Small Bus Econ (2023) 60:133–155
https://doi.org/10.1007/s11187-022-00641-6

Graduates of venture creation programs – where do they apply their entrepreneurial competencies?

Gry Alsos · Gustav Hägg · Mats Lundqvist · Diamanto Politis · Martin Stockhaus · Karen Williams-Middleton · Kari Djupdal

Accepted: 21 April 2022 / Published online: 13 June 2022

Abstract The assessment of entrepreneurship education outcomes should move beyond a focus on firm creation and associated economic impact to consider a more nuanced view that pays attention to graduates and their entrepreneurial competencies. There is currently limited understanding to what extent entrepreneurial competencies developed through entrepreneurship education are applied in graduates' subsequent careers across various occupational roles, either as employees or as self-employed. Our analysis is based on a survey administered to 556 graduates from three Nordic master-level entrepreneurship education programs (1997–2018), all identified as venture creation programs. We find that, to a large extent, entrepreneurial competencies developed through venture creation programs are applied in subsequent careers across multiple occupational roles encompassing self-employment, hybrid entrepreneurship, and intrapreneurship. Entrepreneurship education is relevant not only to new firm creation but also to entrepreneurial positions in established organizations when it comes to graduates' application of entrepreneurial competencies in subsequent careers.

Plain English Summary Entrepreneurial competencies developed through entrepreneurship education are applicable to careers other than "start-up entrepreneur." This article examines graduates from three entrepreneurship education programs in Northern Europe where students experienced venture creation as part of the education. Graduates report the extent to which they apply entrepreneurial competencies (AECs) in their subsequent career. The most common career among graduates is self-employed entrepreneur, closely followed by a career as intrapreneur, where graduates apply their entrepreneurial competencies in established organizations. A smaller group of graduates have careers as hybrid entrepreneurs, where they combine paid employment with self-employment. A minority group of graduates have more conventional careers as full-time employees in established companies, where entrepreneurial tasks are not their main activities. The results indicate that venture creation programs provide fertile ground for graduates to engage in a broad spectrum of entrepreneurial careers. From the analysis, we found that a career as an intrapreneur is more similar to a self-employed entrepreneur than to a conventional

G. Alsos
Nord University Business School, Bodø, Norway

G. Alsos · G. Hägg (✉) · D. Politis
Sten K Johnson Centre for Entrepreneurship, Lund University, Scheelevägen 15B, SE-223 63 Lund, Sweden
e-mail: gustavhagg@hotmail.com; gustav.hagg@fek.lu.se

M. Lundqvist · M. Stockhaus · K. Williams-Middleton
Chalmers University of Technology, Gothenburg, Sweden

D. Politis · K. Djupdal
Norwegian University of Science and Technology, Trondheim, Norway

employee. An implication for entrepreneurship education is that real-life educational experience through venture creation is applicable to entrepreneurial careers beyond start-ups. Additionally, the study provides a first attempt to connect entrepreneurial competencies developed through education with how such competencies are manifested in graduates' subsequent careers, motivating a discursive shift in how policies could spur a more entrepreneurial society that goes beyond a narrow start-up perspective.

Keywords Entrepreneurial careers · Entrepreneurial graduates · Experiential entrepreneurship education · Venture creation program

JEL Classification A23 · M13

1 Introduction

Literature debates the assessment outcomes of entrepreneurship education (Eesley & Lee, 2019; Martin et al., 2013; Nabi et al., 2017; Scott et al., 2016; Walter & Block, 2016). Common measures include numbers of start-ups (and founders) produced (Jones et al., 2017; Matlay, 2008) or increased intention to engage in start-up behavior, as distinct from actual start-up behaviors, post-education (Bae et al., 2014; Rauch & Hulsink, 2015). Several scholars advocate that assessment and evaluation of the outcomes of entrepreneurship education should move beyond singular focus on firm creation (O'Connor, 2013), whether as intention to start or actually starting, and instead pay attention to the human capital developed (Eesley & Lee, 2019; Martin et al., 2013). Research has emphasized that entrepreneurship education fosters competencies that prepare graduates to handle uncertainty, solve problems, collaborate in team settings, and make informed decisions (Gibb, 2002; Hytti et al., 2010; Neck & Corbett, 2018; Williams-Middleton & Donnellon, 2014). An entrepreneurship competence framework developed by the European Commission (Bacigalupo et al., 2016) adopts a broad view, considering entrepreneurial competence as enabling "citizens to develop their ability to actively participate in society, to manage their lives and careers and to engage in value-creating initiatives." Viewing entrepreneurial competence in this way, rather than exclusively as related to firm creation, has gained increased traction as companies demand within-firm entrepreneurial processes commonly known as intrapreneurship or corporate entrepreneurship (Kuratko & Morris, 2018). However, a main issue in addressing entrepreneurial competence as an aggregate construct lies in the heterogeneity of the phenomenon that is being targeted and the versatility of knowledge, skills, abilities, and social awareness in its use. As the phenomenon of entrepreneurship has broadened, there is a need to address a multitude of competencies argued as essential when developing entrepreneurial individuals and subsequently provided through entrepreneurship education. With an emphasis on entrepreneurial competencies and human capital comes the need to re-examine influences of entrepreneurship education applied across all graduates' careers, and not only those who start new firms. In this study, we investigate the relevance of an entrepreneurial competence perspective as applied to a specific form of entrepreneurship education called venture creation programs. Building on Hager and Gonczi (1996 p. 15), we define competencies as practice-integrated consisting of "knowledge, skills, abilities and attitudes displayed in the context of a carefully chosen set of realistic professional tasks." Venture creation programs are utilized as the empirical base because the design of the education integrates practicing entrepreneurship as the baseline for learning.

There are at least two issues with prior studies that this study seeks to address. First, while recent studies examined the development of competencies through entrepreneurship education (Martin et al., 2013; Matlay, 2008; Morris et al., 2013), such studies overlooked whether these competencies are applied by graduates in their subsequent careers. Furthermore, career trajectories of entrepreneurial graduates beyond firm creation are not well understood (Nabi et al., 2017). We address this gap by examining the extent to which entrepreneurial competencies developed through venture creation programs are applied by graduates in their professional occupations, whether as self-employed or as employees. Second, we address and provide a piece of the puzzle for understanding how outcomes may differ depending on the type of entrepreneurship education that is studied. As highlighted in the study by Eesley and

Lee (2019), when assessing outcomes on a highly aggregated level, the impact of entrepreneurship education seems scattered and provides little evidence of justifying its central role in policy arguments spurring more entrepreneurialism through education. But as they imply, when assessing a more specific type of entrepreneurship education (the Mayfield Fellows Program) based on experiential learning, the results seem to lead to increased skill development, where Eesley and Lee (2019) make a call for focused research on specific program types to address the heterogeneity currently clouding our understanding on outcomes of entrepreneurship education. We respond to this acknowledged gap by conducting a study on specialized venture creation programs where focus is to develop knowledge and skills aimed at preparing graduates for a potential entrepreneurial career in a broad sense.

Given the above, the purpose of the study is to develop a more fine-grained understanding of how entrepreneurial graduates apply entrepreneurial competencies across different entrepreneurial occupational roles and attribute the development of these competencies to their entrepreneurial education. Hence, we seek to answer the following research question: *To which extent are entrepreneurial competencies developed through venture creation programs, manifested in graduates' subsequent careers?* To address the purpose and research question, we conducted a survey for graduates of three Nordic master-level entrepreneurship educations, all identified as venture creation programs. In a venture creation program, education is designed to support students in developing competencies needed to transform opportunities into viable business, using the experience of developing a real-life venture as the main learning vessel (Lackéus & Williams-Middleton, 2015). This type of education builds upon learning through experience (Hägg & Gabrielsson, 2019; Johannisson, 1991; Jones, 2009; Pittaway & Cope, 2007), using an experience-based pedagogical approach where the focus on entrepreneurial experience has been dominating (Haneberg & Aadland, 2020; Lundqvist et al., 2015; Rasmussen & Sørheim, 2006). Such an experience-based approach aims to support students' development of entrepreneurial skills, abilities, and attitudes in addition to knowledge, i.e., developing competencies displayed in context.

2 Literature review

2.1 Entrepreneurship education and venture creation programs

The plethora of entrepreneurship education worldwide illustrates the societal importance of teaching entrepreneurship (Katz, 2008; Morris & Liguori, 2016; Neck & Corbett, 2018), but fundamental questions still exist regarding the effects of entrepreneurship education[1] (Fayolle & Gailly, 2015; Jones et al., 2017; Nabi et al., 2017). For example, recent critique questions the cost of entrepreneurship education relative to expected output, in terms of start-up entrepreneurs (Astebro & Hoos, 2016; Eklund, 2019). However, applied learning needs to be recognized not only through self-employment activities but also in terms of alternative career paths taken by entrepreneurship education graduates, such as being intrapreneurs in private or public sector (Lackéus et al., 2020), and in economic as well as social terms (Greene et al., 2018).

Since its establishment, entrepreneurship education research has strongly advocated action-oriented approaches (Johannisson, 1991; Ronstadt, 1985; Solomon et al., 1994). Over the last two decades, the role of experience has been presumed as crucial in teaching and learning entrepreneurial competencies in educational forums (Dhliwayo, 2008; Hägg & Kurczewska, 2021; Morris et al., 2013; Politis, 2005). However, the empirical evidence mirroring this research has been meager (early attempts voiced by Kuratko, 1989), whereas the traditional form of teaching about entrepreneurship, including emphasis on components of a business plan, has been central (Mwasalwiba, 2010). An extreme form

[1] Education focusing on preparing individuals for taking on the role of entrepreneur.

of experience-based entrepreneurship education, so-called venture creation programs, has been developed since the 1990s. Venture creation programs embrace experiential learning as the core process of learning entrepreneurship in educational settings (Hägg, 2017; Haneberg & Aadland, 2020), emphasizing a "learning *through* approach." Learners are embedded in the process of venture emergence including, when viable, incorporation (Lackéus & Williams-Middleton, 2015). The "learning through approach" in entrepreneurship education utilizes enactive mastery, where students are acting as entrepreneurs while also being students (Hägg & Kurczewska, 2019; Harms, 2015; Jones, 2009; Nielsen & Gartner, 2017; Williams-Middleton, 2013). The learning environment is commonly expanded beyond faculty to include also other institutional actors supporting innovative activity as well as actors external to the university in the role of investors, advisors, mentors, and business competition panels (Jacob et al., 2003; Lundqvist, 2014; Rasmussen & Sørheim, 2006). External actors potentially impart social persuasion, above and beyond the peer-to-peer influence created by classmates and recent graduates from the program (Kubberød et al., 2018; Williams-Middleton et al., 2020).

Furthermore, venture creation programs allow for students to experience the emotional, visceral, and contextual factors and consequences associated with entrepreneurship and to use this affective experience as a critical part of the learning journey (Haneberg & Aadland, 2020; Ollila & Williams-Middleton, 2011). By doing this, venture creation programs have been shown to deliver not just the declarative (know-what) and procedural (know-how) knowledge important to carrying out entrepreneurial activity but also embodying learning of a deeply seated "why" for each individual engaged (Hägg, 2017; Williams-Middleton & Donnellon, 2014), thus providing a foundation for developing entrepreneurial competencies.

2.2 Competencies developed from entrepreneurship education

Although there is strong support among scholars for developing entrepreneurial thinking and action as key for entrepreneurship education (Neck & Corbett, 2018), most studies used either intentionality to start a venture or the creation of a new firm as the primary means for assessment of entrepreneurship education (Rauch & Hulsink, 2015; Souitaris et al., 2007). The scarce research investigating the longer-term influence of entrepreneurship education most often addressed number of start-ups created by graduates (Jones et al., 2017) or investigated the antecedents of graduates' entrepreneurial intention or actual start-ups (Lange et al., 2011), illustrating that entrepreneurship education trumps most other factors, except for prior entrepreneurial experience. Hence, there is a lack of knowledge about the broader range of entrepreneurial career trajectories of graduates (see Charney & Libecap, 2000 for an early attempt to address the impact entrepreneurship education has by financial measures), beyond self-employment, such as alternative career paths related to entrepreneurship, including hybrid entrepreneurship, i.e., combining self-employment with paid employment (Folta et al., 2010), and intrapreneurship (Burton et al., 2016). One of the few studies addressing the issue is Jones et al., (2017 p. 692) calling attention to the need for employees with entrepreneurial competencies: "Small business owner-managers claim that their firms require resourceful graduates with relevant entrepreneurial knowledge and skills, including knowledge of assets, capabilities, organizational processes, attributes and information." Investigating the career impact from entrepreneurship education in retrospect, they found that entrepreneurship education provides value not only in enabling start-up behavior but also in supporting a broader spectrum of entrepreneurial activity.

To address what constitutes entrepreneurial competencies, we start with Hager and Gonczi's (1996 p. 15) definition where competencies are seen as practice-integrated including "knowledge, skills, abilities and attitudes displayed in the context of a carefully chosen set of realistic professional tasks." In line with this view and in conjunction with prior work from educational science (Alexander, 1992) and entrepreneurship education (Hägg, 2017; Johannisson, 1991; Martin et al., 2013; Matlay, 2008; Morris et al., 2013; Ronstadt, 1985), we treat entrepreneurial competencies as a multidimensional construct, including various types of knowledge areas that are developmental and seen as essential for engaging in entrepreneurial activity. We base our developmental approach in entrepreneurial competencies on prior research recognizing a plethora of activities tied to entrepreneurial processes or entrepreneurial careers

(e.g., Martin et al., 2013; Matlay, 2008; Morris et al., 2013; Mwasalwiba, 2010). Such studies typically give attention to identifying core entrepreneurial activities ranging from knowledge and skills related to the process (e.g., opportunities, value creation, business strategy and finance), to handling risk and uncertainty in decision-making, and to dealing with networking and human resources. Johannisson (1991) and Ronstadt (1985) addressed the connection between the entrepreneurial competencies of practicing entrepreneurs and the potential adoption of these competencies for the educational setting. Following this, scholars have continued to argue for the importance of developing entrepreneurial competencies through education (e.g., Jones et al., 2017; Matlay, 2008; Morris et al., 2013).

Given the spectrum of knowledge areas tied to entrepreneurship and our selected definition for competencies, we investigate entrepreneurial competencies through division of domain-specific knowledge as addressed by Alexander et al. (1991) and Ertmer and Newby (1996). Alexander and Judy (1988 p. 376) define domain-specific knowledge as "the declarative, procedural, or conditional knowledge one possesses relative to a particular field of study." Knowledge is separated as declarative (know-what), procedural (know-how), and conditional (know-when, where, and why) and further complemented with insights from entrepreneurial practice, addressing the importance of social skills and networking abilities (to include know-who) (see e.g., Gibb, 1987; Johannisson, 1991; Ronstadt, 1985). This division assists the categorization of different knowledge areas that together make up a foundation for developing competencies (e.g., Hager & Gonczi, 1996) tied to professional tasks in the specific context. While many forms of knowledge have been addressed in prior literature, declarative, procedural, and conditional distinctions hold for all types of knowledge, whether content, linguistic, or any other types (Alexander et al., 1991). For the domain of entrepreneurship, declarative knowledge refers to factual knowledge about entrepreneurship, while procedural knowledge consists of skills on how to conduct entrepreneurial activities and conditional knowledge constituting the ability to judge when, where, and why to use one's declarative and procedural knowledge (Alexander & Judy, 1988; Alexander et al., 1991). Related to these three types of domain-specific knowledge, scholars have also clearly pointed out the importance of understanding the social context in which entrepreneurship unfolds as key to forming beneficial attitudes among novice entrepreneurs (Neergaard & Christensen, 2017; Ronstadt, 1985).

Although a qualified argument for division of domain-specific knowledge is established in educational science (and entrepreneurship education scholars have proposed similar distinctions (e.g., Johannisson, 1991; Ronstadt, 1985)), the discussion on knowledge is an evolutionary debate, especially in regard to the interrelation between types of knowledge (Alexander, 1992; Alexander & Judy, 1988; Alexander et al., 1991). It is theoretically possible to argue that one can acquire declarative knowledge about a phenomenon (e.g., components in a business plan or the opportunity construct) without providing evidence on how to apply it (procedural skills). In practice, development of declarative and procedural knowledge often occurs simultaneously (Alexander & Judy, 1988), and as Jarvis (2006) argues, it is the whole person that learns, all of which is mirrored in entrepreneurial learning scholars' attention to learning experientially (Politis, 2005). In venture creation programs, this is especially apparent as the pedagogical foundation is based on learning through experience, where knowing what (declarative knowledge) and knowing how (procedural knowledge) are closely interrelated in entrepreneurial learning activities. Equally important is learning to make judgment calls under uncertainty (Knight, 1921; Sarasvathy, 2001); something that is tied to conditional knowledge implying knowing why, when, and where to make entrepreneurial decisions (Hägg, 2017; Williams-Middleton & Donnellon, 2014). Finally, the skills and abilities to interact in the social context and to develop value both for the entrepreneur and their potential stakeholders (Bruyat & Julien, 2001) are considered essential and can be related to the development of what Johannisson (1991) addressed as networking abilities and know-who (i.e., social skills). Therefore, based on Hager and Gonczi (1996) and the broad categorizations discussed in relation to entrepreneurial competencies (Matlay, 2008; Morris et al., 2013), we argue that a fruitful way to capture the multidimensional construct of entrepreneurial competencies could be found in the types of knowledge tied to the domain of entrepreneurship as follows:

(1) *Knowledge and skills related to the entrepreneurial process* referring to domain-specific knowledge tied to starting and running a business, which has been argued to be core knowledge when teaching entrepreneurship in higher education (e.g., Johannisson, 1991; Jones et al., 2017; Martin et al., 2013; Mwasalwiba, 2010), reflecting both declarative (know-what) and procedural (know-how) knowledge (Alexander et al., 1991).
(2) *Judgmental abilities and decision-making related to entrepreneurial action* built on the argument that entrepreneurs need to embrace and deal with uncertainty (Knight, 1921; Sarasvathy, 2001). This refers to conditional knowledge on why, when, and where to use one's declarative and procedural knowledge (Alexander et al., 1991; Ertmer & Newby, 1996), implying a type of knowledge captured in the quote by Baron (1998 p. 291) that "what we want, ultimately, is not entrepreneurs who are paralyzed into inaction by efforts to conduct totally logical assessments of all possible risks and benefits, but rather ones who pause and reflect sufficiently to increase the chances that they – and their societies – will prosper."
(3) *Social skills and networking abilities*: Building on the work of Johannisson (1991), Ronstadt (1985), as well as Gibb (1987), the social skills tied to the entrepreneur and his/her abilities to network are a type of general knowledge that have been found important to develop and promote in higher education when educating prospective entrepreneurs (e.g., Neergaard & Christensen, 2017).

As our study seeks to understand to which extent entrepreneurial competencies developed in venture creation programs manifest in graduates' subsequent careers, the combination of different types of knowledge areas tied to the field of entrepreneurship provides a foundation to address the purpose of the study.

2.3 Entrepreneurial careers and graduate experiences

As research on entrepreneurial careers has predominantly focused on practicing entrepreneurs, there is limited research on the broader spectrum of entrepreneurial individuals and their career trajectories within existing career theory and entrepreneurship literature (Marshall et al., 2019; Sullivan et al., 2007). The majority of studies on entrepreneurial careers have examined individual characteristics and conditions leading to entrepreneurship, implying that the decision to start a venture is seen as the destination or the only career path for entrepreneurship, instead of considering a variety of career paths associated with entrepreneurship (Burton et al., 2016). This is despite corporate entrepreneurship (Burgelman, 1983) and intrapreneurship (Parker, 2011; Pinchot, 1985) being recognized as phenomena of entrepreneurship. Studies that have examined entrepreneurial careers have predominantly seen self-employment as the primary occupational form characterizing entrepreneurs' vocational careers (e.g., Feldman & Bolino, 2000) or have assumed that venture creation is the main (or sole) career path to pursue after an entrepreneurship education (Bird, 1989; Krueger et al., 2000; Nabi et al., 2010). Although diversity among entrepreneurial careers, such as hybrid entrepreneurship, portfolio entrepreneurship and serial entrepreneurship, is well acknowledged (e.g., Folta et al., 2010; Westhead et al., 2005; Wiklund & Shepherd, 2008), there is no inclusive framework that accounts for entrepreneurial competencies and career paths beyond self-employment.

Dyer (1995) presents four dimensions considered essential for a comprehensive theory of entrepreneurial careers: career choice; career socialization; career orientation; and career progression from entry to exit. Interestingly, entrepreneurial careers have been found to be mostly transient, i.e., involving movements between self-employment, full employment, and other occupational status positions (Burton et al., 2016), and thus resembles what is elsewhere called boundaryless careers (Arthur, 1994; Arthur et al., 2005; DeFillippi & Arthur, 1994). For example, Burton et al. (2016) found that only 15–30% of entrepreneurs are serial founders of successive ventures, which implies that the knowledge and skills of individuals that at some points are self-employed (i.e., entrepreneurs, having entrepreneurial competencies) would be applicable in other settings. The existence and description of "intrapreneurship" introduced by Pinchot in 1985 and presented as entrepreneurship occurring in existing organizations (Hisrich, 1990) reiterate the applicability of entrepreneurial competencies in settings that transcend self-employment or firm creation.

Research argues for the applicability of entrepreneurial competencies across multiple employment forms (Ball, 1989; Blenker et al., 2012), suggesting that individuals are likely to navigate multiple employment positions along a career trajectory (Burton et al., 2016). Due to lack of empirical evidence as previously discussed, we choose to investigate the perceived applicability of entrepreneurial competencies stemming from venture creation programs across the various career trajectories of graduates. We use established descriptions of competencies associated with entrepreneurship and commonly provided through experience-based entrepreneurship education, to explore the extent to which graduates of venture creation programs developed these competencies through their education and the extent to which entrepreneurial competencies were utilized in their current occupations. We categorize graduates into three occupational categories – self-employed (entrepreneur), hybrid (engaging in entrepreneurial activity as self-employed while also receiving a salary from an employer), and employed (with further distinction between conventional employment and intrapreneur).

Based on our literature review, our theoretical conjecture is that graduates assess favorably the competencies developed in venture creation programs in their subsequent careers (e.g., Neck & Corbett, 2018; Williams-Middleton & Donnellon, 2014). Moreover, given venture creation programs' emphasis on venture emergence (Lackéus & Williams-Middleton, 2015; Rasmussen & Sørheim, 2006), we also posit that there are potential differences across the occupational roles when it comes to the application of competencies developed through education. For example, we may expect that graduates who engage in entrepreneurial occupational roles are valuing the usefulness of developed entrepreneurial competencies higher than graduates who engage in non-entrepreneurial occupational roles. In addition, there may be differences across various entrepreneurial occupational roles, where self-employed graduates value developed competencies higher compared to intrapreneurs. However, the empirical support for the conjectures that abound in the literature are still largely unexplored, which warrants further scholarly inquiry. To guide our empirical investigation, we formulate the following hypothesis:

H1: Graduates from venture creation programs show overall high application of entrepreneurial competencies developed through their education; but varying depending on their subsequent occupational role so that:

a) *Graduates in entrepreneurial occupational roles apply entrepreneurial competencies more often than graduates in non-entrepreneurial roles.*
b) *Graduates that are self-employed apply entrepreneurial competencies more often than intrapreneurs, i.e., graduates in waged employment involving entrepreneurial activities.*

3 Method

The empirical strategy of this paper conducts a within-group study of three venture creation programs. A venture creation program is a full-fledged and advanced type of entrepreneurship education aimed at producing entrepreneurial graduates. This specific type of entrepreneurship education program both attracts and helps develop students with high levels of entrepreneurial intention, making these programs a focusing device to study entrepreneurial careers as a normal and not exceptional outcome. The venture creation program design is practice-oriented, embedded in the context of entrepreneurial action including engagement with professional tasks and stakeholders. Thus, it is argued that these programs are well suited to investigate competencies in line with the Hager and Gonczi (1996) definition.

The career trajectories of graduates from venture creation programs are investigated relative to current occupation, categorized as self-employed, employed, or hybrid (i.e. combining both). Current career categorization is analyzed in relation to graduates' assessment of entrepreneurial competencies developed through venture creation programs and application of entrepreneurial competencies attributed to that which was learned during venture creation programs. In the following sections, the survey design and data collection, measures, and sample description of the paper's underlying study will be presented.

3.1 Context

The context of the study comprises three master-level venture creation programs (Lackéus & Williams-Middleton, 2015). The programs represent three independent contexts, but with an underlying homogeneous view on venture creation as the main learning vessel. By including graduates from three programs, we increase the validity of our findings across slightly different contexts that also had in common good access to contact information of graduates (enabling higher response rates). Two of the programs are located in Sweden: Chalmers School of Entrepreneurship (Chalmers University of Technology) and Lund's Master's Program in Entrepreneurship and Innovation (Sten K. Johnson Centre for Entrepreneurship at Lund University). The third is located in Norway: NTNU School of Entrepreneurship (Norwegian University of Science and Technology). The national contexts of the three programs are considered to be highly similar, in comparison to, for example, equivalent programs in the UK or the USA. The programs at Chalmers and at NTNU span 2 years, while the program at Lund spans 1 year. The program in Lund is located at the Business School, while the programs at Chalmers and NTNU are situated at departments of technology management. These differences have some implications on the student cohorts attending the different programs. There is a majority of business students attending the program in Lund, while the programs at Chalmers and NTNU have a majority of engineering students. Over time, all three programs have an increasing breadth of student educational backgrounds.

3.2 Survey design and data collection

A web-based survey was developed during the spring and summer of 2018. Standardized questions were used stemming from prior alumni surveys from MIT, Ohio University, HEDS Alumni survey, and Cornell University, to cover areas such as post-graduation career paths, demographics, as well as graduates' contact and engagement. The questions on post-graduation career paths were then complemented with questions related to intrapreneurial activity as measured in the GEM-project (gemconsortium.org) and additional questions related to start-up behavior and nascent entrepreneurial activity (McGee et al., 2009). Besides these standardized questions, the survey design also included newly developed questions consisting of variables addressing competencies gained from educational experiences during the venture creation program and variables addressing the application of these entrepreneurial competencies in their current occupations. The variables measuring entrepreneurial competencies were derived from three main perspectives relevant to a context-integrated notion of competence (Hager and Gonzi, 1996); knowledge and skills related to the entrepreneurial process, judgmental ability and decision-making related to entrepreneurial action, as well as social skills and networking abilities. As previously addressed, these three perspectives and the set of variables provide a foundation for entrepreneurial competencies.

The web-based survey was distributed to 1103 graduates of the three venture creation programs during 2018. Of these, 556 graduates from the three venture creation programs responded, resulting in a response rate of 50.4%. The following sections present data collection and sample for the venture creation program at each university.

3.2.1 Chalmers graduates

Chalmers School of Entrepreneurship entails four tracks, two addressing corporate entrepreneurship and innovation (with specifications) and two addressing new venture creation (VCP). Between 1997 and 2018, 837 graduates (505 VCP graduates) graduated from Chalmers School of Entrepreneurship. Contact information for 595 of the 837 graduates was obtained, to which the survey was distributed. The survey was sent out in October 2018, followed by three reminders before closing the data collection in November 2018. In total, 316 valid responses were received resulting in a response rate of 53%. For the aim of the study, only the responses from the VCP graduates were included for analysis, corresponding to 240 responses (of a possible 505 VCP graduates), resulting in a response rate of 47.5%.

3.2.2 Lund graduates

The Lund's Master's Program in Entrepreneurship and Innovation entails two tracks, one addressing corporate entrepreneurship and innovation and the other

addressing new venture creation (VCP). The survey was sent to the full population of 472 graduates from the program between 2008 and 2018 (of which 339 are VCP graduates). The survey was sent out in October 2018, followed by four reminders before closing the data collection in November 2018. In total, 201 valid responses were received, which corresponds to a response rate of 42.6%. For the aim of this study, only the responses from the VCP graduates were included for the analysis corresponding to 141 responses (of a possible 339 VCP graduates), resulting in a response rate of 41.6%.

3.2.3 NTNU graduates

The NTNU School of Entrepreneurship entails one track in venture creation (VCP). The survey was sent to the full population of 259 VCP graduates who graduated from NTNU's School of Entrepreneurship between 2003 and 2018. The survey was sent out in September 2018, followed by four reminders before closing the data collection in November 2018. In total, 175 valid responses were received, which corresponds to a response rate of 67.6%.

3.3 Measures

3.3.1 Occupational status

It measures the graduates' current occupational status (in fall 2018). To address how graduates from venture creation programs make use of entrepreneurial competencies in their subsequent careers, four categorical variables were used to represent distinctive occupational roles: self-employed, intrapreneur, conventional employee, and hybrid entrepreneur (i.e., those combining employment with self-employment). An additional set of graduates ($n=73$) responded as either engaged in studies, in-between jobs, on parental leave, unemployed, or taking time off without actively searching for work and were thus excluded from analysis as they were not occupationally active at the time of the survey. This led to an initial sample of 483 graduates determined as occupationally engaged. For graduates responding as employed, the survey included questions on intrapreneurial activity. These questions served to categorize the employed graduates into two distinctions: intrapreneur and conventional employee. The criteria towards being labeled as an intrapreneur was based on two questions addressing intrapreneurial activity as follows (Bosma et al., 2012): Q1, idea development for a new business activity, and Q2, preparation and implementation of a new business activity. To gauge the level of intrapreneurial activity in current employment, a five-graded scale was used asking the employed graduates to what extent they are actively involved or have a leading role in undertaking intrapreneurial activities in their occupation, ranging from 1, main responsibility; 2, to a considerable degree; 3, to some extent; 4, only to a very little extent; and 5, no engagement. Employed graduates that ticked 1 or 2 on one or both of the questions were categorized as intrapreneur.

3.3.2 Developed entrepreneurial competencies (DECs)

The measures for gauging the entrepreneurial competencies that respondents attribute as having developed through the educational experience were derived from prior work on entrepreneurship education, including conceptual and empirical work (see Sect. 2.2). In total, 14 variables on a 7-point scale ranging from 1 (very low extent) to 7 (very high extent) asking about to what extent the graduates perceived that their education have prepared them for a set of entrepreneurial activities. The variables were grouped into three broad categories (see Sect. 2.2): knowledge and skills related to the entrepreneurial process (six variables), judgmental ability and decision-making related to entrepreneurial action (three variables), and social skills and networking abilities (five variables).

The variables for the first category were developed based on entrepreneurship education and education research (e.g., Alexander & Judy, 1988; DeTienne & Chandler, 2004; Johannisson, 1991; Jones et al., 2017; Martin et al., 2013; Mwasalwiba, 2010; Ronstadt, 1985) to capture general skills needed to engage in the entrepreneurial process. The variables focused on declarative and procedural knowledge such as business planning, finance, entrepreneurial marketing, business growth, business modeling, and generating opportunities.

The variables for the second category were developed based on entrepreneurship, entrepreneurship education, and education research (e.g., Alexander et al., 1991; Hägg, 2017; Knight, 1921; Martin

Table 1 Frequency overview of the data

Variables	Total		Chalmers graduates		Lund graduates		NTNU graduates	
	n	%	*n*	%	*n*	%	*n*	%
Female graduates	146	26,3	59	24,6	39	27,7	48	27,4
Employed	266	47,8	122	50,8	55	39,0	89	50,9
Self-employed	156	28,1	62	25,8	41	29,1	53	30,3
Hybrid entrepreneur (combining employment with self-employment)	61	11,0	17	7,1	26	18,4	18	10,3
Studying (excl., PhD education)	8	1,4	4	1,7	4	2,8	0	0
PhD education	9	1,6	2	0,8	5	3,5	2	1,1
Parental leave	9	1,6	7	2,9	1	0,7	1	0,6
Unemployed	6	1,1	2	0,8	4	2,8	0	0
Other (in-between jobs, traveling, etc.)	6	1,1	1	0,4	5	3,5	0	0
Non-valid	35	6,3	23	9,6	0	0	12	6,9
Total	556	100	240	100	141	100	175	100

et al., 2013; Mwasalwiba, 2010; Sarasvathy, 2001) to capture judgment when engaging in entrepreneurial action. The variables focused on judgment with respect to decision-making in situations characterized by risk or uncertainty, ability in evaluating opportunities, and evaluating different sources of information to take action.

The variables for the third category were developed based on entrepreneurship education and education research (e.g., Johannisson, 1991; Jones et al., 2017; Mwasalwiba, 2010; Ronstadt, 1985) to capture the social dimension when entrepreneurs engage in starting up and developing new ventures. The variables focused on abilities of communicating the business idea, promoting and selling to a specific audience, team collaboration, networking abilities to promote a business idea, as well as ability to handle challenges in a team setting.

3.3.3 Applied entrepreneurial competencies (AECs)

The same three categories and corresponding items of entrepreneurial activities that acted as the basis for developed entrepreneurial competencies through the educational experience were used for entrepreneurial competencies applied in current occupation. Graduates answered questions addressing the extent to which they prioritize and frequently pursue different entrepreneurial activities in their *current* occupations as a proxy for entrepreneurial competencies applied in their occupational roles.

3.4 Sample descriptions

The sample is derived from a population of 1103 VCP graduates from three universities: 505 from Chalmers University of Technology, 339 from Lund University, and 259 from NTNU. The gender distribution in this population is 71.5% male and 28.5% female. The initial sample consists of 556 VCP graduates who responded to the survey. An overview of the data including gender distribution and occupational status is presented in Table 1.

The distribution of graduates in the four occupational roles ($n=483$) are presented in Table 2. For the analysis, we included individual responses only for those graduates who gave valid responses for both

Table 2 Occupational groups

	Frequency (initial sample)	Frequency (final sample)
Intrapreneur	151 (31,3%)	127 (30,5%)
Conventional employee	115 (23,8%)	101 (24,2%)
Self-employed	156 (32,3%)	138 (33,1%)
Hybrid entrepreneur	61 (12,6%)	51 (12,2%)
Total	483	417

developed entrepreneurial competencies (DECs) and applied entrepreneurial competencies (AECs) (see *frequency* (*final sample)*). This led to a final sample of 417 graduates.

As can be seen from Table 2, there is a relatively similar distribution of graduates in the different occupational roles when comparing between the initial and final samples, with the largest group being those identified as self-employed, closely followed by intrapreneurs and then conventional employees.

A two-way MANOVA was used with combined dependent variables, to investigate potential interactions that gender and university might have on the occupational roles. First, the entrepreneurial competencies obtained were investigated. No significant differences were observed in the interaction of occupation*gender ($p=0.317$; Wilks' $\Lambda=0.886$), occupation*university ($p=0.541$; Wilks' $\Lambda=0.805$), and occupation*gender*university ($p=0.462$; Wilks' $\Lambda=0.800$). Then the same test was made to reflect entrepreneurial competencies applied with the corresponding combined dependent variable. No significant differences were observed in the interaction of occupation*gender ($p=0.329$; Wilks' $\Lambda=0.886$), occupation*university ($p=0.148$; Wilks' $\Lambda=0.773$), and occupation*gender*university ($p=0.544$; Wilks' $\Lambda=0.805$). These tests indicate that there are no significant interactions from gender and university on occupational status, when used as variables in the analysis.

4 Findings and analysis

4.1 Descriptive statistics

Descriptive statistics are presented followed by statistical testing and analysis using SPSS. In Table 3, the mean values and standard deviations of the dependent variables representing developed entrepreneurial competencies (DECs) and applied entrepreneurial competencies (AECs) are presented and divided based on the four occupational roles.

The first step of analysis was done to determine characteristics of the distribution. A Kolgomorov-Smirnov test was applied to explore the normality of the distribution. As expected from a closed-bound scale, normality could not be confirmed for any of the dependent variables. The large sample size of this study (see Table 2) was assumed to mitigate some of the potential errors in the analysis. For the analysis, the dependent variables were viewed as continuous variables.[2]

The next part of analysis consisted in determining the significant differences between the different occupational roles with respect to developed entrepreneurial competencies through the venture creation programs and the application of entrepreneurial competencies in subsequent careers. The analysis was made independently for developed entrepreneurial competencies and entrepreneurial competencies applied. A comparison of means using one-way ANOVA was conducted for each of the 14 dependent variables (see Sect. 3.4), followed by a posteriori tests to determine significant differences in relation to the occupational roles. Appropriate post hoc treatments were determined by assessing the homogeneity of variance between each occupational role. Due to the difference in sizes of the four occupational roles (e.g., hybrid entrepreneurs were half the size of conventional employees), homogeneity of variance could not be guaranteed. Levene's test was used to determine the homogeneity of variance, where a p value less than 0.05 would violate the assumption of equal variance. In the case that equal variance could be assumed, Tukey's HSD post hoc was used. For the opposite scenario, Games Howell's post hoc was used.

4.2 Developed entrepreneurial competencies (DECs)

First, we examined how graduates from venture creation programs assess developed entrepreneurial competencies (DECs) through their education, in total and per occupation role. Table 3 illustrates to which extent graduates perceive that their educational experience from the program has improved their entrepreneurial competencies. The mean values of the dependent variables measuring DECs range between 4.38 and 5.99 (see column total sample), thus indicating a rather high appreciation of the entrepreneurial competencies gained through their education. The

[2] This assumption presents a potential limitation due to the non-parametric nature of "Likert-type" variables. Support for this assumption was drawn from the ratio-like scale used for each variable and through the work of Lubke and Muthén (2004) who argue that differences in analyzing parametric and non-parametric data decrease for large samples.

Table 3 Descriptive statistics of the study variables

Occupational groups		Intrapreneur $n=127$		Conventional employee $n=101$		Self-employed $n=138$		Hybrid entrepreneur $n=51$		Total $n=417$	
		DECs	AECs	DECs	AECs	DECs	AECs	DECs	AECs	DECs	AECs
Knowledge and skills related to the entrepreneurial process											
Developing business plans	Mean	5,85	4,44	6,04	3,21	5,89	4,01	5,76	4,43	5,90	4,00
	Std	1,267	1,950	1,019	1,997	1,163	2,058	1,505	1,735	1,209	2,025
Financial forecasting in new businesses	Mean	4,50	4,59	4,48	3,29	4,36	4,99	3,94	4,65	4,38	4,41
	Std	1,537	1,973	1,397	1,966	1,404	1,628	1,771	1,683	1,497	1,938
Entrepreneurial marketing (incl. marketing with limited means)	Mean	4,80	4,22	4,65	2,86	4,38	5,48	4,86	4,76	4,63	4,37
	Std	1,528	1,856	1,417	1,726	1,410	1,562	1,497	1,945	1,467	2,001
Planning and managing for business growth	Mean	4,69	5,54	4,68	4,17	4,49	5,84	4,63	5,69	4,61	5,32
	Std	1,383	1,607	1,256	2,059	1,426	1,291	1,549	1,490	1,387	1,750
Developing a sustainable and enduring business model	Mean	5,04	5,23	5,17	3,70	4,99	5,67	5,08	5,16	5,06	5,00
	Std	1,422	1,580	1,265	2,095	1,475	1,258	1,521	1,736	1,413	1,808
Generating new business opportunities	Mean	5,63	5,77	5,68	4,46	5,51	5,86	5,75	5,55	5,62	5,45
	Std	1,338	1,280	1,058	2,042	1,269	1,124	1,309	1,629	1,247	1,600
Judgmental ability and decision-making related to entrepreneurial action											
Making decisions in situations characterized by risk or uncertainty	Mean	5,31	5,47	5,10	4,80	5,16	6,16	5,20	5,27	5,20	5,51
	Std	1,418	1,617	1,221	1,182	1,368	1,148	1,456	1,856	1,359	1,661
Evaluating business opportunities	Mean	5,72	5,72	5,82	4,53	5,69	5,73	5,69	5,49	5,73	5,41
	Std	1,200	1,395	1,043	2,081	1,052	1,276	1,225	1,725	1,116	1,666
Evaluating different sources of information as a basis for entrepreneurial action	Mean	5,38	5,20	5,35	4,05	5,41	5,51	5,43	5,00	5,39	5,00
	Std	1,253	1,487	1,195	1,987	1,194	1,400	1,330	1,980	1,226	1,748
Social skills and networking abilities											
Communicating a business idea for investors or other stakeholders	Mean	5,97	4,93	6,04	3,93	5,91	5,23	6,18	4,67	5,99	4,67
	Std	1,119	1,787	0,937	2,160	1,124	1,810	0,974	2,104	1,062	1,987
Promoting and selling a product or service to a target audience	Mean	5,44	5,25	5,34	4,31	5,20	6,09	5,53	5,67	5,35	5,35
	Std	1,331	1,713	1,202	2,048	1,317	1,345	1,391	1,728	1,305	1,821
Collaborating with members in a team	Mean	5,95	6,41	5,98	6,09	5,85	6,29	5,86	6,08	5,91	6,25
	Std	1,181	0,920	1,157	1,530	1,196	1,233	1,371	1,294	1,202	1,241
Engaging in social activities to promote a business idea	Mean	5,35	4,38	5,36	3,42	5,27	4,46	5,59	4,47	5,35	4,18
	Std	1,325	1,817	1,254	1,867	1,412	1,743	1,314	1,994	1,335	1,873

Table 3 (continued)

Occupational groups		Intrapreneur $n = 127$		Conventional employee $n = 101$		Self-employed $n = 138$		Hybrid entrepreneur $n = 51$		Total $n = 417$	
		DECs	AECs	DECs	AECs	DECs	AECs	DECs	AECs	DECs	AECs
Handling challenges related to team processes in a new business	Mean	5,14	5,29	5,37	4,08	5,20	5,70	5,33	5,02	5,24	5,10
	Std	1,495	1,681	1,271	1,958	1,471	1,386	1,532	1,860	1,438	1,791

DECs developed entrepreneurial competencies, *AECs* applied entrepreneurial competencies

highest level of assessment among the competencies developed through the program is "Communicating a business idea for investors or other stakeholders" (5.99) followed by "Collaborating with members in a team" (5.91) and "Developing business plans" (5.90). The lowest level of assessment among the entrepreneurial competencies is "Financial forecasting in new business" (4.38), followed by "Planning and managing for business growth" (4.61) and "Entrepreneurial marketing including marketing with limited means" (4.63).

Our findings show that graduates with different occupational roles have a rather homogenous view on what has been learnt and how much entrepreneurial competencies they have developed through their venture creation programs. There is equally a homogenous view between the occupational roles on how well the venture creation program prepares them for evaluating opportunities and the sources of information used for making decisions in uncertain environments. Overall, the majority of graduates seem to value the programs as providing learning activities which foster these judgmental abilities. There seems to be a coherent view across the occupational roles, despite having different prior educational backgrounds (e.g.. engineering, business). Also given the slight differences in educational structure, the graduates are shown to develop similar types and extent of entrepreneurial competencies, whether entrepreneurial knowledge, skills, judgmental abilities, social skills, or networking abilities. This indicates that despite having individual and differentiating career trajectories, the graduates can be considered to have a coherent view on what competencies they developed through their educational experience. The results of the ANOVA analysis are presented in Table 4. There were no significant differences between the four occupational roles in any of the dependent variables measuring DECs. From the analysis, it seems reasonable to suggest that graduates who chose to invest their time and resources into a venture creation program have improved their perceived entrepreneurial competencies after undergoing the program. Consequently, graduates from venture creation programs show overall positive assessments of the entrepreneurial competencies developed through their educational experience regardless of occupational role. Hence, the subsequent career does not seem to influence the assessment of the education.

Table 4 ANOVA analysis of developed entrepreneurial competencies through education among occupational groups

Developed entrepreneurial competencies	ANOVA		
	F value	η^2	Sig
Knowledge and skills related to the entrepreneurial process			
Developing business plans	0,734	0,005	,532
Financial forecasting in new businesses	1,870	0,013	,134
Entrepreneurial marketing (including marketing with limited means)	2,422	0,017	,065
Planning and managing for business growth	0,615	0,004	,606
Developing a sustainable and enduring business model	0,336	0,002	,800
Generating new business opportunities	0,634	0,005	,594
Judgmental ability and decision-making related to entrepreneurial action			
Making decisions in situations characterized by risk or uncertainty (e.g., using effectual or causal reasoning)	0,528	0,004	,664
Evaluating business opportunities	0,317	0,002	,813
Evaluating different sources of information as a basis for entrepreneurial action	0,081	0,001	,970
Social skills and networking abilities			
Communicating a business idea for investors or other stakeholders	0,855	0,006	,465
Promoting and selling a product or service to a target audience	1,174	0,008	,319
Collaborating with members in a team	0,315	0,002	,815
Engaging in social activities to promote a business idea	0,712	0,005	,545
Handling challenges related to team processes in a new business	0,558	0,004	,643

*η^2 is a measure of the effect size and reflects the percentage of the variance in the dependent variable explained by the independent variables

4.3 Applied entrepreneurial competences (AECs)

To test Hypothesis 1, we examined the extent to which graduates reported they have applied the entrepreneurial competences in their current occupation. In Table 5, the statistical analysis of means is presented with respect to the application of entrepreneurial competencies by occupation. Significant differences were observed in 13 of 14 variables representing applied entrepreneurial competencies (AECs), with *collaborating with members in a team* having a non-significant difference in mean value. Post hoc tests were used to determine where these significant differences occurred. According to the results in Table 5, there is a significant difference in 13 of 14 applied entrepreneurial competencies variables between conventional employee and the other three occupational roles, supporting Hypotheses 1a. Significant differences between intrapreneur and self-employed are present in 3 of the 14 variables measuring applied entrepreneurial competencies, namely, *entrepreneurial marketing*, *making decisions in uncertain environment*, and *promoting and selling a product or service*, supporting Hypothesis 1b for these three. For the occupational role hybrid entrepreneur, the only significant difference in entrepreneurial competencies applied is in relation to self-employed, on the variable *making decisions in uncertain environment*. No significant differences could be seen when comparing occupational roles hybrid entrepreneur and intrapreneur.

When reviewing Tables 3 and 5, it becomes evident that some AECs, such as *collaborating with members in a team*, show strong coherence over occupational roles. Other AECs, for example, *entrepreneurial marketing*, show large differences and weak coherence between occupational roles. Further, the results indicate that the entrepreneurial competencies graduates make use of in their daily work depend on their occupational roles. For instance, *entrepreneurial marketing* is applied more by self-employed graduates than by intrapreneurs, probably because marketing with limited means is even more relevant for start-ups. Similarly, *making decisions in situations characterized by risk or uncertainty* is applied more by self-employed than all other occupational groups,

Table 5 ANOVA and post hoc analysis of applied entrepreneurial competencies in current occupations

Applied entrepreneurial competencies	ANOVA		Post hoc analysis	
	F value	η^2	Post hoc test	Mean difference
Knowledge and skills related to the entrepreneurial process				
Developing business plans	8,352**	0,057	T	Intrapreneur (**) and hybrid (**) higher than conventional employee Self-employed (*) higher than conventional employee
Financial forecasting in new businesses	18,050**	0,116	GH	Intrapreneur (**), self-employed (**), and hybrid (**) higher than conventional employee
Entrepreneurial marketing (including marketing with limited means)	44,973**	0,246	GH	Intrapreneur (**), self-employed (**), and hybrid (**) higher than conventional Employee Self-employed (**) higher than intrapreneur
Planning and managing for business growth	23,268**	0,145	GH	Intrapreneur (**), self-employed (**), and hybrid (**) higher than conventional employee
Developing a sustainable and enduring business model	29,368**	0,176	GH	Intrapreneur (**), self-employed (**), and hybrid (**) higher than conventional employee
Generating new business opportunities	20,177**	0,128	GH	Intrapreneur (**), self-employed (**), and hybrid (**) higher than conventional employee
Judgmental ability and decision-making related to entrepreneurial action				
Making decisions in situations characterized by risk or uncertainty (e.g., using effectual or causal reasoning)	14,856**	0,097	GH	Self-employed higher than intrapreneur (**), conventional employee (**), and hybrid (*) Intrapreneur (*) higher than conventional employee
Evaluating business opportunities	13,706**	0,091	GH	Intrapreneur (**), self-employed (**), and hybrid (*) higher than conventional employee
Evaluating different sources of information as a basis for entrepreneurial action	16,102**	0,105	GH	Intrapreneur (**), self-employed (**), and hybrid (*) higher than conventional employee
Social skills and networking abilities				
Communicating a business idea for investors or other stakeholders	9,328**	0,063	T	Intrapreneur (**) and self-employed (**) higher than conventional employee
Promoting and selling a product or service to a target audience	22,352**	0,140	GH	Intrapreneur (**), self-employed (**), and hybrid (**) higher than conventional employee Self-employed (**) higher than intrapreneur
Collaborating with members in a team	1,645	0,012	N/A	No difference between groups
Engaging in social activities to promote a business idea	7,921**	0,054	T	Intrapreneur (**), self-employed (**), and hybrid (*) higher than conventional employee
Handling challenges related to team processes in a new business	18,638**	0,119	GH	Intrapreneur (**), self-employed (**), and hybrid (*) higher than conventional employee

GH Games Howell's post hoc, *T* Tukey's post hoc

*=$p<$,05, **=$p<$,0

but also more by intrapreneurs compared to conventional employees, which implies variations in experienced uncertainty by self-employed, intrapreneurs, and conventional employees.

Our results indicate support for our hypothesis suggesting that graduates from venture creation programs show overall high application of entrepreneurial competencies developed through their education, but varying across occupational forms. More specifically, the findings suggest that graduates in entrepreneurial occupational roles apply entrepreneurial competencies more often than conventional employees. The second part of our hypothesis, stating that self-employed graduates apply entrepreneurial competencies more often than intrapreneurs, is only supported for three out

of fourteen entrepreneurial competencies. Hence, interestingly, graduates in different types of entrepreneurial occupations have an even more similar application of entrepreneurial competencies developed through entrepreneurship education than we hypothesized.

5 Discussion

The findings offer several insights adding to a more fine-grained understanding of how venture creation programs can help develop entrepreneurial competencies across different occupational roles. Addressing the main research question, we discuss the extent to which graduates apply various entrepreneurial competencies developed through venture creation programs in their subsequent careers. We pay attention to the high level of similarities found between the occupational roles of intrapreneur and self-employed, supporting previous claims that entrepreneurial competencies developed from venture creation programs are applicable in a broader sense (Bacigalupo et al., 2016) both within new and established organizations. Hence, our results suggest moving beyond prior research assessing entrepreneurship education outcomes mainly from a number game such as financial measures and number of start-ups (e.g., Charney & Libecap, 2000; Jones et al., 2017; Lange et al., 2011) to a more comprehensive view of entrepreneurship education that pays attention to graduates and their entrepreneurial competencies. Further, the stability of the findings over three variants of venture creation programs deserves attention as it provides support for more generalizable conclusions. Finally, the findings contribute to current discussions on closing the intention-to-behavior gap in entrepreneurship education research (e.g., Nabi et al., 2017; Rauch & Hulsink, 2015).

5.1 Graduates use of competencies

Our findings show that graduates apply, to a high extent, the entrepreneurial competencies they attribute as being developed through their venture creation programs. As we measure competencies from a practice-integrated perspective (Hager & Gonczi, 1996), we gain a more fine-grained view on how well the learnings from an experience-based venture creation program are applied within different occupations. Although the entrepreneurial competencies measures are broad in addressing general entrepreneurial knowledge, skills, judgmental abilities, and social skills needed to perform entrepreneurial work tasks, the results provide valuable insights on the extent graduates positively assess and apply entrepreneurial competencies in different career contexts.

The main findings are important in several regards. First, graduates express that they have developed entrepreneurial competencies from the venture creation programs. On average, graduates who are engaged in entrepreneurial occupational roles (categorized as intrapreneur, self-employed and hybrid) had a similar appreciation of entrepreneurial competencies developed through their educational experience implying that they perceive that their venture creation program has to a high degree provided them with entrepreneurial competencies useful in different entrepreneurial contexts. When it comes to application of entrepreneurial competencies, our findings show that graduates in all entrepreneurial occupational roles manifested on average high (rather than low) levels for all measures of AECs related to their education. Even graduates who are not engaged in entrepreneurial occupational roles applied entrepreneurial competencies to some extent (in particular competences related to decision-making under uncertainty and teamwork, cf. Table 3). This indicates that graduates to a high extent utilize those entrepreneurial competencies developed from venture creation programs in their subsequent careers when engaging in occupational roles.

Secondly, the findings were consistent across the 14 variables representing entrepreneurial competencies, ranging from entrepreneurial process knowledge and skills (Mwasalwiba, 2010), via judgmental abilities (Hägg, 2017; Haynie et al., 2010), to social and networking skills (Johannisson, 2009). By taking an integrated approach on competencies (Hager & Gonczi, 1996), the study is able to provide novel insights on how entrepreneurial competencies are perceived as applicable in the occupation in the subsequent careers of graduates from venture creation programs. Further studies examining in more detail when and where different types of competencies are applied are needed to be able to say something about the longitudinal aspects of how graduates transfer and utilize their entrepreneurial competencies

developed through venture creation programs in different careers. The results from this study suggest that an experience-based pedagogical approach has the potential to reduce the distance between what is learned in education and the actual application of these competencies in practice (Hägg, 2017; Lackéus & Williams-Middleton, 2015) and potentially creates some long-lasting abilities that can be brought forward in times of need.

Third, more generally, the findings point to the perceived value and application of entrepreneurial competencies across a variety of occupational roles and careers. Our findings suggest a variety of entrepreneurial competencies applied among self-employed as well as employed graduates. This supports arguments about the relevance of entrepreneurial competencies in a broad set of career contexts (Man et al., 2002; Shepherd, et al., 2010; Stenholm & Hytti, 2014).

5.2 Occupational patterns among graduates

From the analysis, it was found that there are many similarities between graduates who are self-employed and intrapreneurs when it comes to the application of entrepreneurial competencies in their current careers. This similarity has important implications. If we care about entrepreneurial careers and the value such careers might create for society and for organizations, then we need to widen our scope from mainly studying self-employed to also including employed. Intrapreneur constitutes an occupational role pursuing an entrepreneurial career (Kuratko & Morris, 2018). This study not only justifies the importance of venture creation programs in developing competencies relevant for self-employment and associated start-ups (Jones et al., 2017; Nabi et al., 2017) but also for other occupational roles that constitute entrepreneurial careers.

Further, the study suggests that venture creation programs provide a synergy between what is learned during education and the usefulness of these learnings in practice through application of entrepreneurial competencies developed from education in subsequent careers. Graduates from venture creation programs are equipped not only with content (declarative) knowledge about entrepreneurship and how to start a venture but also with enhanced skills and abilities to make judgmental decisions. From these insights, we can speculate that graduates' ability to use generic skills (Boud & Walker, 1990), such as communication (ability to engage in networking and persuade others about ideas, products, processes etc.), collaborating in a team setting (co-creation), and reflective thinking (metacognitive awareness, self-regulation), provides them with a foundation for regulating how, what, why, and when to use certain entrepreneurial competencies across different career contexts. However, further research is needed to explore the relationship between different types of competencies.

5.3 Competencies for various entrepreneurial careers

Prior research has continuously called for assessing subsequent effects of entrepreneurship education. Numerous scholars have responded with studies examining entrepreneurship education by measuring outcomes using scales related to self-efficacy and entrepreneurial intentions (Bae et al., 2014; Martin et al., 2013; Oosterbeek et al., 2010; Sánchez, 2013). From the study by Lange et al. (2011), we gained knowledge that taking courses in entrepreneurship increased the intentionality and aspiration to become an entrepreneur, while the study by Rauch and Hulsink (2015) provided evidence that entrepreneurship education affects behavior when measuring a more long-term perspective (see also Kolvereid & Moen, 1997). With a high percentage of graduates positioned in entrepreneurial careers (76%) and covering a population of graduates that spans over 20 years (1997–2018), the current study adds to these previous findings suggesting that experiential entrepreneurship education can have effects not only on self-efficacy and entrepreneurial intentions but also on entrepreneurial competencies applied into careers we can deem entrepreneurial. This pattern is stable among the decades of entrepreneurial graduates produced. However, to further substantiate these cross-sectional findings, a more longitudinal approach with multiple data points would be warranted, picturing how graduates engage in their careers post-graduation to fully portray the behavioral development.

6 Conclusion

To conclude we revisit the question asked in this study and the purpose: To which extent are

entrepreneurial competencies developed through venture creation programs, manifested in graduates' subsequent careers? The purpose of the study is to develop a fine-grained understanding of how venture creation programs can develop entrepreneurial competencies that are useful across different entrepreneurial occupational roles. The main conclusion is that entrepreneurial competencies developed in the three studied venture creation programs to a large extent are applied in subsequent careers. These findings include all surveyed competencies, whether related to knowledge and skills tied to the entrepreneurial process, judgmental abilities related to decision-making, or social skills and networking abilities. Furthermore, this main conclusion is valid for different occupational roles, whether self-employed (33%), hybrid (12%), or intrapreneur (31%), although with somewhat decreasing magnitude. The remaining occupational role of conventional employee (24%), which per definition does not regularly engage in entrepreneurial activities, still shows an overall high positive assessment of entrepreneurial competencies developed from the program, although significantly less than entrepreneurial occupational roles.

More than three quarters of the graduates distinguish themselves as pursuing entrepreneurial careers, and most of them have an entrepreneurial career in waged employment. From these findings, there is a strong argument to appreciate entrepreneurial competencies being used far beyond self-employment. Future research into entrepreneurial careers should also include intrapreneurs and hybrid entrepreneurs, since the application of entrepreneurial competencies of these occupational roles are similar to being self-employed and starting new firms. Hence, a competencies-based perspective addressing the effects of entrepreneurship education is wider and more relevant than mere focus on intentions to start a firm or actually starting a firm.

The study includes three universities and venture creation programs with similar pedagogical approach based on experiential learning but differing in their overall composition of students in terms of disciplinary backgrounds, nationalities, and length of study. Nevertheless, the results show consistency both between programs and between graduates over time when it comes to their perceptions of entrepreneurial competencies developed. These findings suggest that the main vehicle for learning in these programs – learning from real-life early-stage venture creation – generates valuable competencies across different entrepreneurial work roles. Hence, venture creation programs on the MBA and MSc level may help develop not only knowledge and skills valuable long after graduation but also judgmental decision-making as well as social skills, appreciated in a variety of settings.

6.1 Limitations

As with all studies that address novel research paths and include new measures, we acknowledge a number of limitations in the light of the results. First, the present study is a first attempt to examine the extent to which competencies developed through entrepreneurship education are manifested across different career paths of the graduates, as self-employed or as employed, with or without entrepreneurial roles within existing organizations. But by doing so, the study is explorative in nature, mapping out this playing field. While the explorative nature might represent a limitation, it is also a necessary step towards building the knowledge base needed for future studies to further develop and test prescriptive assumptions about the extent to which entrepreneurship education or venture creation programs, in particular, contribute to the development of competencies applicable for various career contexts and the factors explaining how these competencies are applied in various career paths.

Second, our sample includes graduates from venture creation programs only. Hence, the results hold for those self-selecting into entrepreneurship education, limiting their generalizability. We have sought to outweigh this limitation by including a large sample of graduates from three institutions, two countries, various educational backgrounds, and covering a relatively large time span. However, future studies should control for various background variables. Further, it has been our purpose to examine the application of entrepreneurial competencies developed from venture creation programs. The study is not designed to assess the effects of the programs compared to other types of education. However, our findings may inform future effect assessments by pointing to the application of entrepreneurial competencies in multiple occupational roles. Consequently, further studies are

needed to examine how graduates of venture creation programs compare to others in similar occupations.

Third, this study is one of the first to examine the application of a breath of entrepreneurial competencies developed through entrepreneurship education. We have devoted effort to developing measures including process knowledge and skills, judgmental abilities, and social skills to be able to take an integrated approach to entrepreneurial competencies. While we see this as a contribution in itself, we also acknowledge that the robustness of the measures has not yet been validated beyond this study. Despite these limitations, the present study points to potential avenues for future research to further address the effects of entrepreneurship education, the application of entrepreneurial competencies, as well as the intention-to-behavior gap in entrepreneurship.

6.2 Implications for research and practice

The current study opens up multiple implications for future research. First, future research should expand beyond cross-sectional approaches and employ longitudinal research designs to explore how the use of competencies developed from entrepreneurship education may shift or vary during the entrepreneurial career of graduates. Second, future research may ask how a typical entrepreneurial career path such as self-employment differs from more linear (hierarchical) or specialized careers found in other occupations. Some graduates may in this respect follow more boundary-spanning careers, i.e. once a venture has been founded some of them may choose to proceed into another new venture, rather than staying and growing the initial firm (Westhead et al., 2005). Future research may also study whether boundary-spanning careers imply transitions between different occupational positions where graduates can enter, exit, and re-enter entrepreneurial careers or taking job opportunities that extend over a single employment setting (DeFillippi & Arthur, 1994; Hytti 2010).

There are several implications for practice and policy. Firstly, the diversity of entrepreneurial careers pursued in the current study suggests that educational experience from venture creation programs is transferable to a variety of contexts. Our findings are in line with Eesley and Lee (2019) who suggest that outcomes from entrepreneurship education vary depending on the context studied and therefore we need to be more specific in what type of education the results are embedded in. Overall, this has important implications for how potential career opportunities from different types of entrepreneurship education should be examined and assessed. Secondly, there is reason for practice to acknowledge the broader potential value of entrepreneurially trained and competent persons beyond self-employment. Especially, given that many contemporary outcome studies do not discriminate between focused longer-term interventions (such as a one- or two-year venture creation program) or shorter courses (a couple of weeks), nor address the pedagogical approach that seems to be a key issue for developing sustained entrepreneurial behavior. The current study points to the value of venture creation programs in regard to developing entrepreneurial competencies that can be applied beyond self-employment contexts in multiple occupational roles. In this respect, our analysis and findings point towards the value of entrepreneurial competencies for coping with the uncertainties and complexities that characterize today's working environment. Policy should therefore incentivize universities to offer venture creation programs as viable vehicles for entrepreneurial learning.

Acknowledgements This research is a part of the Entrepreneurship Program Alumni Study (EPAS), a collaboration between Sten K Jonsson Centre for Entrepreneurship at Lund university, Sweden, Chalmers School of Entrepreneurship at Chalmers University of Technology, Sweden, and Engage/NTNU School of Entrepreneurship at the Norwegian University of Science and Technology, Norway. The authors acknowledge the indispensable support from Torgeir Aadland and Dag Håkon Haneberg in organizing and collecting data for this study from the NTNU sample.

Author contribution The names are listed based on contribution where alphabetical order reflect equal authorship.

Funding Open access funding provided by Lund University. Data collection from The Norwegian University of Science and Technology (NTNU) graduates was funded by Engage – Centre for Engaged Education through entrepreneurship, Norway. Data collection from Lund University graduates was funded by The Entrepreneurship Foundation in Lund, Sweden. Gry Alsos, Gustav Hägg, and Diamanto Politis gratefully acknowledge financial support from The Entrepreneurship Foundation in Lund. Martin Stockhaus gratefully acknowledge financial support from Hans E Olsson Foundation.

Data Availability N/A.

Code availability N/A.

Declarations

Conflict of interest The authors declare no competing interests.

References

Alexander, P. A. (1992). Domain knowledge: Evolving themes and emerging concerns. *Educational Psychologist, 27*(1), 33–51.

Alexander, P. A., & Judy, J. E. (1988). The interaction of domain-specific and strategic knowledge in academic performance. *Review of Educational Research, 58*(4), 375–404.

Alexander, P. A., Schallert, D. L., & Hare, V. C. (1991). Coming to terms: How researchers in learning and literacy talk about knowledge. *Review of Educational Research, 61*(3), 315–343.

Arthur, M. B. (1994). The boundaryless career: A new perspective for organizational inquiry. *Journal of Organizational Behavior, 15*(4), 295–306.

Arthur, M. B., Khapova, S. N., & Wilderom, C. P. (2005). Career success in a boundaryless career world. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior, 26*(2), 177–202.

Astebro, T. B., & Hoos, F. (2016). The Effects of a Training Program to Encourage Social Entrepreneurship: Field-experimental evidence. HEC Paris Research Paper No. SPE-2016–1128. https://doi.org/10.2139/ssrn.2715384.

Bacigalupo, M., Kampylis, P., Punie, Y., & Van den Brande, G. (2016). EntreComp: The entrepreneurship competence framework. *Luxembourg: Publication Office of the European Union, 10*, 593884.

Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The relationship between entrepreneurship education and entrepreneurial intentions: A meta-analytic review. *Entrepreneurship Theory and Practice, 38*(2), 217–254.

Ball, C. (1989). *Towards an 'enterprising' culture: A challenge for education and training*. Paris, France: OECD/CERI.

Baron, R. A. (1998). Cognitive mechanisms in entrepreneurship: Why and when entrepreneurs think differently than other people. *Journal of Business Venturing, 13*(4), 275–294.

Bird, B. J. (1989). *Entrepreneurial behavior*. Glenview, IL: Scott Foresman & Company.

Blenker, P., Frederiksen, S. H., Korsgaard, S., Müller, S., Neergaard, H., & Thrane, C. (2012). Entrepreneurship as everyday practice: Towards a personalized pedagogy of enterprise education. *Industry and Higher Education, 26*(6), 417–430.

Bosma, N., Wennekers, S., & Amorós, J. E. (2012). Global entrepreneurship monitor 2011 extended report: Entrepreneurs and entrepreneurial employees across the globe. *Global Entrepreneurship Research Association* (pp. 59). London, UK.

Boud, D., & Walker, D. (1990). Making the most of experience. *Studies in Continuing Education, 12*(2), 61–80.

Bruyat, C., & Julien, P.-A. (2001). Defining the field of research in entrepreneurship. *Journal of Business Venturing, 16*(2), 165–180.

Burgelman, R. A. (1983). Corporate entrepreneurship and strategic management: Insights from a process study. *Management Science, 29*(12), 1349–1364.

Burton, M. D., Sørensen, J. B., & Dobrev, S. D. (2016). A careers perspective on entrepreneurship. *Entrepreneurship Theory and Practice, 40*(2), 237–247.

Charney, A., & Libecap, G.D. (2000). Impact of entrepreneurship education. *Insights: A Kauffman research series*. Kansas City, MO: Kauffman Center for Entrepreneurial Leadership.

DeFillippi, R., & Arthur, M. (1994). The boundaryless career: A competency-based perspective. *Journal of Organizational Behaviour, 15*(4), 307–324.

DeTienne, D. R., & Chandler, G. N. (2004). Opportunity identification and its role in the entrepreneurial classroom: A pedagogical approach and empirical test. *Academy of Management Learning and Education, 3*(3), 242–257.

Dhliwayo, S. (2008). Experiential learning in entrepreneurship education: A prospective model for South African tertiary institutions. *Education+ Training, 50*(4), 329–340.

Dyer, W. G. (1995). Toward a theory of entrepreneurial careers. *Entrepreneurship Theory and Practice, 19*(2), 7–21.

Eesley, C. E., & Lee, Y. S. (2019). Do university entrepreneurship programs promote entrepreneurship? *Strategic Management Journal, 42*(4), 833–861.

Eklund, J. (2019). *Entrepreneurship education – Is it possible to teach entrepreneurship? (Entreprenörskapsutbildning - Går det att lära ut entreprenörskap?) Stockholm*. Entrepreneurship forum.

Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated, and reflective. *Instructional Science, 24*(1), 1–24.

Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of Small Business Management, 53*(1), 75–93.

Feldman, D. C., & Bolino, M. C. (2000). Career patterns of the self-employed: Career motivations and career outcomes. *Journal of Small Business Management, 38*(3), 53–68.

Folta, T. B., Delmar, F., & Wennberg, K. (2010). Hybrid entrepreneurship. *Management Science, 56*(2), 253–269.

Gibb, A. A. (1987). Enterprise culture—its meaning and implications for education and training. *Journal of European Industrial Training, 11*(2), 2–38.

Gibb, A. A. (2002). In pursuit of a new 'enterprise'and 'entrepreneurship'paradigm for learning: Creative destruction, new values, new ways of doing things and new combinations of knowledge. *International Journal of Management Reviews, 4*(3), 233–269.

Greene, P. G., Fetters, M. L., Bliss, R., & Donnellon, A. (2018). The future of entrepreneurship education: Educating for economic and social impact. In Fayolle, A. (Ed.), *A Research Agenda for Entrepreneurship Education*: Edward Elgar Publishing, Cheltenham, pp. 62–80.

Guerrero, M., Urbano, D., & Gajón, E. (2020). Entrepreneurial university ecosystems and graduates' career patterns: Do entrepreneurship education programmes and university business incubators matter? *Journal of Management Development, 39*(5), 753–775.

Hager, P., & Gonczi, A. (1996). What is competence? *Medical Teacher, 18*(1), 15–18.

Haneberg, D. H., & Aadland, T. (2020). Learning from venture creation in higher education. *Industry and Higher Education, 34*(3), 121–137.

Harms, R. (2015). Self-regulated learning, team learning and project performance in entrepreneurship education: Learning in a lean startup environment. *Technological Forecasting and Social Change, 100*, 21–28.

Haynie, J. M., Shepherd, D., Mosakowski, E., & Earley, P. C. (2010). A situated metacognitive model of the entrepreneurial mindset. *Journal of Business Venturing, 25*(2), 217–229.

Hisrich, R. D. (1990). Entrepreneurship/intrapreneurship. *American Psychologist, 45*(2), 209.

Hytti, U., Stenholm, P., Heinonen, J., & Seikkula-Leino, J. (2010). Perceived learning outcomes in entrepreneurship education: The impact of student motivation and team behaviour. *Education+ Training, 52*(8/9), 587–606.

Hägg, G. (2017). *Experiential entrepreneurship education: Reflective thinking as a counterbalance to action for developing entrepreneurial knowledge*. Lund University, MediaTryck, Lund.

Hägg, G., & Gabrielsson, J. (2019). A systematic literature review of the evolution of pedagogy in entrepreneurial education research. *International Journal of Entrepreneurial Behavior & Research, 26*(5), 829–861.

Hägg, G., & Kurczewska, A. (2019). Who is the student entrepreneur? Understanding the emergent adult through the pedagogy and andragogy interplay. *Journal of Small Business Management, 57*(S1), 130–147.

Hägg, G., & Kurczewska, A. (2021). Towards a learning philosophy based on experience in entrepreneurship education. *Entrepreneurship Education & Pedagogy, 4*(1), 4–29.

Jacob, M., Lundqvist, M., & Hellsmark, H. (2003). Entrepreneurial transformations in the Swedish University system: The case of Chalmers University of Technology. *Research Policy, 32*(9), 1555–1568.

Jarvis, P. (2006). *Towards a comprehensive theory of human learning*. Routledge.

Johannisson, B. (1991). University training for entrepreneurship: Swedish approaches. *Entrepreneurship & Regional Development, 3*(1), 67–82.

Johannisson, B. (2009). Networking and entrepreneurship in place. In M.-A. Galindo, J. Guzman, & D. Ribeiro (Eds.), *Entrepreneurship and Business* (pp. 137–162). Springer.

Jones, C. (2009). Enterprise education: Learning through personal experience. *Industry and Higher Education, 23*(3), 175–182.

Jones, P., Pickernell, D., Fisher, R., & Netana, C. (2017). A tale of two universities: Graduates perceived value of entrepreneurship education. *Education+ Training, 59*(7/8), 689–705.

Katz, J. A. (2008). Fully mature but not fully legitimate: A different perspective on the state of entrepreneurship education*. *Journal of Small Business Management, 46*(4), 550–566.

Knight, F. H. (1921). *Risk, Uncertainty and Profit*. Houghton Mifflin Company.

Kolvereid, L., & Moen, Ø. (1997). Entrepreneurship among business graduates: Does a major in entrepreneurship make a difference? *Journal of European Industrial Training, 21*(4), 154–160.

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing, 15*(5–6), 411–432.

Kubberød, E., Fosstenløkken, S. M., & Erstad, P. O. (2018). Peer mentoring in entrepreneurship education: Towards a role typology. *Education+ Training, 60*(9), 1026–1040.

Kuratko, D. F. (1989). New venture creation: A laboratory course for entrepreneurship education. *Journal of Education for Business, 64*(6), 248–250.

Kuratko, D. F., & Morris, M. H. (2018). Corporate entrepreneurship: A critical challenge for educators and researchers. *Entrepreneurship Education & Pedagogy, 1*(1), 42–60.

Lackéus, M., Lundqvist, M., Williams-Middleton, K., & Inden, J. (2020). The entrepreneurial employee in public and private sector - What, why, how. Joint Research Centre (Seville site). https://econpapers.repec.org/RePEc:ipt:iptwpa:jrc117661

Lackéus, M., & Williams-Middleton, K. (2015). Venture Creation Programs: bridging entrepreneurship education and technology transfer. *Education+ Training, 57*(1), 48–73.

Lange, J. E., Marram, E., Jawahar, A. S., Yong, W., & Bygrave, W. (2011). Does an entrepreneurship education have lasting value? A study of careers of 4,000 alumni. *Frontiers of Entrepreneurship Research, 31*(6), 2.

Lubke, G. H., & Muthén, B. O. (2004). Applying multigroup confirmatory factor models for continuous outcomes to Likert scale data complicates meaningful group comparisons. *Structural Equation Modeling, 11*(4), 514–534.

Lundqvist, M. (2014). The importance of surrogate entrepreneurship for incubated Swedish technology ventures. *Technovation, 34*(2), 93–100.

Lundqvist, M., Williams-Middleton, K., & Nowell, P. (2015). Entrepreneurial identity and role expectations in nascent entrepreneurship. *Industry and Higher Education, 29*(5), 327–344.

Man, T. W., Lau, T., & Chan, K. F. (2002). The competitiveness of small and medium enterprises: A conceptualization

with focus on entrepreneurial competencies. *Journal of Business Venturing, 17*(2), 123–142.

Martin, B. C., McNally, J. J., & Kay, M. J. (2013). Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes. *Journal of Business Venturing, 28*(2), 211–224.

Marshall, D. R., Dibrell, C., & Eddleston, K. A. (2019). What keeps them going? Socio-cognitive entrepreneurial career continuance. *Small Business Economics, 53*, 227–242.

Matlay, H. (2008). The impact of entrepreneurship education on entrepreneurial outcomes. *Journal of Small Business and Enterprise Development, 15*(2), 382–396.

McGee, J. E., Peterson, M., Mueller, S. L., & Sequeira, J. M. (2009). Entrepreneurial self–efficacy: Refining the measure. *Entrepreneurship Theory and Practice, 33*(4), 965–988.

Morris, M. H., & Liguori, E. (2016). *Annals of Entrepreneurship Education and Pedagogy–2016*. Edward Elgar Publishing.

Morris, M. H., Webb, J. W., Fu, J., & Singhal, S. (2013). A Competency-Based Perspective on Entrepreneurship Education: Conceptual and Empirical Insights. *Journal of Small Business Management, 51*(3), 352–369.

Mwasalwiba, E. S. (2010). Entrepreneurship education: a review of its objectives, teaching methods, and impact indicators. *Education+ Training, 52*(1), 20–47.

Nabi, G., Holden, R., & Walmsley, A. (2010). From student to entrepreneur: Towards a model of graduate entrepreneurial careermaking. *Journal of Education and Work, 23*(5), 389–415.

Nabi, G., Liñán, F., Fayolle, A., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: A systematic review and research agenda. *Academy of Management Learning & Education, 16*(2), 277–299.

Neck, H. M., & Corbett, A. C. (2018). The scholarship of teaching and learning entrepreneurship. *Entrepreneurship Education and Pedagogy, 1*(1), 8–41.

Neergaard, H., & Christensen, D. R. (2017). Breaking the waves: Routines and rituals in entrepreneurship education. *Industry and Higher Education, 31*(2), 90–100.

Nielsen, S. L., & Gartner, W. B. (2017). Am I a student and/or entrepreneur? Multiple identities in student entrepreneurship. *Education+ Training, 59*(2), 135–154.

O'Connor, A. (2013). A conceptual framework for entrepreneurship education policy: Meeting government and economic purposes. *Journal of Business Venturing, 28*(4), 546–563.

Ollila, S., & Williams-Middleton, K. (2011). The venture creation approach: Integrating entrepreneurial education and incubation at the university. *International Journal of Entrepreneurship and Innovation Management, 13*(2), 161–178.

Oosterbeek, H., van Praag, M., & Ijsselstein, A. (2010). The impact of entrepreneurship education on entrepreneurship skills and motivation. *European Economic Review, 54*(3), 442–454.

Parker, S. C. (2011). Intrapreneurship or entrepreneurship? *Journal of Business Venturing, 26*(1), 19–34.

Pinchot, G. (1985). Intrapreneuring: Why you don't have to leave the corporation to become an entrepreneur. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*.

Pittaway, L., & Cope, J. (2007). Simulating entrepreneurial learning integrating experiential and collaborative approaches to learning. *Management Learning, 38*(2), 211–233.

Politis, D. (2005). The process of entrepreneurial learning: A conceptual framework. *Entrepreneurship Theory and Practice, 29*(4), 399–424.

Rasmussen, E. A., & Sørheim, R. (2006). Action-based entrepreneurship education. *Technovation, 26*(2), 185–194.

Rauch, A., & Hulsink, W. (2015). Putting entrepreneurship education where the intention to act lies: An investigation into the impact of entrepreneurship education on entrepreneurial behavior. *Academy of Management Learning & Education, 14*(2), 187–204.

Rideout, E. C., & Gray, D. O. (2013). Does Entrepreneurship Education Really Work? A Review and Methodological Critique of the Empirical Literature on the Effects of University-Based Entrepreneurship Education. *Journal of Small Business Management, 51*(3), 329–351.

Ronstadt, R. (1985). The educated entrepreneurs: A new era of entrepreneurial education is beginning. *American Journal of Small Business, 10*(1), 7–23.

Sánchez, J. C. (2013). The impact of an entrepreneurship education program on entrepreneurial competencies and intention. *Journal of Small Business Management, 51*(3), 447–465.

Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review, 26*(2), 243–263.

Scott, J. M., Penaluna, A., & Thompson, J. L. (2016). A critical perspective on learning outcomes and the effectiveness of experiential approaches in entrepreneurship education. *Education+ Training*.

Shepherd, D. A., Patzelt, H., & Haynie, J. M. (2010). Entrepreneurial spirals: Deviation–amplifying loops of an entrepreneurial mindset and organizational culture. *Entrepreneurship Theory and Practice, 34*(1), 59–82.

Solomon, G. T., Weaver, K. M., & Fernald, L. W. (1994). A historical examination of small business management and entrepreneurship pedagogy. *Simulation & Gaming, 25*(3), 338–352.

Souitaris, V., Zerbinati, S., & Al-Laham, A. (2007). Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources. *Journal of Business Venturing, 22*(4), 566–591.

Stenholm, P., & Hytti, U. (2014). In search of legitimacy under institutional pressures: A case study of producer and entrepreneur farmer identities. *Journal of Rural Studies, 35*, 133–142.

Sullivan, S. E., Forret, M. L., Mainiero, L. S., & Terjesen, S. (2007). What motivates entrepreneurs? An exploratory study of the kaleidoscope career model and entrepreneurship. *The Journal of Applied Management and Entrepreneurship, 12*(4), 4–19.

Walter, S. G., & Block, J. H. (2016). Outcomes of entrepreneurship education: An institutional perspective. *Journal of Business Venturing, 31*(2), 216–233.

Westhead, P., Ucbasaran, D., Wright, M. E., & Binks, M. R. (2005). Novice, Serial and Portfolio Entrepreneur Behaviour and Contributions. *Small Business Economics, 25*(2), 109–132.

Wiklund, J., & Shepherd, D. A. (2008). Portfolio entrepreneurship: Habitual and novice founders, new entry, and mode of organizing. *Entrepreneurship Theory and Practice, 32*(4), 701–725.

Williams-Middleton, K. (2013). Becoming entrepreneurial: Gaining legitimacy in the nascent phase. *International Journal of Entrepreneurial Behaviour & Research, 19*(4), 404–424.

Williams-Middleton, K., & Donnellon, A. (2014). Personalizing entrepreneurial learning: A pedagogy for facilitating the know why. *Entrepreneurship Research Journal, 4*(2), 167–204.

Williams-Middleton, K., Padilla-Meléndez, A., Lockett, N., Quesada-Pallarès, C., & Jack, S. (2020). The university as an entrepreneurial learning space. *International Journal of Entrepreneurial Behavior & Research, 26*(5), 887–909.