictable aspects of the entrepreneurial process. None of the learning activities within the process-based approaches can specify, in advance, these variations in a way that maps onto the marketplace in real time the *nonlinear* process of entrepreneurship.

Researchers have noted that educators who rely on process-based approaches to EE are likely to be ineffective in creating entrepreneurs because entrepreneurship is a discipline of action in a real-world ecology of complex changes (Corbett & Katz, 2012; Neck et al., 2014; Pittaway & Thorpe, 2012; Rae & Carswell, 2000; White & D'Souza, 2014). Furthermore, these approaches, which focus on idealized hypothetical business plans and models, ignore constraints under which entrepreneurship functions such as resource scarcity, limited human capital, or missing technological know-how. Entrepreneurs must learn to overcome these deficiencies if they are to succeed.

Process-Based Learning

Consequently, process-based learning, with its focus on hypothetical business plans and models without factoring in actual resource constraints, may inadvertently create distance between entrepreneurial students and their ideas, since it focuses attention on the things the entrepreneur lacks instead of the knowledge, skills, and abilities the entrepreneur brings to the idea. Moreover, examination of the impact of EE indicates that, in forming entrepreneurs, there appears to be a lack of intended outcomes, instructional processes, and assessment criteria in process-based approaches (Kamovich & Foss, 2017; Nabi et al., 2017). Unfortunately, process-based learning overlooks critical elements of successful entrepreneurship. The formative and summative activities in process-based learning are based on preconceived learning outcomes and do not resemble how most entrepreneurs actually launch their businesses.

Description of the Process-Based Course

The process-based course focuses teaching and learning on the steps of starting a new venture. The final deliverable of the course is to submit a completed business plan. The process involved students forming a hypothetical founding team, conducting market analysis, outlining the operational plan, development of a marketing plan, creating pro forma financial statements, and outlining the funding requirements for this venture. This course uses a teaching-centered perspective that relegated the student to passive learner (Morris, 2014; Nabi et al., 2017; Neck et al., 2014).

Problem-Based Learning

Conversely, problem-based learning focuses curricular attention on helping students learn how to solve real problems. There are six generally accepted steps in problem-based learning (Svinicki & McKeachie, 2011). First, identify and analyze the problem; second, determine prior knowledge of the underlying and related concepts to solve the problem; third, identify and address knowledge gaps related to solving the problem; fourth, outline and evaluate possible solutions; fifth, attempt to solve the problem; and sixth, report the findings.

Within problem-based learning, incidental preparation is critical to understanding entrepreneurial success since the entrepreneur incorporates their specific context to develop potential solutions to market problems. Here, the EE student determines what prior knowledge they possess to solve the market problem, while experiencing and learning about personal exposure to social, emotional, and financial risk involved in developing their idea (Cope & Watts, 2000).

Researchers have long explored opportunity recognition, focusing on the identification of qualities that make a good opportunity (Shane & Venkataraman, 2000; Timmons & Spinelli, 2007). However, Singh (2001) questions the value of focusing on the identifications of opportunity qualities since this approach permits post hoc validation, offering little understanding of which conditions or opportunities are developed by entrepreneurs in the beginning. Overcoming this limitation, Lumpkin and Lichtenstein (2005) identify the need for the entrepreneur to effectively pursue the opportunity. In addition, Sarasvathy (2009) suggests effectual thinking for uncertainty of opportunity identification. Regarding opportunity recognition, Rogers' (2014) research on informal learning that which occurs in everyday life while one is focused on a task, yet vaguely aware of incidental and unconscious learning confirms such learning happens when people have "need, motivation, and opportunity to learn" (Garrison, 1997, p. 28). Finally, to successfully pursue opportunities, entrepreneurs rely on their personal and professional experiences, also known as their incidental preparation (Wallas, 1926), distinct from formal systemic or deliberate learning preparation (Hills, Shrader, & Lumpkin, 1999). Thus, incidental experiences aid to form the bases of essential problem-solving skills in entrepreneurship.

Description of Problem-Based Course

In our exploratory research, the problem-based approach we used eschews creation of hypothetical businesses, business models, simulations, case studies, and games. The problem-based learning course with designed and structured curriculum and cocurricular activities ensured concrete entrepreneurial experiences for students and remained student-centered. For many, this was a new way to learn and for some, it was uncomfortable at first. The active nature of the

experiential learning process provided an experience from which the learner can reflect and learn (Argyris & Schon, 1996). The reflective process allowed for students to interpret and understand their experiences so that new learning could occur (Finger & Asun, 2001; Moon, 2004). The problem-based course switched from focusing on "what to learn" and instead taught students "how to learn" by moving past their assumptions, building on self-directed learning, and becoming self-determined in their ideas and thinking (Hase & Kenyon, 2013).

The problem-based courses followed Piaget's (1973) constructivist approach to teaching and learning in which entrepreneurial knowledge is actively constructed by the individual in a process of building on prior knowledge through concrete experiences. The learning environment focused on creating opportunities for students to test their ideas in the real world instead of the classroom. The course approach intentionally allowed for a great deal of collaboration among students as they developed solutions based on their current knowledge. There were weekly student presentations on the current state of their ventures, which included student dialogue, interpretation, reflection, and collaboration. This process facilitated the development of an effective transactive memory system (Huang, 2009), which enables the entrepreneur to recognize their own missing expertise and identify people who can help them. Sharing their personal experiences with others in their network serves to increase knowledge sharing, empathy, and seeking member participation to help solve problems. The transactive memory system relies on learning by doing, learning from others, and working together all key elements to the problem-based learning course.

At the beginning of the semester, the students were all given $1.00 and told to start a business. The business had to be legal, abide by the school's code of conduct, and align with their moral compass. The students needed to identify a real problem they could reasonably resolve with their resources and time constraint. Each week the students spent 5 hours working on the venture. The students relied on their previous experiences and prior knowledge of the problem to evaluate various options and in the end developed a potential solution which they tested on the market problem. The following week the students reported on their success and failures in solving the market problem.

Each week they attempted to sell their product or service to real customers. Between our first and our second wave of data collection, students had engaged in anywhere from two to five complete cycles of entrepreneurial iteration. The number of cycles varied because students who were not initially successful (in selling their product or service) had the ability to pivot and come up with a different idea. Ideally between the second and third wave of data collection, the students had finalized their business ventures and spent the rest of the semester developing their venture. Typically, between Waves 2 and 3 of data collection, students made small iterations to their idea based on customer feedback, peer feedback, and their own ideas of how to make the venture more profitable. Table 1 shows a comparison of problem-based and process-based courses used in this research.

Table 1. Comparison Between Process-Based EE and Problem-Based EE.

	Process-based	Problem-based
Assumptions	Entrepreneurs start new ventures. Courses teach the process of starting a new venture.	Entrepreneurs solve (market) problems. Learners should learn to solve real problems.
Teaching methodology	Theoretical lecturing	Concrete experiential learning
Role of a student	Passive learner who is taken through a linear process of how to start a business or develop a business model.	Self-directed learner who constructs their nonlinear journey of entrepreneurship and becomes self-determined in their learning.
Activities	Write a hypothetical business plan, conduct marketing analysis, assess financial feasibility, read case studies, and use of simulations.	First, identify and analyze a real problem; second, determine prior knowledge of the underlying and related concepts to solve the problem; third, identify and address knowledge gaps related to solving the problem; fourth, outline and evaluate possible solutions; fifth, attempt to solve the problem; and sixth, report the findings.
Learning outcomes	Learning about entrepreneurship.	How to learn to be an entrepreneur.
Assessments	Summative and formative assessments based on predetermined best practices.	Time spent working on their venture, self-reflection, journaling, incorporating feedback to improve their idea, iterating business idea, and demonstrating learning.

Note. EE = entrepreneurship education.

Entrepreneurial Learning

Entrepreneurial opportunities are not identified or pursued in an experiential vacuum (Gartner, 1985) but are developed through action-learning from a culmination of a repeated or iterative process through real-life experiences (Cope, 2003; Gartner, 1985). In light of the previous literature, we argue that an iterative nonlinear problem-based methodology for EE is a direct mechanism by which students develop into entrepreneurs. A particularly well-stated critique by Hindle (2007) noted that in higher education, EE includes two different

approaches: those that "teach it" and those that "teach about it" (p. 107). There is a growing consensus of the utility of this approach, and the need to develop more self-directed and self-determined students (Quality Assurance Agency for Higher Education, 2018) through the exposure to concrete experiences (Kolb & Kolb, 2008). We agree, and add that problem-based learning with its emphasis on learning by doing, from others, by working together is an effective method to teach students to become entrepreneurs. This type of course exposes students to concrete experiences and problem-solving in the real-world marketplace rather than abstract theoretical concepts.

Problem-based learning focuses on active student-centered learning, requiring students to assume responsibility for the exploration, adaptation, and transitioning of ideas with unknown outcomes (Kolb & Kolb, 2008). Problem-based learning within entrepreneurship is an iterative dynamic nonlinear progression process of knowledge construction, in which the entrepreneur actively engages with the world (Cope, 2003; Fenwick & Hutton, 2000; Pittaway & Thorpe, 2012). Learning comes from finding practical solutions to problems based on what does and does not work (Cope, 2005). Within this trial and error approach, learning is a personal journey overtime (McMullen & Dimov, 2013). For this approach to be successful, the student requires a large degree of autonomy and assumes personal responsibility for learning, also known as self-directed learning (Garrison, 1997; Merriam & Bierema, 2013). Problem-based entrepreneurial learning requires a change in thinking from that of a passive student in a classroom to that of an active learner in control of their learning process.

Theoretical Framework

The theoretical framework will outline the suitability of using the theory of planned behavior (TPB) as an organizing framework to examine the effectiveness of EE.

This a well-known theory for predicting behavior (Ajzen & Fishbein, 1980, 2005; Fishbein, 2007). Our research interest is in developing a pedagogy that will inspire and create entrepreneurs with a more comprehensive theoretical interest in predicting entrepreneurial behavior. TPB is a foundational general theory applicable across a wide variety of domains. For purposes of our research, we focus on the ability of TPB to explain entrepreneurial behavior. According to TPB, there are three interrelated factors an individual will ponder prior to engagement in entrepreneurial behavior: current state of their attitude toward entrepreneurship behavior, perceived subjective norms of entrepreneurship behavior, and perceived control over the extent to which they can act with entrepreneurial behavior. These three factors connect to form one's entrepreneurial intention, which in turn predicts entrepreneurial behavior.

Figure 1 outlines the key elements of TPB (Ajzen & Fishbein, 1980) on how attitudes, subjective norms, and perception of behavioral control (PBC) impact the intentions and ultimate action of a student to become an entrepreneur.

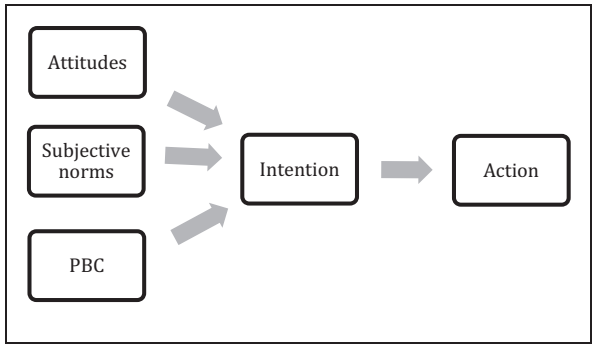

Figure 1. The relationship of attitudes, subjective norms, and PBC on entrepreneurial intention and action. PBC = perception of behavioral control. Adapted from Ajzen and Fishbein (1980).

Consistent with TPB, this research examines how process-based and problem-based courses impact the dynamic relationship shown in Figure 1. The target of this exploratory research were first-year university students. We suggest that changes in attitudes, subjective norms, PBC, and intentions are related prior to EE and impact those relationships after exposure to our problem-based and process-based entrepreneurship classrooms. Thus, we have five specific hypotheses.

Hypothesis 1 (H1): Prior to the class (T1), the process-based and problem-based classes, attitudes, subjective norms, and PBCs will be positively correlated with entrepreneurial intentions.
Hypothesis 2 (H2): At mid-term (T2) in both classes, students will experience a statistically significant drop on attitudes, subjective norms, and PBC, which will be positively correlated with a drop in entrepreneurial intention.
Hypothesis 3 (H3): At the end of the semester (T3), the concrete experiences in the problem-based class will result in a statistically significant increase in scores from T2 in attitudes, subjective norms, PBC, and intention.
Hypothesis 4 (H4): At T3, the process-based scores related to attitudes, PBC, subjective norms, and intentions will continue to decline from T2, and the decline from T1 will be statistically significant.
Hypothesis 5 (H5): At T3, the differential of the scores between the problem-based and process-based classes will be statistically significant from each for attitudes and subjective norms, PBC, and intention.

Research Design and Methods

We used a quantitative research approach to examine the impact of process-based and problem-based classrooms on EE. First, we explored correlational

design, allowing us to assess the degree of linear relationship between attitudes, subjective norms, PBC, and intention within nine courses (one problem-based course and eight process-based courses). We selected three points for data collection: prior to the start of class (T1), mid-term (T2), and at the end of the semester (T3). The addition of T2 data allows us to examine the changes in students' beliefs after they have been exposed to concrete experiences in the problem-based class. Second, we used a between-group design to explore the changes between the process-based and the problem-based classes at the three data collection points.

Design

The survey instrument was developed following Ajzen's (2006) framework for constructing a TPB questionnaire. It is one of the most well-known and widely used survey instruments to predict action. Relying on Ajzen (2006), we modified other questionnaires to our context. We created five to seven questions for each element with salient outcomes, referents, attitudes, and control factors of entrepreneurship. Finally, the survey instrument included additional measures of demographic information and previous experiences taking entrepreneurship courses that may have impacted intention to become an entrepreneur. Data were collected through an online survey using Qualtrics. After participants provided general demographic information, they responded to a series of questions assessing the variables of interest for the study.

Participants

The sample consisted of nine courses. The first course used problem-based learning, while the remaining eight courses were a process-based approach to teaching entrepreneurship. All courses were the first-year courses in an entrepreneurship minor track within the management major.

In the process-based course, we sampled 8 sections with 225 students. The school is a top-tier comprehensive university. These students were first semester freshmen in the Entrepreneurship and Innovation minor, which is a stream in the management program. A total of 225 participants completed the first wave of data collection, 187 completed Wave 2, and 169 completed Wave 3.

In the problem-based course, we sampled one section with a total of 18 students from a small liberal arts university in New England. The course is the first course of the Innovation and Entrepreneurship minor that gets a mix of business and nonbusiness students in various stages of the academic years who are exploring entrepreneurship. Fifteen participants completed the first wave of data collection, 13 completed Wave 2, and 14 completed Wave 3.

Measures

This section examines the correlations within the process-based and problem-based courses at T1, T2, and T3.

Attitudes toward entrepreneurship. Students were asked two questions related to their personal attitudes toward entrepreneurship. Specifically, participants were asked whether "a career as an entrepreneur was attractive to me" and if such a career "would entail great satisfaction for me" on 7-point scales (1 = *completely disagree* and 7 = *completely agree*).

For students in the process-based course, we observed that all factors were positively correlated with each other. Attitudes were most highly correlated with intentions at T1 (.70), T2 (.72), and T3 (.73).

For students in the problem-based course, attitudes were most highly correlated with intentions, T1 (.77), T2 (.86), and T3 (.59).

Perceived behavioral control. Students responded to five questions that measured perceived behavioral control specifically, "If I tried to start a business, I would have a high probability of succeeding," "I have the necessary knowledge to be a successful entrepreneur," "I have the necessary skills to be a successful entrepreneur," "I have the necessary abilities to be a successful entrepreneur," and "I can control the creation process of a new business." Participants were asked to indicate on 7-point scales (1 = *completely disagree* and 7 = *completely agree*).

For students in the process-based class, PBC correlations to intention were T1 (.48), T2 (.53), and T3 (.62).

For students in the problem-based course, PBC had the lowest correlations with intentions at T1 (.25) and highest at T2 (.61) and T3 (.59).

Subjective norms. Students responded to two questions that measured perceived behavioral control specifically, "My family would be very happy and proud if I would start my own business" and "My friends would be happy and proud if I would start my own business." Students indicated on 7-point scales (1 = *completely disagree* and 7 = *completely agree*).

For students in the process-based course, the correlation of subjective norms to intentions was T1 (.50), T2 (.73), and T3 (.69).

For students in the problem-based course, the correlation of subjective norms to intentions was T1 (.57), T2 (.65), and T3 (.57).

Entrepreneurial intention. Students responded to three items that assessed their entrepreneurial intentions specifically, "I am ready to do anything to be an entrepreneur," "My professional goal is to become an entrepreneur," and "I have a strong intention to start a business someday." They indicated on 7-point scales (1 = *completely disagree* and 7 = *completely agree*).

Table 2. Results of Changes in Attitudes Between the Problem-Based and Process-Based Classes Measuring Statistically Significant Changes.

	Attitudes: problem-based versus process-based					
	T1	T2	T3	T1 versus T2	T2 versus T3	T1 versus T3
Problem-based	6.33	5.42	6.07	Yes	Yes	No
Process-based	6.04	5.59	5.41	Yes	No	Yes
Significant: Yes/No	No	No	Yes			

Note. T1 = start of class; T2 = mid-term; T3 = at the end of the semester.

Table 3. Results of Changes in PBC Between the Problem-Based and Process-Based Classes Measuring Statistically Significant Changes.

	Perception of behavioral control: problem-based versus process-based					
	T1	T2	T3	T1 versus T2	T2 versus T3	T1 versus T3
Problem-based	5.33	4.75	5.85	Yes	Yes	No
Process-based	5.04	4.97	5.14	No	No	No
Significant: Yes/No	No	No	Yes			

Note. PBC = perception of behavioral control; T1 = start of class; T2 = mid-term; T3 = at the end of the semester.

Findings and Analysis

Findings

To establish a baseline for how entrepreneurial attitudes, subjective norms, PBC, and intentions were related, we computed a paired two sample t test to account for variability to determine whether the means are truly different. Using bivariate Pearson correlation coefficients at Time 1, Time 2, and Time 3 to test at a statistical significance level of 0.05 (using two-tailed p ($p < .05$, the t-Stat ($t > |2|$)) we can confirm the statistical significance or not. Furthermore, we can confirm that in order to conduct the pair sample t test, the individual student had to complete all three rounds of data collection. These correlation matrices, along with statistical tests of significance, are detailed in Tables 2 to 5 and more detailed results can be found in Appendices A to D.

To test for robustness of our data, we conducted an analysis of variance and Levene's test. There was homogeneity across all questions in each topic: behavioral control, attitudes, subjective norms, and intention. In each instance,

Table 4. Results of Changes in Subjective Norms Between the Problem-Based and Process-Based Classes Measuring Statistically Significant Changes.

	Subjective norms: problem-based versus process-based					
	T1	T2	T3	T1 versus T2	T2 versus T3	T1 versus T3
Problem-based	6.60	6.15	6.43	Yes	Yes	No
Process-based	6.09	5.76	5.58	No	No	Yes
Significant: Yes/No	Yes	Yes	Yes			

Note. T1 = start of class; T2 = mid-term; T3 = at the end of the semester.

Table 5. Results of Changes in Intentions Between the Problem-Based and Process-Based Classes Measuring Statistically Significant Changes.

	Intentions: problem-based versus process-based					
	T1	T2	T3	T1 versus T2	T2 versus T3	T1 versus T3
Problem-based	5.84	5.26	5.81	Yes	Yes	No
Process-based	5.64	5.38	5.38	Yes	No	Yes
Significant: Yes/No	No	No	Yes			

Note. T1 = start of class; T2 = mid-term; T3 = at the end of the semester.

the *p* value was greater than .05, indicating that the survey questions were precise, and we do not have enough evidence to reject the results (Figure 2).

We tracked the changes in student attitudes as they progressed through each course. The problem-based class showed a statistically significant drop in attitudes from T1 to T2. The scores rebounded from T2 to T3 and the increase was statistically significant. The score from T1 to T3 showed a drop but the drop was not statistically significant.

The process-based class showed a statistically significant decline in attitudes from T1 to T2, the scores continued to drop from T2 to T3, but the decline was not statistically significant. However, the decline from T1 to T3 showed a statistically significant decline in attitudes from the beginning to the end of the process-based course.

The difference in attitudes between problem-based and process-based classrooms is not statistically significant at T1. The scores drop and converge at wave T2 and are no longer statistically significant. There is a statistically significant drop in attitudes for both groups from T1 to T2. However, from T2 to T3, we observe a statistically significant divergence between the two classes. The problem-based class scores rebound while the process-based class scores continue to decline. The total decline (T1–T3) for the process-based class is statistically

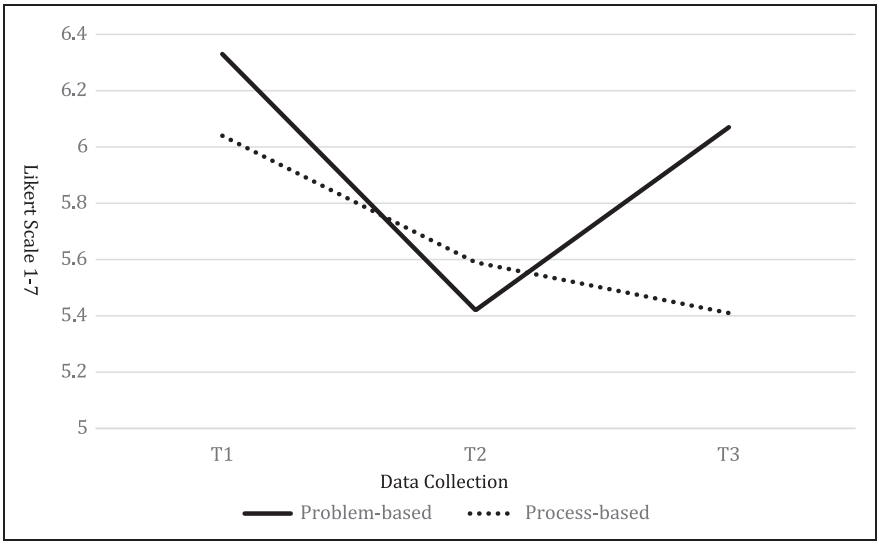

Figure 2. Results of attitudes between the problem-based and process-based classes.

significant. While the problem-based class scores return to about the same level, without the T2, this research would have missed the dramatic decline at T2 and subsequent rebound of scores for the problem-based class. There was a statistically significant increase in attitudes from T2 to T3 in the problem-based class (Figure 3).

We tracked the changes in student PBC as they progressed through each course. The problem-based class showed a statistically significant drop in PBC from T1 to T2. The scores rebounding from T2 to T3 was also statistically significant. The score from T1 to T3 also showed a statistically significant increase.

The process-based class showed a minor decline in PBC that was not statistically significant from T1 to T2. The scores on PBC increased slightly from T2 to T3, but the increase was not statistically significant. There was a slight increase from T1 to T3 but again the change was not statistically significant.

The differences in PBC between problem-based and process-based classrooms are not statistically significant at T1. At T2, there is a statistically significant drop in PBC in the problem-based class and no change in the process-based class. Further from T2 to T3, we observe a statistically significant divergence between the two classes. The problem-based class scores rebound and exceed T1. There is a statistically significant change between T1 and T2 in the problem-based class, while the process-based class remains statistically the same. In the problem-based class, we observe a statistically significant drop from T1 to T2 and a statistically significant increase from T2 to T3. In addition, we observe a statistically significant increase from T2 to T3 (Figure 4).

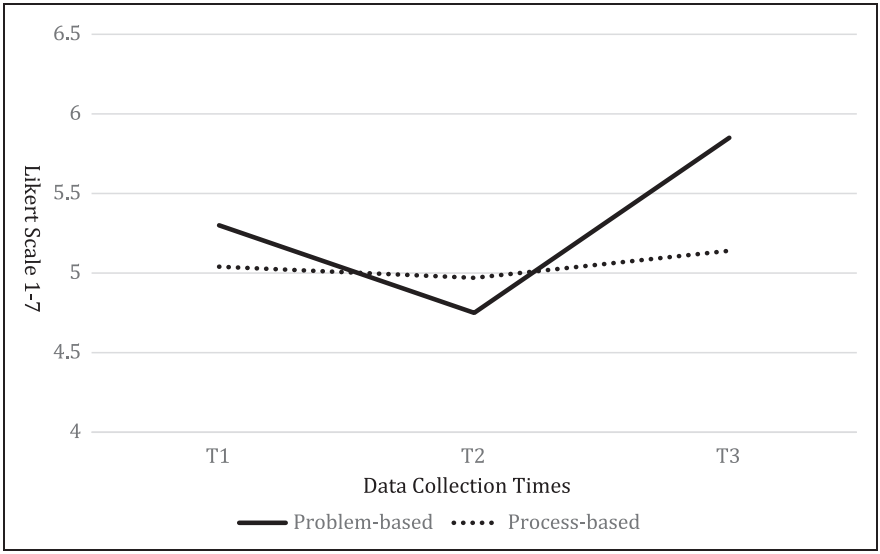

Figure 3. Results of changes in PBC between the problem-based and process-based classes. PBC = perception of behavioral control.

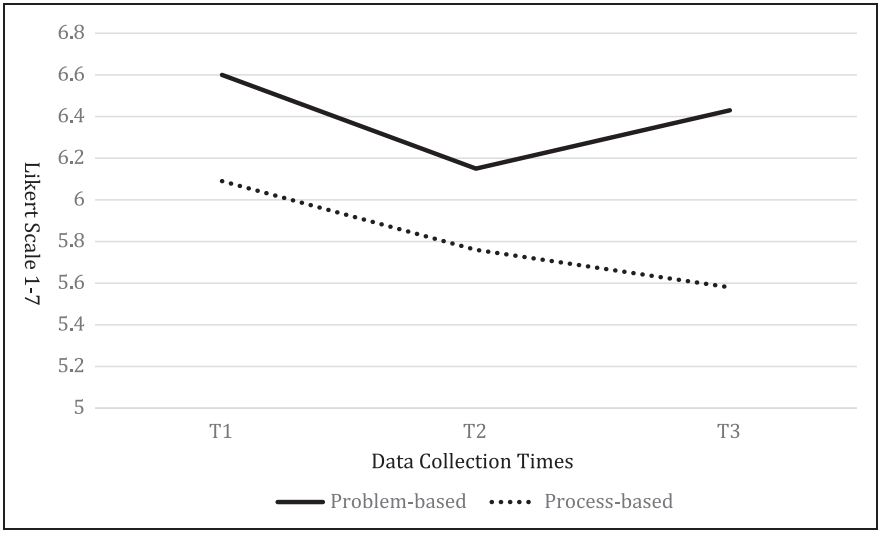

Figure 4. Results of changes in subjective norms between the problem-based and process-based classes.

We tracked the changes in student subjective norms as they progressed through each course. The problem-based class showed a statistically significant drop in subjective norms T1 to T2. The scores rebounded from T2 to T3 and were also statistically significant. The score from T1 to T3 showed a drop but the drop was not statistically significant.

The process-based class did not show a statistically significant decline in subjective norms from T1 to T2. The scores continued to drop from T2 to T3, but the decline was also not statistically significant. However, the decline from T1 to T3 showed a statistically significant decline in subjective norms from the beginning to the end of the process-based course.

The differences in subjective norms between problem-based and process-based classrooms are statistically significant at T1. However, at T2, both groups experienced drops in subjective norms, with the problem-based class showing a statistically significant decline. From T2 to T3, the process-based class continues to decline, while the problem-based class scores rebound and are statistically significant from T2 and from the process-based class at T3. The decline from T1 to T3 in the process-based class is statistically significant, while there is no statistical difference between T2 and T3 in the problem-based class, but the downward trend continues. Further from T2 to T3, we observe a statistically significant divergence between the two classes. The problem-based class scores rebound while the process-based class scores continue to decline. The continued decline (from T1 to T3) is statistically significant for the process-based class, while the problem-based class scores at T3 return to about the same level as T1 (Figure 5).

We tracked the changes in student intentions at as they progressed through each course. The problem-based class showed a statistically significant drop in intention from T1 to T2. The scores rebounded from T2 to T3, and the rise was statistically significant. The score from T1 to T3 showed a slight drop in intention from the beginning but the drop was not statistically significant at the end of the course.

The process-based class showed a statistically significant decline in intention from T1 to T2, the scores continued to drop from T2 to T3, but the decline was not statistically significant. However, the decline from T1 to T3 showed a statistically significant decline in intention from the beginning to the end of the process-based course.

The differences in intentions between problem-based and process-based classrooms are not statistically significant at either T1. However, there is a statistically significant drop in attitudes for both groups from T1 to T2. Further from T2 to T3, we observe a statistically significant divergence between the two classes. A notable result shows the problem-based class scores rebound while the process-based class scores continue to decline. The continued decline (from T1 to T3) is statistically significant for the process-based class. While the problem-based class scores return to about the same level from T1 to T3.

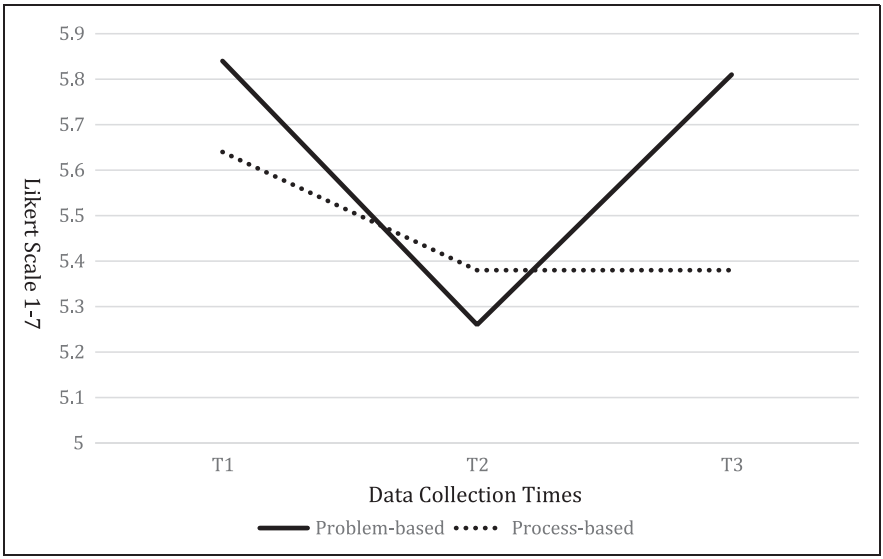

Figure 5. Results of changes in intentions between the problem-based and process-based classes.

Analysis

The results support H1. Prior to both the problem-based and process-based classes (T1), attitudes and PBC were positively correlated with entrepreneurial intentions.

The results partially support in H2. At mid-term (T2), the data indicated a statistically significant decline in attitudes, subjective norms, intentions, and PBC all in the problem-based class from T1. The process-based class had statistically significant declines at T2 in attitudes and intentions. There was a decline in subjective norms, but it was not significant, with no difference in scores for PBC. We believe that the theoretical nature of the process-based class had a negative impact on attitudes, subjective norms, and intentions because there is a disconnection between writing a hypothetical business plan and actual entrepreneurial action. Furthermore, there is no decline in PBC because nothing in the process-based class has tested the students' entrepreneurial grit. They still believe that they could be successful entrepreneurs if they wanted to, but the experience of the process-based class has made them less likely to want to be an entrepreneur.

The results support H3. The experience of the problem-based class resulted in a statistically significant increase in scores of attitudes, subjective norms, and PCB from T2 to T3. The scores rebound as the students, through concrete experiences figured out how to develop products and services that had market acceptance.

This positive feedback led to improvements in all scores. The scores at T3 for attitudes, subjective norms, and intention all return to levels that are similar to T1. The score for PBC at T3 rebounded and was statistically significantly higher than at T1 indicating that the problem-based course had the strongest positive impact on students' PBC. The experiences in the problem-based course provided them with the necessary concrete experiences to increase their self-efficacy and belief in their ability to become successful entrepreneurs.

The results partially support H4. These results partially support H4 that the exposure to the process-based course with its focus on entrepreneurial theory or learning about entrepreneurship will decrease attitudes, subjective norms, and intentions. When examining the process-based class, our data indicate that attitudes, subjective norms, and intention drop from T1 to T2 and continue the downward trend to T3. These results are statistically significant for attitudes, subjective norms, and intentions partially supporting our hypothesis that exposure to process-based approaches undermines the development of entrepreneurs. We believe that this is because the process-based learning focuses the student's attention away from the practice of entrepreneurship and towards theories of entrepreneurship. In other words, learning about entrepreneurship instead of learning to become an entrepreneur may not create entrepreneurs. Scores did not change for PBC at T2 nor at T3. This indicates that students still thought they could be successful entrepreneurs but were less likely to become entrepreneurs because of the drop in their attitudes, subjective norms, and intention. We believe PBC did not change because the students perceived that writing a business plan is not entrepreneurship and that the process-based class did not actually challenge their resilience or entrepreneurial grit.

The results support H5. The results support H5, as the measures of attitudes, PBC, subjective norms, and intentions were statistically different at T3 between the problem-based and process-based classes. This indicates that the students in the problem-based class finished the course more likely to become entrepreneurs, while the students in the process-based class were less likely to become entrepreneurs. Furthermore, the theoretical experiences in the process-based class resulted in lower scores for all measures.

There is one caveat: While the scores for attitudes, PBC, and intentions were statistically similar at T1, the scores for subjective norm were not. However, we believe that the impact of these different starting measures was mitigated by using each student as their own control group as the study focused on the change in individual measures across time.

Discussion

This research was motivated by our desire to better understand how best to create an EE program that stimulates and encourages students to start new

ventures as well as increase their likelihood of success. This question emerged from the literature review that found no positive impact of EE on the development of entrepreneurs (Bae et al., 2014). In light of the significant financial and academic focus devoted to these programs, we believe that it is vitally important researchers understand why these programs are not effective. Our research identified success through failure as a key component of EE to develop entrepreneurs including concrete experiences, experiencing failure, and developing grit and resilience by working through the failure. Relying on our experiences, in teaching entrepreneurship through the process-based learning approach and on intuition from the researchers' own entrepreneurial experiences, our exploratory research was based on the premise that part of the problem in reaching learning outcomes was that EE programs rely on traditional process-based approaches dependent on theory-laden pedagogical methods that are not suitable for learning entrepreneurship in the real world (Corbett & Katz, 2012; Pittaway & Thorpe, 2012; Rae & Carswell, 2000; White & D'Souza, 2014) and the nature of millennial students (Twenge, 2009).

The introduction of this article connected research that proposed millennials are risk-averse, avoid uncertainty, have high levels of self-efficacy, and are unable to cope with failure (Campbell et al., 2017; Twenge, 2009). These traits are contrary to the inherent uncertainty embedded in entrepreneurial action. We have an interest in the capacity of problem-based education to strengthen entrepreneurial attitudes, subjective norms, PBC, and intentions, which the TPB predicts will lead to increased action thus, creating more entrepreneurs. We assessed the relationship between these four variables. The specific tasks embedded in problem-based learning, namely related to the requirement of having students identify a real market problem and encouraging their attempts to solve it through concrete activities (Svinicki & McKeachie, 2011), exposes students to personal and business failure as they attempt to figure out actual market need (Cope, 2005; Pittaway & Thorpe, 2012).

At the beginning of the semester, the problem-based learning class initially had a negative impact on attitudes, subjective norms, PBC, and intentions. At first, the notion that attitudes, subjective norms, PBC, and intentions about entrepreneurship would decrease between T1 and T2 may appear to be counterintuitive. In the development of their product or service, students may have struggled to develop a first prototype or even sell their product or service. However, actually, experiencing concrete actions challenged the student's sense of self when faced with failure which caused attitudes towards entrepreneurship to decline.

During the semester, as students worked through failures and began to develop grit and resilience, which is important in entrepreneurial learning (Syed & Mueller, 2014), they became more aware and self-determined in their learning (Hase & Kenyon, 2013). Overtime, students experienced successes in their ventures that served as a catalyst to rebound, stimulate, and encourage

entrepreneurial attitudes, subjective norms, PBC, and intention. Successes emerged from how a product or service was modified to fit with the customer's need, allowing the students to overcome their fear of failure, notably prevalent in millennials (Tweenge, 2009). In addition, developing real solutions required that students work on menial tasks, which they are not predisposed to do (Tulgan, 2009) but which are essential to starting a business. Finally, to successfully develop solutions, students need to develop empathy (Grijalva & Zhang, 2016) for their customers. The literature noted that millennials are weak in these three areas. The problem-based class with its focus on solving real problems ensures that these areas are all strengthened.

A key to the problem-based class was the exposure to personal risks, unpredictability, and especially to failures in the development of one's own idea; these are all aspects of entrepreneurship learning (Morris, 2014; Nabi et al., 2017; Pittaway & Thorpe, 2012). Part of the strategy in problem-based learning is removing the objective threat, that is, the potential to "fail" the course from experience of subjective failure or student venture "fails." This approach appeared to increase students' intrinsic motivation to try novel solutions to market problems and to be more self-directed in their learning (Garrison, 1997; Merriam & Bierema, 2013). Students were offered a safe environment to be challenged and strengthen awareness of self-control, navigate concrete experiences, and view failure as an opportunity to learn among their peers in a designated time. This is of interest since peer recognition from feedback is something millennials crave according to Bye (2018). The class emphasized the students' ability to develop their business idea in search of gaining some level of market acceptance rather than the worry of a failed grade based on a successful first venture. Thus, increasing PBC may rely on the students' actual experience with failure in entrepreneurial ventures.

The problem-based approach is in stark contrast to process-based learning in which students rely on best practices, theoretical assumptions, and preconceived correct answers and methods to develop business plans, business models, or complete coursework. Process-based approaches tend to reduce attitudes, subjective norms, and intentions of becoming an entrepreneur, because the learning outcomes are at times contradictory to how entrepreneurs actually behave not so linear and more complex, based on a personal journey of idea iteration, with highs and lows (Corbett & Katz, 2012; Pittaway & Thorpe, 2012; Rae & Carswell, 2000). Inadvertently, by creating an idealized business plan or hypothetical business model, it focuses attention on what students lack and away from the "bird in hand" principle of effectuation (Sarasvathy, 2009).

Although we must be cautious in making too much of the effects of the between-group comparison, we believe that these exploratory data provide a meaningful piece to our arguments about problem-based approaches to teaching entrepreneurship. Whereas the previous analyses investigated the ability of our problem-based approach to increase PBC overtime, the between-group

comparison indicates that our problem-based approach resulted in significant increases in PBC compared with a traditional, process-based approach. In addition, the inclusion of T2 data collected allowed the research to observe the decline in all measures and the subsequent rebound in scores, which would not have been possible if we had only collected data pre- and postclass.

These results are evidence of the utility of the problem-based teaching and learning method. Until students experience entrepreneurship, its value and application are abstract. After the struggle involved with initial entrepreneurial experiences, one may feel more equipped to approach entrepreneurial behavior (as evidenced by increases in perceived behavioral control) but may see such endeavors as less desirable along a variety of other dimensions, that is, attitudes and subjective norms. Indeed, entrepreneurship is certainly not for everyone, and we believe that a problem-based approach in early levels of entrepreneurship curricula may be critical in helping students realize that they do not, in fact, want to pursue entrepreneurship as a career. We believe that concrete experiences are critical to the developing of the necessary *grit* and resilience that will foster the next generation of entrepreneurs.

Interestingly within the problem-based class, the data expose a different pattern. All measures show a significant decline from T1 to T2. The drop is greater than what was observed in the process-based class. However, unlike the process-based class, students in the problem-based class saw a statistically significant drop in attitudes, PBC subjective norms, and intentions. This indicates that the concrete experiences had an initial negative impact on entrepreneurial intention. Consistent with research on millennials, we attribute the dramatic decline to the well-documented lack of resilience of these students (Campbell et al., 2017; Twenge, 2009). As students struggle to figure out their businesses, attitudes, and perceptions of subjective norms, their intentions to become an entrepreneur logically drop. At this stage of EE learning, students have to overcome the fear of failure and uncertainty which are both critical for entrepreneurial learning (Morris, 2014; Nabi et al., 2017; Neck et al., 2014; Pittaway & Cope, 2007; Syed & Mueller, 2014). In the problem-based class, the assignments are presented as fail-safe. In other words, the grade is not associated with the profitability of the business but is limited to the time and effort exerted by the students. It is noteworthy that at T2, scores for attitude, PBC, and intentions in the problem-based class were lower than the process-laden class. It appears that in the process-laden class, the decline is a result of disinterest or disillusion with entrepreneurship, while in the problem-based class, the shock of experiencing failure is the cause of the decline.

The process of becoming an entrepreneur is built on previous failures or what we are calling ''success through failure'' since we argue that failure is an integral part of entrepreneurial development and should be a part of EE. Our entrepreneurship classroom followed Svinicki and McKeachie's (2011), six steps for problem-based learning and aligns with Kolb's (1984) concept of experiential

learning through concrete experiences, in that students are required to execute a business venture by developing and engaging their ideas into opportunities. We attributed the rebound in T3 in scores of the problem-based approach to the response of students presented with challenging yet achievable goals, which formed self-directed learning (Garrison, 1997; Merriam & Bierema, 2013). We intentionally separated the grade from the success or failure of the business, allowing students to reconcile the time and effort expended with the importance of the venture. Furthermore, this approach allows students to take risks in testing ideas without worrying about how a mistake will impact their grade; entrepreneurship is a messy process in which students make many incorrect assumptions about market demand. We believe that EE needs to provide students with grade-safe environments in which to test their ideas regarding the grade based on success or failure of a venture. A challenge becomes how to assess student learning (Lackeus & Middleton, 2018). Students are assessed on their time spent working on their venture, self-reflection, journaling, incorporating feedback to improve their idea, iterating the business idea, and demonstrating both self-directed and self-determined learning; they are not assessed on the success or failure of the venture. Creating this environment allows students to take bigger risks and effectively go through a process that we are calling "success through failure."

Limitations

Our research contributes to the knowledge of the effectiveness of EE. However, there are limitations to all studies, and it is important that we identify the limitations of this study. First, we only compared a process-based class against a problem-based class; further research is still required to examine the effectiveness of other types of EE learning methodologies. Second, the TPB is focused on actual action, with the belief that attitudes, subjective norms, and PBC influence intention and that intention is the best predictor of action (Fishbein, 2007). This study, because it was situated within a class, could only measure the changes in attitudes, subjective norms, PBC, and intentions. A longitudinal study is required to determine whether the changes observed in this class result in changes in long-term behavior in the form of increased entrepreneurship. Third, we did not account for the impact of different faculty backgrounds on the effectiveness of the entrepreneurial course. We did not account for the influence a faculty teaching the problem-based or the process-based courses has on the students. Fourth, while the results showed a rebound in scores, we are unsure whether the students have developed the necessary "grit" or resilience to effectively overcome the future challenges and uncertainty of entrepreneurship. Furthermore, research is required to measure the long-term impact of problem-based learning on actual entrepreneurship. Fifth, the subjective norms were statistically different at T1 for the problem-based and process-based classes.

This might indicate some underlying difference in sample groups for which this survey instrument did not control. Additional research into the impact of subjective norms is needed to explore the discrete role of this factor on entrepreneurial intention. However, this research used each student as their own control group, so what was of interest to us were the individual changes in the measures. Sixth, the sample size of the two groups was significantly different. The problem-based class came from a small liberal arts school, while the process-based students were from a large comprehensive school. The result is that even through the student were all millennials, there might be some other underlying differences between students who attend each type of school and their beliefs of entrepreneurship.

Practical Implications

The problem-based class was introduced in an introduction to entrepreneurship course, where we believe this pedagogical approach begins to develop the necessary resilience in students. We further believe, since the data were trending in a positive direction, that additional problem-based courses in entrepreneurship are necessary to further build attitudes, subjective norms, PBC, and intentions within students for the required "grit" to become successful entrepreneurs.

We conducted exploratory research to compare the effectiveness of process-based versus problem-based curricula on increasing entrepreneurship among university students. In particular, we noted the biggest change happened with the measures for behavioral control that occurred between Wave 1, Wave 2, and Wave 3, indicating that students need to experience subjective failure in order to develop a realistic understanding of the requirements to be a successful entrepreneur. While we believe that both problem-based learning and process-based learning are necessary, our research provides support for the notion that problem-based learning is essential. Furthermore, research is required to determine the relative focus of each approach to a successful EE. We believe from the research that the approaches may need to be scaffolded, first with problem based-learning and then process-based learning. This is because we think that students need to learn to become entrepreneurs first, before learning how to manage their ventures.

Conclusion

This study explored the impact of problem-based learning and process-based learning on EE. The literature review offered both educational and entrepreneurial underpinnings for concrete problem-based learning. Our research teased out the differential effects an experiential class had on students' learning, demonstrating the divergent impacts these two different methodologies have on student entrepreneurial attitudes, PBC, subjective norms, and intentions. We identified

benefits in problem-based learning which can stimulate and encourage entrepreneurship. Limitations and practical implications of this research for the future were also discussed.

Appendix A

Attitudes: Detailed Data Results

Table A1. Attitudes: Problem-Based Versus Process-Based at T1.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	6.33	6.04
Variance	0.31	0.99
Observations	15.00	225.00
Hypothesized mean difference	0.00	
df	21.00	
t Stat	1.85	
P ($T \leq t$) one-tail	0.04	
t critical one-tail	1.72	
p ($T \leq t$) two-tail	.08	
t critical two-tail	2.08	

Note. *df* = degrees of freedom.

Table A2. Attitudes: Problem-Based Versus Process-Based at T2.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	5.42	5.59
Variance	1.66	1.92
Observations	13.00	187.00
Hypothesized mean difference	0.00	
df	14.00	
t Stat	–0.44	
p ($T \leq t$) one-tail	.33	
t critical one-tail	1.76	
p ($T \leq t$) two-tail	.67	
t critical two-tail	2.14	

Note. *df* = degrees of freedom.

Table A3. Attitudes: Problem-Based Versus Process-Based at T3.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	6.07	5.41
Variance	0.99	1.49
Observations	14.00	169.00
Hypothesized mean difference	0.00	
df	16.00	
t Stat	2.35	
p ($T \leq t$) one-tail	.02	
t critical one-tail	1.75	
p ($T \leq t$) two-tail	.03	
t critical two-tail	2.12	

Note. *df* = degrees of freedom.

Appendix B

Perception of Behavioral Control: Detailed Data Results

Table B1. PBC: Problem-Based Versus Process-Based at T1.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	5.33	4.99
Variance	1.04	1.07
Observations	15.00	187.00
Hypothesized mean difference	0.00	
df	16.00	
t Stat	1.26	
p ($T \leq t$) one-tail	.11	
t critical one-tail	1.75	
p ($T \leq t$) two-tail	.23	
t critical two-tail	2.12	

Note. *df* = degrees of freedom.

Table B2. PBC: Problem-Based Versus Process-Based at T2.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	4.75	4.97
Variance	1.59	1.35
Observations	13.00	187.00
Hypothesized mean difference	0.00	
df	13.00	
t Stat	−0.59	
p ($T \leq t$) one-tail	.28	
t critical one-tail	1.77	
p ($T \leq t$) two-tail	.56	
t critical two-tail	2.16	

Note. *df* = degrees of freedom.

Table B3. PBC: Problem-Based Versus Process-Based at T3.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	5.84	5.14
Variance	0.52	1.64
Observations	14.00	169.00
Hypothesized mean difference	0.00	
df	21.00	
t Stat	3.24	
p ($T \leq t$) one-tail	.00	
t critical one-tail	1.72	
p ($T \leq t$) two-tail	.00	
t critical two-tail	2.08	

Note. *df* = degrees of freedom.

Appendix C

Subjective Norms: Detailed Data Results

Table C1. Subjective Norms: Problem-Based Versus Process-Based at T1.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	6.60	6.09
Variance	0.36	1.25
Observations	15.00	225.00
Hypothesized mean difference	0.00	
df	21.00	
t Stat	2.93	
p ($T \leq t$) one-tail	.00	
t critical one-tail	1.72	
p ($T \leq t$) two-tail	.01	
t critical two-tail	2.08	

Note. *df* = degrees of freedom.

Table C2. Subjective Norms: Problem-Based Versus Process-Based at T2.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	6.15	5.76
Variance	0.85	1.87
Observations	13.00	187.00
Hypothesized mean difference	0.00	
df	16.00	
t Stat	1.45	
p ($T \leq t$) one-tail	.08	
t critical one-tail	1.75	
p ($T \leq t$) two-tail	.17	
t critical two-tail	2.12	

Note. *df* = degrees of freedom.

Table C3. Subjective Norms: Problem-Based Versus Process-Based at T3.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	6.43	5.58
Variance	0.42	1.49
Observations	14.00	169.00
Hypothesized mean difference	0.00	
df	22.00	
t Stat	4.30	
p ($T \leq t$) one-tail	.00	
t critical one-tail	1.72	
p ($T \leq t$) two-tail	.00	
t critical two-tail	2.07	

Appendix D

Intentions: Detailed Data Results

Table D1. Intentions: Problem-Based Versus Process-Based at T1.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	5.84	5.64
Variance	1.39	1.21
Observations	15.00	225.00
Hypothesized mean difference	0.00	
df	16.00	
t Stat	0.67	
p ($T \leq t$) one-tail	.26	
t critical one-tail	1.75	
p ($T \leq t$) two-tail	.51	
t critical two-tail	2.12	

Note. *df* = degrees of freedom.

Table D2. Intentions: Problem-Based Versus Process-Based at T2.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	5.26	5.38
Variance	1.11	1.06
Observations	13.00	169.00
Hypothesized mean difference	0.00	
df	14.00	
t Stat	−0.40	
p ($T \leq t$) one-tail	.35	
t critical one-tail	1.76	
p ($T \leq t$) two-tail	.70	
t critical two-tail	2.14	

Note. *df* = degrees of freedom.

Table D3. Intentions: Problem-Based Versus Process-Based at T3.

t Test: Two-sample assuming unequal variances		
	Problem-based	Process-based
Mean	5.81	5.38
Variance	0.58	1.06
Observations	14.00	169.00
Hypothesized mean difference	0.00	
df	17.00	
t Stat	2.00	
p ($T \leq t$) one-tail	.03	
t critical one-tail	1.74	
p ($T \leq t$) two-tail	.05	
t critical two-tail	2.11	

Note. *df* = degrees of freedom.

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Note

1. If the rate of new venture creation had remained the same in the 2010s as it was in the 2000s, there would be 4.8 more businesses in the U.S. today.

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