TPM Vol. 32, No. S8, 2025
ISSN: 1972-6325
https://www.tpmap.org/

CONTEXTUALIZING ENTREPRENEURSHIP EDUCATION USING ACTION RESEARCH: FINDING THE BALANCE BETWEEN EFFECTUATION AND CAUSATION.

ABDEL AZIZ, HADIA H
UNIVERSITIES OF CANADA IN EGYPT, EMAIL: Hadia.Hamdy@UofCanada.edu.eg

Abstract: Entrepreneurship education is one of the most dynamic and rapidly evolving fields. This is especially true when educating "for" and "through" entrepreneurship as there are many personal and contextual dynamic variables that affect the outcomes of entrepreneurship education programs. Therefore, the design of the entrepreneurship education programs that seek to yield the ultimate outcome of venture creation should reflect the nature of these variables. This paper uses the action research methodology to develop and test an entrepreneurship education program in the Egyptian context that is characterized by a highly dynamic environment and a risk-averse culture. A tailored approach merging the elements of causation and effectuation was developed along the different stages of the venture creation process, namely opportunity discovery, opportunity exploitation and opportunity scaling. The new approach emphasizes predicting possible future outcomes within the parameters of the present contextual constraints or what can be referred to as constrained predictions. The new approach proved to improve both the short term and the long-term outcomes of the program as it positively affected both the "distance travelled" or the behaviors and skills acquired throughout the venture creation process, and the venture creation rate by program graduates. The research has several implications for entrepreneurship education. It presents a new approach to entrepreneurship education that can be used in highly dynamic, risk averse contexts; and it **positions entrepreneurship education as a continually evolving field** that needs to adapt to the dynamic cultural, economic, political, and regulatory environment through continuous iterations of planning, measuring outcomes, reflection, and modification.
Keywords: Entrepreneurship, Education, Action Research, Effectuation

I. INTRODUCTION

Entrepreneurship education is widely recognized as an important driver of entrepreneurial intention and, consequently, new venture creation and economic growth. Researchers have identified many underlying philosophies and pedagogies within entrepreneurship education. However, there is no consensus on what entrepreneurship should be as a teaching subject and there is a lack of widely accepted paradigms or theories for teaching entrepreneurship (Fayolle & Gilly, 2008). As a relatively young field, there are still many disagreements around the basic educational principles and substantial room for learning (Lyons et al., 2021). Many researchers agree that the "one size fits all approach" is not applicable with entrepreneurship education since several personal and contextual variables, such as culture, economic, political, and regulatory environment, moderate the relationship between education and entrepreneurial intention. Therefore, developing entrepreneurship education programs must be specific to the target audience, business ecosystem and environmental variables. In fact, Bechard and Gregoire (2005) argue that entrepreneurship teaching is closer to art than to science, being driven by experience and experimentation rather than by systematic teaching approaches. This is further supported by Scott, Penaluna, and Thompson (2016) who emphasize the importance of the interplay between the scientific and artistic dimensions of entrepreneurship education, whereby context plays an important role in the latter, as competencies are enhanced through experiential learning. One of the latest trends is using effectuation in entrepreneurship education, especially in dynamic environments. Effectual thinking challenges the causal assumption of pre- existing predictable opportunities, markets and resources, and instead, focuses on the ongoing challenges of designing entrepreneurial ventures when pre-existing goals are absent, markets are unpredictable, and only limited means are available.

Since action research is widely regarded as an appropriate methodology to use in educational program development, it is particularly suitable for experimenting with new teaching approaches across different contexts. Therefore, this paper employs the action research methodology to develop and test an entrepreneurship development program in the Egyptian context. Given Egypt's highly turbulent environment and risk- averse culture, the program integrates elements from both effectual and causal approaches to ensure the effectiveness of the program in achieving its ultimate goal of venture creation. The methodology and outcome propose a road map for developing context- specific entrepreneurship education programs that account for the interplay between global best practices and the dynamic local environmental variables. It

also introduces the concept of tailoring variations using both causal and effectual approaches to effectively foster entrepreneurship development.

II. LITERATURE REVIEW

Entrepreneurship education could be defined as "knowledge transfer regarding how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited" (Hindle, 2007). It is gaining wide popularity around the world, as it has been shown to have a positive effect on entrepreneurial intention and subsequent venture creation (Pedrini, Langella, & Molteni, 2017; Ali, 2013; Solesvik, Westhead, & Matlay, 2014). However, despite the growing interest in entrepreneurship education and the increasing number of universities and schools offering it, this field is far from being fully established. There is a lack of consensus on the body of knowledge that entrepreneurship education should offer, and disagreement exists between academics and professionals on how to approach the teaching of entrepreneurship (Neck & Greene, 2011; Sioukas, 2022). Several researchers have differentiated between two main types of entrepreneurship education; education "for" entrepreneurship whereby students learn the skills they need to start their business through training and experiential learning, and education "about" entrepreneurship whereby students learn the concepts of entrepreneurship and its importance to the economy but remain at a distance from implementation (Laukkanen, 2000; Rasmussen & Sorheim, 2006; Falkang & Alberti 2000). Others suggested a third type to educate students "through" the new venture creation process using experiential learning so that they would acquire both business knowledge and transferable skills and competencies they need to start a business (Kirby, 2006; Vincett & Farlow,2008).

Neck and Greene (2011) explain that entrepreneurship education programs vary according to their focus: on the entrepreneur (in terms of characteristics), on the process (in terms of business planning), on entrepreneurial cognition (in terms of thinking models), or on the method (in terms of execution). Moreover, such programs may be offered by entrepreneurship centers, management schools, engineering schools, or university-wide, either as part of the curriculum or on a standalone basis. They can also be taught by practitioners or by faculty from different fields (Streeter, Jacquette, & Hovis, 2002).

These variations can mainly be attributed to the unique characteristics of entrepreneurship education as a practically oriented, young field offered to a heterogeneous audience from diverse disciplines. In addition, venture creation and economic development, which are expected to occur in different environments and contexts, are assumed to be outcomes of entrepreneurship education (Duval-Couetil, 2013). Therefore, the field still faces many ontological, theoretical, pedagogical, and practical challenges (Fayolle & Gilly, 2008), and the development of entrepreneurship education programs remains closer to an art than a science, often driven more by experience than by a systematic teaching approach (Bechard & Gregoire, 2005).

Beyond the traditional key educational questions of learning objectives, content, pedagogy and methods, and target audience (Fayolle & Gilly, 2008), entrepreneurship educators also need to consider contextual factors, institutional characteristics, the economic environment, and entrepreneurial culture (Duval-Couetil, 2013; Nielsen & Lassen, 2012). From an institutional theory perspective, entrepreneurship is closely connected to the institutional context, which can either enable or hinder certain activities or decisions (Greenman, 2013). Therefore, educators must respond creatively to this context and its dynamic nature. Institutional context can be classified in terms of more-developed and less-developed regions (Drakopoulou & Hynes, 2012). In less-developed regions, despite the urgent need for entrepreneurship, the effectiveness of entrepreneurship education is often difficult to achieve due to adverse contextual conditions, especially in terms of legal barriers, inadequate regulations, lack of stability and security, corruption, insufficient infrastructure, limited business networks, and weak financial systems (Libombo & Dinis, 2015). Context can also be interpreted in terms of the intensity of entrepreneurial activity. In regions characterized by a high degree of entrepreneurial activity, reflective modes of education are more effective, while active modes of education are effective regardless of the level of entrepreneurial activity (Walter & Dohse, 2012). Breslin and Jones (2014) suggest that entrepreneurship education is not about teaching students how to think about the future, but rather how to rationalize and realize their dreams given the surrounding environment. Fayolle and Gilly (2008) argue that, in a given context and at a given time, different teaching models and learning processes should be considered, moving away from a "one size fits all" approach. However, despite general agreement that context plays a significant role in shaping entrepreneurial capital, few studies have explicitly considered the importance or role of context in developing the knowledge, skills, and resources needed to start and run entrepreneurial ventures. This may be attributed to the objective view of research, which often calls for decontextualizing studies to seek "general laws" (Anderson, Drakopoulou, & Jack, 2009).

Mäkimurto-Koivumaa (2013) argues that, since entrepreneurship is inherently about change, processual pedagogical methods that focus on the new venture creation process should be used in entrepreneurship education. Two predominant schools of thought are proposed as alternative approaches to the new venture creation process used by entrepreneurs: causation and effectuation (Chandler et al., 2011). While the foundation of causation is the logic of predicting the future, the foundation of effectuation is the logic of controlling the present. Entrepreneurs following the causal logic predict specific outcomes and focus on the means to achieve them, whereas entrepreneurs following the effectual logic identify

the means already available to them and focus on selecting from a set of possible outcomes that can be reached using these means (Sarasvathy, 2001).

Effectuation was first introduced by Sarasvathy (2001) as a theory presenting a new decision model that influences the creation of new business ventures. The effectuation logic emerges in the effectual problem space, which is characterized by Knightian uncertainty, goal ambiguity, and isotropy. Knightian uncertainty refers to the impossibility of calculating probabilities for future consequences; goal ambiguity refers to a state in which preferences are neither defined nor prioritized; and isotropy refers to the lack of clarity regarding which elements of the environment require attention and which can be ignored (Sarasvathy, 2009). Thus, effectuation addresses the challenges entrepreneurs face when only limited means are available, pre-defined goals do not exist, and environmental unpredictability is high (Nielsen & Lassen, 2012). Sarasvathy (2001) explains that, while causation is more useful in static, linear, and independent environments that allow decision-makers to focus on the predictable aspects of the uncertain future, effectuation is more effective in dynamic, nonlinear, and ecological environments.

The first uderlying principle of effectuation calls for entrepreneurs to start with what they **already have**, namely who they are, what they know, and whom they know (Sarasvathy, 2001). This implies that the entrepreneurial process is "actor-dependent" rather than "effect-dependent", and that the entrepreneur's identity actively shapes how opportunities are perceived, resources are generated, and new connections are formed. This role is dynamic, as the entrepreneur's identity evolves during the entrepreneurial process while gaining new knowledge, meeting new people, and acquiring new resources. This evolving identity, in turn, impacts how the entrepreneur discovers and exploits new opportunities (Nielsen & Lassen, 2012). The second principle of effectuation calls for entrepreneurs to determine their **affordable loss**, i.e., to evaluate opportunities based on the acceptability of potential loss rather than the attractiveness of potential reward (Sarasvathy, 2009). As this principle encourages taking limited risks and failing cheaply, it suggests that entrepreneurs should make only incremental investments (Harms & Schiele, 2012). This aligns with Sarasvathy's recommendation to bootstrap and delay external funding whenever possible to "do the most with the least" (Sarasvathy, 2009). The third principle emphasizes leveraging contingencies by remaining flexible in order to exploit potential upside. Effectuation also encourages forming partnerships with organizations and individuals committed to the joint development of the venture, who eventually influence its future. Finally, effectuation emphasizes shaping the activities within the entrepreneur's control to affect the future rather than attempting to predict it (Sarasvathy, 2009).

One of the proposed applications of effectuation theory is as a framework for entrepreneurship education (Duval-Couetil & Fernandez, 2017). This is particularly relevant as the business environment worldwide becomes increasingly turbulent, making it progressively more difficult to predict the future. In such an environment, the traditional causation-based approach in entrepreneurship education fails to fully meet the skill and competence requirements necessary for establishing and growing a successful venture. Therefore, a new effectuation-based approach to entrepreneurship education is required to teach students how to behave entrepreneurially in different environments (Mäkimurto-Koivumaa & Puhakka, 2013; Melinda, Sutanto, & Christian, 2014). Although it has been shown that students use less effectual logic than expert entrepreneurs, their mindset can shift toward greater effectuation through entrepreneurship education (Mäkimurto-Koivumaa & Puhakka, 2013). Entrepreneurship teaching using the effectual approach has been shown to maximize entrepreneurial potential, particularly in terms of empowerment and transformation (Melinda, Sutanto, & Christian, 2014). It also significantly improves the performance of young entrepreneurs in areas such as business idea discovery, business flexibility, and resource utilization. The implementation of effectuation-based learning is perceived as particularly effective in equipping learners with the flexible mindset and persistence necessary to navigate the various constraints and uncertainties of contemporary business environments (Melinda, Sutanto, & Christian, 2014). Additionally, it facilitates personalized entrepreneurial learning that is shaped by context, as it places the individual at the center of the process (Rae, 2010). However, since the theory was originally developed through the study of expert entrepreneurs, using effectuation in the classroom should be approached with care and consideration (Gunzel-Jensen & Robinson, 2017).

Although several researchers have explored the area of effectual education, many gaps remain in the field. One important missing aspect is understanding how students intentionally apply the effectuation principles, and how experience influences the use of this logic, given that even experienced entrepreneurs often rely on predictive reasoning (Duval-Couetil & Fernandez, 2017). This led Mäkimurto-Koivumaa and Puhakka (2013) to suggest that effectuation education programs should focus on both effectual and causal approaches to help students develop metacognitive habits indicative of higher levels of knowledge. Sioukas (2022) combined effectuation and causation in an entrepreneurship course and found that students embraced both approaches, and that their combined use led to an increase in entrepreneurial intent.

Nevertheless, effectuation is still mainly presented as a way of rethinking entrepreneurship education, with a limited empirical base on the subject. There is little explanation of how students learn effectuation and minimal guidance regarding specific educational approaches (Duval-Couetil & Fernandez, 2017). Furthermore, the dynamic interaction between entrepreneurship education and contextual variables has received little attention in the development of entrepreneurship education programs.

III. METHODOLOGY

Given the variations in entrepreneurship education programs and the fact that entrepreneurship education and development should be context-specific, developing effective programs has become a challenge for academics, particularly when aiming to achieve the outcome of new venture creation. Action research is well-suited to address this challenge, as it allows the development of locally relevant curricula through a dialectical interaction between practice, reflection, and learning (Sahasewiyon, 2004). By engaging relevant stakeholders who are directly affected by the implementation and outcomes of the action, the iterative process begins with the identification of major issues and stakeholders, followed by research to design an action, implementation of the action, evaluation, and finally reflection and modification for subsequent iterations (McNiff, 2013). Action research simultaneously generates knowledge and improves social action. It involves both the physical and mental aspects of development. Through reflective iterations of action and research, it eliminates the boundaries between knowledge generation and action, thereby facilitating social transformation (Somekh & Zeichner, 2009).

Therefore, an action research methodology was used to develop and test a new entrepreneurship development program offered to students at a reputable private university in Egypt, with the objectives of fostering their entrepreneurial mindset, developing their entrepreneurial skills, and ultimately supporting them in building their own startups through the new venture creation process. The program was offered to all senior-year students and alumni from ten faculties in the fields of science, engineering, design, and management. The program development is based on the Theory of Guided Preparation (TGP), which stipulates that, while knowledge is important, entrepreneurs can never have perfect knowledge. Therefore, guided preparation through external experts with startup, industry, and contextual experience is crucial to the success of entrepreneurial efforts (Chrisman, McMullan, & Hall, 2005; Tornikoski & Newbert, 2009; Chrisman et al., 2012; Mohamed & Ali, 2021).

Egypt is a developing country that has recently undergone significant political, economic, cultural, and social changes. After decades of political stagnation, the 25 January 2011 revolution, followed by the 30 June 2013 revolution, led to substantial political and socioeconomic transformations. Economically, these revolutions and the resulting changes in political regimes contributed to lower FDI rates, reduced living standards, higher budget deficits, and increased unemployment and poverty rates. Recent global shocks further exacerbated economic conditions, culminating in a foreign exchange crisis and historic inflation (World Bank, 2022). Socially, approximately one-third of the population, categorized as youth, experienced a major mindset shift in recent years. They felt both the urge and the capacity to pursue their passions and work toward their dreams, with entrepreneurship gradually becoming a central activity in their communities (Saeed et al., 2014). This occurred within a promising yet turbulent context and a culture characterized by a high level of uncertainty avoidance and power distance, as well as a collectivist, feminine society with normative thinking, short-term orientation, and a restrained, pessimistic outlook (www.hofstede-insights.com). In such cultures, there is a strong emotional need for rules and predictability, even if these rules are ineffective; innovation is often resisted, and security is a primary motivator. This contextual setting calls for a new approach to entrepreneurship education and development, capable of addressing the paradox of fostering new venture creation in a culture that intensely avoids uncertainty while operating in an environment that is highly unpredictable.

To address this complex dilemma, the progressive problem-solving model through action research (AR), introduced by Riel in 2007, was used. According to Riel, through the reflective stages of planning, acting, gathering evidence, and reflecting, action researchers can better identify solutions amid complex interactions between multiple environmental variables over time (Manuel, Perlato Castro, et al., 2023).

Planning

The planning phase was conducted by experts in entrepreneurship education and included the program strategy, content design, delivery approach, and the format and timing of coaching and mentoring interventions. The learning process involved not only students and teachers but also entrepreneurs and experts capable of transferring tacit, context-specific knowledge within an informal setting.

As the Egyptian students came from diverse faculties and had no prior exposure to entrepreneurship education, a three-month introductory phase was introduced in each iteration to create awareness and provide students with basic skills “for” entrepreneurship, such as opportunity identification and assessment, principles of business modeling, customer discovery, and team management skills. This phase was conducted through open workshops for all university students and alumni. Following the introductory phase, students interested in starting their own ventures were required to submit potential business ideas, and the most viable ones were selected to join the next phase. The subsequent six- to eight-month phase consisted of a series of training, mentoring, and coaching sessions designed to provide students with the skills, knowledge, and expertise necessary to navigate the venture development process “through” entrepreneurship. These sessions included workshops on customer validation, value proposition design, business modeling, business planning, marketing and branding, pitching, financial planning, sources of finance, legal aspects, networking techniques, and intellectual property rights (IPR) protection.’

Implementation

The research was conducted over a period of three years, consisting of three iterations of planning, implementation, gathering evidence, and reflection. The iterative process, in theory, could continue indefinitely, as contextual factors are highly dynamic and influenced by the process itself. However, from the outset, the scope of the research was deliberately limited to a maximum of three iterations. The introductory phase was typically conducted during the spring, while the educational phases of training, mentoring, and coaching took place during the summer and the first few months of the fall. Across the three iterations, all variables that might affect the program, such as teaching style, instructors' attitudes toward entrepreneurship, and similar factors—except for the methodology itself—were held constant.

Evidence gathering

In order to evaluate the outcomes of the iterations, practical and valid outcome measures needed to be defined. Many researchers agree that measuring the outcomes of entrepreneurship education programs is a complex task (Borchers & Hee, 2011; Duval-Couetil, 2013). This complexity arises from the diversity of outcomes, which include behavioral, cognitive, affective, attitudinal, and skills-based results, as well as from the nature of the ultimate outcome—venture creation—which may take many years to materialize (Borchers & Hee, 2011). In the context of entrepreneurship education and development, researchers differentiate between "hard outputs" and "soft outcomes" (or "distance traveled"). Hard outputs are the quantitative, tangible results of the program, while soft outcomes refer to the behavioral and skill changes developed throughout the process of achieving these outputs. The distance traveled represents the progress individuals make toward achieving tangible outcomes (Welsh European Funding Office, 2005; Dewson et al., 2000). There is also a trend toward integrating direct assessment methods, which require students to demonstrate competency and exhibit mastery of acquired knowledge and skills, with indirect assessment methods, which involve surveys or focus groups where graduates reflect on their learning rather than demonstrate it. Developing an effective assessment plan requires not only balancing different approaches but also engaging various stakeholders who have an interest in the program (Duval-Couetil, 2013).

In this study, two approaches were employed: one of a short-term nature, measuring the "distance traveled"—that is, the behaviors and skills acquired throughout the venture creation process—and one of a longer-term nature, measuring venture creation across the different iterations of action research. The skills acquired throughout the processes of opportunity discovery, opportunity exploitation, and opportunity scaling were compiled from the literature and validated and ranked in terms of importance through interviews with entrepreneurship development experts. The most important identified behaviors and skills for opportunity discovery included opportunity search, opportunity evaluation, and creative and innovative thinking; for opportunity exploitation, they included decision-making under uncertainty, initiative-taking, risk assessment and mitigation, and resource acquisition and management; and for opportunity scaling, they included flexibility, leadership and team management, problem-solving, and social networking skills.

Assessments were conducted by scoring participants on a scale from 1 to 10 for each skill, based on observations and interviews with both participants and mentors. Focus group discussions with participants and mentors were also conducted to gain a deeper understanding of the dynamics of the learning process. A composite score measuring the average distance traveled by participants for each set of skills was then calculated for each iteration. The second approach, measuring venture creation, was conducted through observations and interviews (both phone and face-to-face) with program graduates one year after graduation.

Reflection

Evidence gathered, as well as insights from interviews and focus group discussions, were used in the reflection phase to assess the relevance, impact, and interplay of the different elements of causation and effectuation. Reflection was conducted by the program team, mentors, coaches, and students. Students' reflections on their own learning, both during and after the learning experience, proved to be central to the learning process, as they helped students understand their needs and evaluate both the meaning and applicability of this learning within their context (Mueller & Anderson, 2014).

IV. RESULTS AND DISCUSSION

Over the three iterations of action research, combining elements of effectual and causal logics at different stages of venture development proved to have a positive impact on students' learning, venture creation, and success, taking into account the contextual variables, as follows:

Iteration 1: Planning and Implementation

The initial program design was based entirely on the causal approach, which is the most established internationally. Given the risk-averse culture, the large market size, and the numerous available gaps in several underdeveloped products and services, this approach initially appeared to be the most appropriate. Participants were required to begin by identifying and evaluating opportunities, setting goals, and developing a business plan that outlined the resources needed to achieve these goals (Vorontsova et al., 2016). The next step involved validation through testing the minimum viable product (MVP) or prototype to determine whether potential customers were interested in the product through actual monetary exchange. Once validated, participants began collecting the necessary resources—both personal and external—to

implement their business plans. During the early stages of implementation, startups refined their business models and improved the efficiency of their customer acquisition processes in preparation for aggressive scaling.

Iteration 1 Outcomes and Reflections

Results of the first iteration revealed that participants—given their limited skills and prior education that had not incorporated any enterprise or entrepreneurship training—were only able to identify a limited set of opportunities and problems that were already widely trending, such as renewable energy and recycling. However, when evaluating and validating these opportunities, they were confronted with the realities of resource scarcity, an underdeveloped market, and a developing entrepreneurial ecosystem.The average distance travelled for the opportunity discovery skill set reached 5.5/10, as 20% of participants did not progress beyond the opportunity evaluation stage and 30% stopped at the validation stage. The average distance travelled for opportunity exploitation skills was 3.9/10. Although 30% of participants validated their opportunities and began the exploitation process, they did not proceed to launch their ventures. The main reasons were social pressure against risk-taking and the resulting fear of failure. The average distance travelled for scaling was 4/10, with higher scores observed for flexibility than for other skills. By the end of the program, only 20% of participants successfully launched their ventures, and after one year, only 10% had survived the turbulent market conditions.

As the primary motive for almost all participants was to gain freedom from corporate life and fulfill their need for achievement, few began with a clear vision of what they wanted to accomplish, as required by the causation approach (Sarasvathy, 2001). This, coupled with the dynamic nature of the context, which rendered many of their projections obsolete, necessitated the introduction of an effectual approach—one that emphasizes what entrepreneurs can do rather than what they should do. Nonetheless, their need for predictability and risk control still required attention

Iteration 2: Planning and Implementation

During the second iteration, the effectual principle of "start with what you have" was adopted. Participants were guided to evaluate their personal bundle of resources, including their skills and knowledge, prior experiences, passions, networks, and both physical and financial assets. However, rather than directly creating opportunities from this bundle, as the traditional effectual approach suggests, they were instructed to construct their own "personal opportunity space"—that is, to identify relevant gaps in the environment that aligned with their individual resource bundles. This variation addressed participants' limited risk appetite while leveraging the abundant market opportunities available and capitalizing on their networks of connections, which are critical to success within Egypt's cultural and business context.

Opportunities generated within this personal opportunity space underwent several cycles of customer validation, context validation, and pivoting. Ideas were initially tested through extensive customer validation to address uncertainties related to uncontrollable factors such as industry structure and cost models. Participants then developed business plans and identified the contextual constraints their ideas would face within the Egyptian environment—including legal, social, market, financial, logistical, operational, and technological limitations. Based on these analyses, they were encouraged to pivot and adapt their ideas to align with contextual realities and available resources. This iterative process of validation and pivoting was repeated until both product–market fit and business–context fit were achieved.

In the opportunity exploitation stage, the effectuation concept of forming partnerships was introduced as a strategy to minimize risk and cost. However, participants were also cautioned about the potential pitfalls of early partnerships given their limited experience. To prepare them, the program included the development and analysis of adverse outcome scenarios as well as sessions on partnership management strategies and techniques. The principle of "doing the most with the least", or bootstrapping, was also emphasized—encouraging participants to rely on internal resources for as long as possible before seeking external funding. Nonetheless, the importance of timing and strategic planning for external investment was equally stressed

Iteration 2: Outcomes and Reflection

Results from the second iteration showed a considerable improvement in the distance travelled for skills related to opportunity discovery, which reached an average of 8.4/10, as the ideas generated were more applicable and aligned with students' personal, social, and contextual backgrounds. The distance travelled for opportunity exploitation skills recorded an average of 7/10, with approximately 66% of participants successfully validating their ideas. However, the business establishment rate, though improved, reached only 42%, primarily due to fear of failure and related social pressures, as well as difficulties in resource acquisition.

The distance travelled for scaling skills averaged 5/10, mainly hindered by challenges in team formation and management. Recruiting qualified team members remained difficult in a culture that favors secure corporate or government employment over entrepreneurial ventures. One year after program completion, only 25% of participants' startups survived the turbulent market conditions.

Iteration 3: Planning and Implementation

In the third iteration, participants continued to generate opportunities within their personal opportunity space and evaluate them through the iterative process of customer validation, context validation, and pivoting. To further increase the business establishment rate and ensure the availability of resources, the affordable loss principle was introduced at this stage. Participants were required to define their own personal "affordable loss" parameters, including invested assets, capital, effort, time, work-life balance, and social networks. These parameters were incorporated as constraints that

partially influenced opportunity evaluation and impacted the timeline and milestones for execution. Although these parameters were limiting, they alleviated the significant challenges and pressures arising from the Egyptian cultural aversion to risk, which, when combined with strong family and social ties, generates substantial peer and family pressure to abandon risky career options in favor of secure employment. For almost all participants, the primary motive was freedom from corporate life and fulfillment of their need for achievement; therefore, minimizing downside risk was prioritized over maximizing expected returns

Iteration 3: Outcomes and Reflection

In the third iteration, the distance travelled for skills related to opportunity discovery reached an average of 8.6/10, while for opportunity exploitation skills it reached 7.8/10. Approximately 64% of participants successfully validated their ideas, and 57% established their businesses. Despite improvements in the distance travelled for scaling skills, which averaged 6.5/10, challenges in team formation and management persisted, resulting in a 35% survival rate after one year. It is also noteworthy that the scalability potential of the implemented ideas was constrained by the affordable loss parameters introduced during this iteration.

V. CONCLUSION

Entrepreneurship education is one of the most dynamic and rapidly evolving fields. This is particularly true for education "for" and "through" entrepreneurship, as many personal and contextual variables influence the outcomes of entrepreneurship education programs. These variables are constantly changing and highly dynamic; therefore, for programs that aim to achieve the ultimate outcome of venture creation, their design should reflect this dynamism and be responsive to the context.

This paper focuses on the design of an entrepreneurship education program "for" and "through" venture creation in the Egyptian context, which is both highly dynamic and risk-averse. The program employed the model of progressive problem solving through action research, as it is particularly well-suited for identifying solutions amid complex interactions among multiple environmental variables over time (Manuel, Perlato Castro, et al., 2023). Ideally, the planning, implementation, evidence-gathering, and reflection process should be an integral part of the program's design to continuously improve its alignment with the dynamic context. However, for the purposes of this research, only three iterations of this process were conducted over a period of three years.

Throughout the iterations, elements of causation and effectuation were combined across the different stages of the venture creation process—namely, opportunity discovery, opportunity exploitation, and opportunity scaling—to address the highly dynamic yet risk-averse cultural context. A new approach was developed that emphasizes predicting possible future outcomes within the constraints of the present context, or what can be referred to as constrained predictions. This approach begins by identifying opportunities within the participants' "personal opportunity space"—the spectrum of opportunities aligned with their personal resource bundle and defined affordable loss. Identified opportunities then undergo iterative cycles of customer validation, context validation through business planning, and pivoting, which are repeated until both product–market fit and business–context fit are achieved. During the opportunity exploitation stage, participants were encouraged to use bootstrapping and partnerships, guided by careful forecasting and scenario planning. Despite improvements in participants' skills, as measured by distance travelled, and the business establishment rate resulting from this approach, several gaps remain. First, the scalability and impact of established businesses require further investigation, as participants often reverted to smaller-scale, less risky opportunities to navigate contextual constraints. The scaling phase was not fully captured in this research, as it would require a longer timeframe to evaluate properly. Finally, increasing the number of participants and resulting businesses is necessary to enhance the generalizability of the results.

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