Entrepreneurial competency development in education
– A tool-based approach

Introduction

Entrepreneurial education and learning

Entrepreneurial education is a term encompassing both enterprise education and entrepreneurship education, two terms that are often causing confusion (Erkkilä, 2000). In Europe, enterprise education has been defined as focusing more broadly on personal development, mindset, skills and abilities, whereas entrepreneurship education has been defined to focus more on the specific context of setting up a venture and becoming self-employed (QAA, 2012, Mahieu, 2006). In United States, the only term used is entrepreneurship education (Erkkilä, 2000).

A question within entrepreneurial education that never seems to go out of fashion is “Can entrepreneurship be taught?” Many argue that there is enough evidence that entrepreneurship can be taught (Kuratko, 2005, Gorman et al., 1997, Pittaway and Cope, 2007a). Others argue that entrepreneurs are primarily born, not made (Nicolaou and Shane, 2009). Some opt for a middle way, claiming that certain aspects of entrepreneurship cannot be taught, such as self-confidence, persistence and energy levels (De Faoin et al., 2003). Others connect the question to assessment in education, stating that the difficulty lies primarily in measuring the effects of entrepreneurial education (Martin et al., 2012, Henry et al., 2005). To complicate things further, there is little agreement on how to define entrepreneurship, which profoundly affects educational objectives, target audiences, course content design, teaching methods and student assessment procedures, leading to a wide diversity of approaches (Mwasalwiba, 2010).

In the domain of entrepreneurial learning there is no similar polarized discussion on the corresponding question “Can entrepreneurship be learned?”. Instead a multitude of empirically grounded frameworks and models are proposed on how entrepreneurship is learned by individuals pursuing entrepreneurial endeavors (Rae and Carswell, 2001, Rae, 2005, Pittaway, 2011, Minniti and Bygrave, 2001, Cope, 2005, Politis, 2005). This domain is however largely disconnected from the educational arena, and primarily studies on-the-job learning, i.e. learning from the experience of operating a company.

Perspectives of this thesis

This thesis takes a learner perspective on entrepreneurial education, drawing on both the entrepreneurial education domain and the entrepreneurial learning domain. A basic tenet is that if entrepreneurship can be informally learned it can also be formally taught (Lange et al., 2011, Drucker, 1985). Links with the overarching domains of education and learning are established, since these domains contain valuable theories and models that facilitate understanding and research in entrepreneurial education and learning (Cope, 2005). A competence perspective is applied with its emphasis on knowledge, skills and attitudes (Mitchelmore and Rowley, 2010). This allows for a focus on all three faculties of mind at play in learning, i.e. thought, action and emotion (Hilgard, 1980, Jarvis, 2006).
Some way into this study an insight emerged that a “psychological tools” based approach was helpful in explaining how entrepreneurial competencies are developed. The concept of tools that facilitate (mediate) human learning was proposed by Vygotsky in early 20th century (Kozulin and Presseisen, 1995). Some example tools that mediate human learning are teachers (human tools), pencil-and-paper (material tools) and literacy (psychological tools) (ibid). In addition to the more obvious human and material tools, psychological tools can become equally indispensable in forming the reality of learners, and are defined by Egan as “things that enable our brain to do cultural work” (Egan, 2008, p.40) and “the things people think with, not the things they think about” (ibid, p.14).

**Purpose and research design**

The main purpose of this study has been to investigate how entrepreneurial competency is developed in education. This has been accomplished by studying ‘venture creation’ based entrepreneurship programs in higher education where the students are required to start a real-life venture as formal part of the curriculum, with an intention to incorporate. These programs constitute a particularly action-based educational setting where previous research indicates a high frequency of developed entrepreneurial competencies (Barr et al., 2009, Ollila and Williams-Middleton, 2011). So far 17 such programs have been identified globally, described more in-depth at my research blog. Ten of these programs have been studied more in-depth, and 13 students at one of them – Chalmers School of Entrepreneurship – have been followed longitudinally with the purpose of understanding how they develop entrepreneurial competencies.

To facilitate the research, two research questions have been articulated – RQ1) What mediating psychological tools are contributing to development of entrepreneurial competencies in entrepreneurial education? and RQ2) How do these tools mediate development of entrepreneurial competencies in educational environments?

A qualitative comparative case study approach has been applied, consisting of semi-structured individual interviews, focus group interviews, analysis of secondary sources and relating to various domains of literature. An inductive/abductive approach has been used, labeled as “systematic combining” by Dubois and Gadde (2002), stressing theory development rather than the theory generation approach proposed in the ‘grounded theory’ approach (Corbin and Strauss, 1990). Two major units of analysis have been selected, studying entrepreneurial education programs as well as individual students of such programs.

**Findings**

Some propositional mediating psychological tools identified in this research are the venture creation approach (Ollila and Williams-Middleton, 2011), the logic of effectuation (Sarasvathy, 2001) and the more general term value creation (Bruyat and Julien, 2001). Viewing these concepts as tools mediating development of entrepreneurial competencies in accordance with a Vygotskian tradition has not been proposed before. I posit that if learners manage to integrate these psychological tools into their cognitive, behavioral and affective structures by following an entrepreneurial education course or program, this can lead to the formation of a new reality for them, causing permanent and significant changes in their lives. These tools become part of their natural way of thinking, acting and

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1www.chalmers.se/vcplist.
feeling, resulting in learners becoming capable of, and perhaps even subconsciously inclined to, asking themselves questions such as “How can I turn this into a venture?”, “What effects can I create with my available means?” and “What value can I create here?”. The familiarity with, internalization (mental acquisition), possession of, and inclination to use such psychological tools in everyday life can constitute an addition to the current understanding of what constitutes entrepreneurial competencies and an entrepreneurial mindset.

Some implications

The findings from this study imply that adding value creation goals to curriculum can increase learners’ motivation and enhance the capacity to develop entrepreneurial competencies. Further, adding a venture creation program to the curricular offering of a higher education institution can increase its technology transfer efficiency and its capacity to develop entrepreneurial competencies. Effectuation has been identified as a method in curriculum design to increase both legitimacy and efficiency of process-based, iterative and socially situated learning environments.

Some advice for practitioners have also been developed in this study. Educators aiming to develop entrepreneurial competencies should try to design a learning environment ripe of uncertainty and ambiguity where students frequently are able and encouraged to interact with the outside world in a working environment emphasizing a team-based approach. These kinds of emotional events and situations can be considered an explanatory proxy between educational design and developed entrepreneurial competencies.

This thesis is the result of an explicit focus on interdisciplinary research, bridging between the domains of entrepreneurship, entrepreneurial education, entrepreneurial learning on the one hand, and general education and learning on the other hand. This approach has shown capable of surfacing theoretical perspectives that can shed light on entrepreneurial competency development processes. There seems to be a lack of such research integrating deeply between these domains. More insights, concepts and theories from learning and education literature can probably be beneficially transferred to the entrepreneurial domain in the future if more research of this kind is conducted.

Finally it can be concluded that a psychological tools approach can facilitate understanding of competency development processes in entrepreneurial education.
Theory

The primary area of this thesis is entrepreneurial education. The areas covered in this theory section are; (1) entrepreneurial, (2) entrepreneurial education, (3) entrepreneurial learning, (4) learning and (5) education, and in that order. This is illustrated in Figure 1. This choice of topics is based on the view that entrepreneurial education cannot be fully understood without also understanding the general educational setting within which it is embedded, and the general process of learning which it is relying upon.

![Figure 1. The five areas covered in theory section.](image)

Entrepreneurial

Being entrepreneurial can mean many things to many people. A common conception according to Gartner (1990) is that entrepreneurship is about entrepreneurial individuals creating innovative organizations that grow and create value, either for the purpose of profit or not. But entrepreneurship does not have to include the creation of new organizations, it can also occur in existing organizations (Shane and Venkataraman, 2007). It is not only limited to the entrepreneurial individual, but also to entrepreneurial opportunities and the relation between the individual and the opportunity, i.e. the individual-opportunity nexus as described by Shane (Shane, 2003). Stevenson and Jarillo (1990) define entrepreneurship as “a process by which individuals - either on their own or inside organizations - pursue opportunities without regard to the resources they currently control” (ibid, p.23). Bruyat and Julien (2001) use a constructivist approach and propose a definition incorporating not only the entrepreneur, but also the new value created, the environment within which it takes place, the entrepreneurial process itself and the links between these constructs over time. Entrepreneurship is as much about the change and learning that the individual entrepreneur experiences by interacting with the environment, as about the change and value creation the entrepreneur causes through his/her actions. Their definition has implications for this thesis, since it proposes learning for the individual as an inherent and core outcome of an entrepreneurial process alongside new value creation.
Sarasvathy and Venkataraman (2011) argue that viewing entrepreneurship as a subset of economics or any other sub-domain entails the risk of committing a logical category mistake, i.e. to allocate “concepts to logical types to which they do not belong” (Ryle, 1949, p.17). Instead they propose that we should “reformulate entrepreneurship as a method of human action, … a powerful way of tackling large and abiding problems at the heart of advancing our species.” (Sarasvathy and Venkataraman, 2011). They propose that a dominant logic for the entrepreneurial method is “effectuation”, a concept developed by Sarasvathy (2001) through observing how expert entrepreneurs think and act. Effectuation is described as an iterative process of decision making and active commitment seeking that results in creation of new value, where each iteration is started with questions such as “Who am I?”, “What do I know?” and “Whom do I know?” (Sarasvathy and Dew, 2005). Sarasvathy and colleagues position effectuation as an alternative to an objectivist, linear, transaction and causal logic based scientific method aiming to uncover general “laws” (Sarasvathy, 2001, Sarasvathy and Dew, 2005, Sarasvathy and Venkataraman, 2011, Venkataraman et al., 2012). They emphasize the subjectivist and constructivist nature of the entrepreneurial method, and specify the intersubjective as a key unit of analysis, i.e. emphasizing social relations between people as more useful for decision making when operating under uncertain conditions. Thus they recognize that individuals operating under uncertainty in a process of emergence utilize knowledge learned through the constructivist and progressionist principles outlined in this paper. For this thesis these propositions by Sarasvathy and colleagues are relevant since they offer an escape from the rationalist bias prevalent in most educational institutions, instead moving towards a more socially situated perspective on learning (Lackéus, 2012a, p.10).

Moving now to the domain of educational policy, there are two main definitions of entrepreneurship – a narrow and a wide definition (QAA, 2012, Mahieu, 2006, Fayolle and Gailly, 2008). The narrow definition outlines curriculum related to opportunity identification, business development, self-employment and venture creation and growth, i.e. being or becoming an entrepreneur. When this definition is used in education, it is most often termed “entrepreneurship education”. The wide definition focuses on personal development, creativity, self reliance, imitative taking, action orientation and other emotional, social and practical skills, i.e. being or becoming entrepreneurial. When this broader definition is used, it is often termed “enterprise education”. There are not only differences between individuals in perceptions and practical use, but also regional differences. In Finland for example, the wide definition described above is termed “internal entrepreneurship”, and the narrow definition above is termed “external entrepreneurship” (Erkkilä, 2000). In United States the term “entrepreneurship education” is primarily used, and in United Kingdom the term “enterprise education” is primarily used (ibid). Erkkilä has proposed the use of the term “entrepreneurial education”, encompassing both definitions. The potential for confusion around terms and definitions is substantial, and the three terms described above are used interchangeably in literature (Mwasalwiba, 2010). Some scholars opt for the longer term “enterprise / entrepreneurship education” (Pittaway and Cope, 2007b). In this thesis the term “entrepreneurial education” will primarily be used, and is then encompassing both enterprise education and entrepreneurship education.

*Developing entrepreneurial competence/y/ies*

Competence/y/ies is a set of terms with widespread use in the human resource development domain, where they are used in assessment of people’s job performance (Moore et al., 2002).
Sanchez (2011) defines competencies as “a cluster of related knowledge, traits, attitudes and skills that affect a major part of one’s job; that correlate with performance on the job; that can be measured against well-accepted standards; and that can be improved via training and development” (ibid, p.241). These terms also have regional variations in interpretation, with differences in emphasis between United Kingdom and United States (Mitchelmore and Rowley, 2010). To alleviate the confusion, Moore et al. (2002) have proposed competence to relate to an area of work, competency to relate to the behaviors supporting that area of work, and competencies to relate to the attributes underpinning these behaviors. They also relate behavior to both ability and willingness to act, leaning on Burgoyne (1989) who defines competency as “the willingness and ability to perform a task” (p. 57).

Combining the two ambiguous terms entrepreneurial and competencies, we get a concept that varies substantially in its meaning and interpretation. Still, scholars have found value in using the concept of entrepreneurial competencies. Man et al. (2002) see it as a higher-level characteristic that reflects the “total ability of the entrepreneur to perform a job role successfully” (ibid, p.124). Based on a comprehensive literature review, they define six major areas of entrepreneurial competencies; “opportunity, relationship, conceptual, organizing, strategic and commitment competencies” (ibid, p.124). In his article on entrepreneurial learning, Man (2007) has proposed a framework containing four factors involved in developing entrepreneurial competencies; (1) inputs, or individual characteristics; (2) process, or tasks leading to competence; (3) outcomes, or achieving standards of performance; and (4) context, or organizational and environmental factors affecting competency development. According to Man (ibid), a competency approach to entrepreneurial learning has important implications for teaching entrepreneurship, in that more focus should be put on input and context aspects in a systemic and integrated way, rather than just treating knowledge, skills and attitudes separately as is often done in educational contexts. This recommendation has been taken into account in this thesis, impacting research design.

Some other frameworks for entrepreneurial competencies have been proposed. Johannisson (1991) has proposed a framework consisting of five levels of learning; (1) Know-what, or knowledge; (2) Know-when, or insight; (3) Know-who, or social skills; (4) Know-how, or skills; (5) Know-why, or attitudes, values and motives. Based on this framework he calls for more contextual approaches in entrepreneurship teaching, involving qualified experience and social networks through action learning. Another influential scholar is Bird, who (1995) explored various “laundry lists” of entrepreneurial competencies mainly derived from management theories, and proposed a model of entrepreneurial competency development consisting of antecedents to competency, current competencies and outcome. Starting with antecedents to competency, factors such as family background, education, industry experience and work experience were highlighted. Current competencies were categorized in motive/trait, self-concept, social role and skills. The outcome in new venture start-up success were stated to feed back to antecedents in a circular way. Yet another group of scholars, Rasmussen et al. (2011), have studied spin-offs in university settings, and identified three main categories of entrepreneurial competencies, (1) opportunity refinement, or discovering and developing opportunities; (2) leveraging, or acquiring the resources required to develop an opportunity; and (3) championing, or identifying with the resulting venture and convincing others to join. Finally, a recent literature review on entrepreneurial competencies by Mitchelmore and Rowley (2010) resulted in a rather long “laundry list” of key competencies grouped in four categories: (1)
entrepreneurial competencies; (2) business and management competencies; (3) human relations competencies; and (4) conceptual and relationship competencies. This list illustrates the definitional issues around entrepreneurship described earlier, and it becomes clear that defining entrepreneurship broadly risks “dissolving it as a specialized field of study” (Stevenson and Jarillo, 1990, p.23).

A specific aspect of a competencies approach is its emphasis on measurability. Some definitions of competencies include measurability, others do not (Moore et al., 2002). Measuring competencies is problematic, requiring multiple methods and approaches that to a varying degree are subjective. Bird (1995) lists 17 potential methods for assessing entrepreneurial competencies, such as diaries, observation, archival data, critical event interviewing, role set ratings, cases, think aloud protocols and job shadowing. In the domain of entrepreneurial education an often advocated approach to assess the degree of competencies developed in an entrepreneurship course or program is the use of pseudo-randomized experiments with pre- and post measurements on treatment and control groups (Martin et al., 2012). The measurement instruments are often survey-based and try to capture the prevalence of entrepreneurial knowledge, skills, attitudes and intentions before and after an educational treatment.

The search for evidence for developed competencies in education has led many scholars to advocate and apply research methods taken from natural science, such as the randomized experiment. It has been a recurring theme for some decades now, fuelled by research funding policy in United States and elsewhere (Slavin, 2002). This kind of evidence based approach has however been heavily criticized by scholars in education. Olson (2004) claims that “the more simple cause-effect relations so important to the physical and biological sciences are largely inappropriate to the human sciences, which trade on the beliefs, hopes, and reasons of intentional beings.” (p. 25). Biesta (2007) states that “education cannot be understood as an intervention or treatment because of the noncausal and normative nature of educational practice and because of the fact that the means and ends in education are internally related.” (p. 20).

This thesis represents an approach to outcome assessment that differs from the traditional randomized experiment approach, in that it explores what entrepreneurial competency development can be tied to emotionally laden experiences caused by an action-based entrepreneurial education program.

**Entrepreneurial education**

Erkkilä (2000) has defined United States and United Kingdom as leaders in the entrepreneurial education trend. In United States the first entrepreneurship class was held in 1947 (Katz, 2003). In United Kingdom Allan Gibb has been an key scholar leading the development in the field for decades. Entrepreneurial education has seen worldwide exponential growth in higher education institutions (Kuratko, 2005), and was in 2001 offered at around 1200 business schools only in United States (Katz, 2008). This growth is often explained by entrepreneurship being seen as a major engine for economic growth and job creation (Wong et al., 2005), and as a response to the increasingly globalized, uncertain and complex world we live in (Gibb, 2002). Today entrepreneurial education has become an important part of both industrial and educational policy in many countries (Hytti and O’Gorman, 2004). Besides the usual economical and job growth related reasons to promote entrepreneurial
education, there is also increasing emphasis on the effects it can have on students’ perceived relevancy, engagement and motivation in education (Surlemont, 2007).

With very few exceptions, focus of research in entrepreneurial education has been on post-secondary levels of education (Gorman et al., 1997), which is surprising given that childhood and adolescence is considered to be an ideal age for acquiring basic knowledge and positive attitudes towards entrepreneurship (Peterman and Kennedy, 2003). This lack of research is also surprising given the immense policy pressure on educational institutions to integrate entrepreneurial education in pre-university education (European_Commission, 2012). Following a rapidly developing trend starting as late as in 2003, most countries in the European Union now have launched national strategies for entrepreneurial education in general schooling (ibid). There is today very limited available empirical research outlining to what extent and with what results entrepreneurial education has been diffused in pre-university education.

Entrepreneurial education is often categorized into three approaches (Johnson, 1988, O’Connor, 2012, Heinonen and Hytti, 2010, Scott et al., 1998). Teaching “about” entrepreneurship means a content-laden and theoretical approach aiming to give a general understanding of the phenomenon. Teaching “for” entrepreneurship means an occupationally oriented approach aiming at giving budding entrepreneurs the requisite knowledge and skills. Teaching “through” means a process based and often experiential approach where students go through an actual entrepreneurial learning process (Kyrö, 2005).

How entrepreneurial education is carried out in practice varies substantially, primarily depending on which definition is used (Mwasalwiba, 2010), but also depending on what underlying educational paradigm is applied (Ardalan, 2008). In general, the definitions used seem to get more and more narrow (i.e. business and start-up focused) the higher up in the educational system one looks (Johannisson et al., 1997, Mahieu, 2006). The actual coursework is often based on personal experience rather than systematic approaches (Fayolle and Gailly, 2008), and is often centered around letting students create a business plan (Honig, 2004). To guide educators, Fayolle and Gailly (2008) have proposed a teaching framework for entrepreneurial education consisting of five questions to be answered in this order – (1) Why, or objectives and goals connected to learning needs in society; (2) For whom, or characteristics of the intended audience in terms of previous knowledge, experience and attitudes; (3) For which result, or how to evaluate and assess the learners; (4) What, or contents in terms of professional, spiritual and theoretical dimensions; and (5) How, or methods and pedagogies.

Entrepreneurial education at post-secondary levels is often expected to take part of the regional entrepreneurial ecosystem. (Mwasalwiba, 2010, Gorman et al., 1997). Common activities, often termed “outreach”, include assisting local entrepreneurs, interacting with student clubs, inviting alumni and experts, visiting networking events, conducting student consulting and participating in business plan competitions (European_Commission, 2008, Mwasalwiba, 2010, Rice et al., 2010). Less common activities include interaction with incubators and technology transfer offices for university commercialization purposes (Moroz et al., 2010, Nelson and Byers, 2010). Hynes and Richardson (2007) outline several benefits of outreach arrangements for students, faculty, researchers and stakeholders outside university. Two terms frequently used in conjunction to outreach activities are
“third mission” and “the entrepreneurial university” (Etzkowitz, 2003, Rothaermel et al., 2007, Etzkowitz and Leydesdorff, 2000).

Many outreach activities are extra-curricular due to difficulties in integrating them into formal courses and programs (Botham and Mason, 2007). A notable exception to this is a “venture creation approach” (Ollila and Williams-Middleton, 2011), i.e. when entrepreneurial education is formally integrated with commercialization entities at the university. This constitutes an exception from the prevailing norm that the formation of spinoffs based on university research is managed by technology transfer offices or similar entities, without integration to entrepreneurial education (Shane, 2004). Some programs applying a venture creation approach have shown interesting outputs in terms of both student learning and student-led venture creation (Barr et al., 2009, Hofer et al., 2010, Meyer et al., 2011, Thursby et al., 2009). Research on this kind of integrated environments is in a nascent stage, but seems to be an environment well suited to study entrepreneurial competency development first-hand as ventures are started by inexperienced individuals. This research opportunity is one of the basic tenets of this thesis.

At pre-university level interaction between entrepreneurial education and the surrounding society is not well researched. Some exceptions outline substantial benefits of external engagement in terms of increased motivation for learners, increased school attachment and strengthened self-confidence (Surlemont, 2007, Nakula et al., 2003, Jamieson, 1984). A widespread model is Young Enterprise (Dwerryhouse, 2001) where adolescents run a company for 8 months, followed by voluntary liquidation.

Paradigmatic ontology and epistemology related challenges abound in entrepreneurial education (Kyrö, 2005, Taatila, 2010). Articles contrasting between a “traditional” and an “entrepreneurial” way of teaching are frequent in entrepreneurial education literature. The usual way of illustrating the differences is by showing a table with two columns contrasting traditional teaching with entrepreneurial teaching (Gibb, 1993, Johnson, 1988, Ollila and Williams-Middleton, 2011, Cotton, 1991, Kyrö, 2005, Kirby, 2004). Standardized, content focused, passive and single-subject based curriculum in traditional education is often contrasted with an individualized, active, process-based, collaborative and multidisciplinary approach in entrepreneurial education. In line with this, entrepreneurial education scholars often attack traditional business schools for their alleged detachment from real life and silo structures, stating that it is not a suitable place for entrepreneurial education or entrepreneurial extracurricular activities (Hindle, 2007, Binks et al., 2006, Wright et al., 2009, Tan and Ng, 2006). Some even claim that formal education in general suppresses entrepreneurial attitudes (Löbler, 2006, Gorman et al., 1997, Chamard, 1989). In line with this, a study by Kourilsky (1980) found that entrepreneurial characteristics were found at 25% of kindergarten children but only at 3% of high school students.

Löbler (2006) has stated that “the constructivist paradigm serves as a theoretical base for entrepreneurship education” (p.31). This way of positioning entrepreneurial education in the progressivist and constructivist end of an educational philosophy continuum gives the domain of entrepreneurial education an interesting opportunity to leverage on a century-long debate between traditional and progressive / constructivist education (Tynjälä, 1999, Labaree, 2005). Some scholars in education have recently proposed a “third way” bridging between traditional and progressive education (Egan, 2008, Hager, 2005, Säljö, 2007). This strategy has however not yet reached the
domain of entrepreneurial education. Other educational concepts with many similarities to entrepreneurial education are pragmatism (Dewey, 1916), experiential learning (Kolb, 1984), communities of practice and situated learning (Lave and Wenger, 1991), service-learning (Meyers, 1999) and adult and life-long learning (Jarvis, 2006). We will come back to many of these issues in the sections about learning and education.

**Entrepreneurial learning**

Markowska (2011) has described entrepreneurial learning as the process by which entrepreneurs acquire entrepreneurial competencies. According to Man (2007), “understanding entrepreneurial learning is essential for the design of enterprise education and entrepreneurship training programmes.” (p.190). Rae (2005) has proposed a conceptual framework of entrepreneurial learning that can assist sense-making for students in entrepreneurial education, consisting of three major themes - (1) personal and social emergence; (2) contextual learning; and (3) the negotiated enterprise. Politis (2005) has stated that entrepreneurial learning cannot be achieved through formal education, since it requires learning by doing. Despite this, Pittaway and Thorpe (2012) have outlined numerous implications for entrepreneurial education of Cope’s framework for entrepreneurial learning, one of the most elaborate frameworks ever proposed (Cope, 2005, Cope and Watts, 2000, Cope, 2010, Cope, 2003). Together with Pittaway, Cope has also explored his framework’s implications for entrepreneurial education (Pittaway and Cope, 2007b). Cope’s framework for entrepreneurial learning is outlined in Figure 2, as it has been presented by Pittaway and Thorpe (2012), since Cope himself died in 2011.

![Figure 2. Cope's entrepreneurial learning framework.](image)

An important implication of Cope’s entrepreneurial learning framework is that ‘action-based’ learning, or learning from doing, or experiential learning, is essential to entrepreneurial education (Pittaway and Thorpe, 2012). According to Pittaway and Thorpe (2012), action learning can be broken down into acting, experiencing and learning from experience. A project-based, hands-on and context-based approach is recommended, as it captures the social, emotional and experiential
nature of entrepreneurial learning (Pittaway and Cope, 2007b). Pittaway and Thorpe (2012) have also outlined some other key implications of Cope’s work for entrepreneurial education. Educators should try to build in opportunities for students to learn from emotional and risk-laden events and processes by letting them resolve uncertain, complex and ambiguous situations, preferably in authentic settings. Three kinds of risks are outlined and elaborated on – emotional risk, financial risk and social risk (ibid, p.853-854). This implies that entrepreneurial education should be socially situated in the communities of practice that the students are preparing themselves to work in, allowing them to pick up valuable information, knowledge, skills, manner and techniques. In Cope’s framework failure is considered highly beneficial for learning, as deep learning occurs from failures such as damaged personal relationships, lost personal credibility, isolation from personal business networks and the loss of financial resources (ibid, p.853). Exposing students to such risks is however problematic in both ethical and practical terms (Pittaway and Cope, 2007b).

Learning

Cope states (2005) that “the entrepreneurship discipline does not currently possess sufficient conceptual frameworks to explain how entrepreneurs learn” (ibid, p.373). He further states that we need to go outside the entrepreneurship domain to find learning theories that can help us explain the emotionally intense process that entrepreneurial activities constitute. According to Gondim and Mutti (2011), Jarvis theory of human learning fully acknowledges the importance of emotion in the learning process. This is unusual in today’s society where a rationalist bias is ever so present, emphasizing rationality, objectivity, and cognition and downplaying emotion and experience (Yorks and Kasl, 2002, Postle, 1993, Lutz and White, 1986). Jarvis’ theory of human learning constitutes an important theoretical platform for this thesis, and will therefore be described further below.

The whole person

A foundational statement in Jarvis (2006) theory of human learning is that “it is the whole person who learns” (ibid, p. 31, 32, 50, 116, 151, 181 and 186). This reflects a view of the learner as comprising both body (genetic, physical and biological) and mind (knowledge, skills, attitudes, values, emotions, meaning, beliefs and senses). This stance also exposes some major inherent flaws in the widely used behaviorist, cognitivist and functionalist approaches to learning. Behaviorist approaches to learning focus primarily on measurable behavior. According to Jarvis this is a theoretically weak position incapable of explaining learning processes (ibid, p.35), since it disregards the crucial role of personal meaning and thoughts. Cognitivist approaches study learning primarily as knowing and thinking. They are also regarded as crude and limited by Jarvis, as they isolate the individual from the social and do not take bodily and emotive experiences into consideration (ibid, p. 157 and 176). Functionalist approaches approximate the human brain to a computer, regarding the mental states of a person as causally related to sensory inputs and behavioral outputs. According to Jarvis (ibid p.36), this approach ignores the importance humans put on meaning and intentionality and is also limited by its emphasis on rationality, whereas human reasoning is frequently based on emotional and irrational reasoning.
Jarvis theory of human learning

Jarvis’ own theory of learning is grounded in the experiential and social learning domains. He defines learning as a process where the whole person experiences social situations that transform them cognitively, emotively and/or practically, leading to a more experienced person (ibid, p.134). This way we learn to become ourselves, i.e. we are continually in the process of creating our personal biographies through learning (Jarvis, 2009, p.135). Jarvis regards this as a life-long identity transformation process. This view of learning constitutes an empirically grounded and “whole person” based foundation for studying how individuals are becoming entrepreneurial through entrepreneurial education. It also shows similarities to the definition of competencies offered by Sanchez (2011), with its emphasis on the three faculties of mind (Hilgard, 1980).

Based on this definition Jarvis outlines ten different types of learning (2010), see Table 1. Central to most of them is the notion of a “disjuncture”, which is a situation where a person’s harmony is disturbed by something or someone in the environment, triggering thoughts, emotions and actions. The trigger can be another person, a phenomenon (thing/event), a future phenomenon or self. This situation forces the person to raise questions such as “What do I do now?”, “What does that mean?” etc., and subsequently initiate a learning process.

Table 1. Ten different types of learning, based on Jarvis (2010).

<table>
<thead>
<tr>
<th>Ten learning types</th>
<th>Disjuncture</th>
<th>Thought</th>
<th>Emotion</th>
<th>Action</th>
<th>Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-learning</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Taken-for-granted patterned life experiences (harmony).</td>
</tr>
<tr>
<td>Non-consideration</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Learning opportunity unconsciously rejected.</td>
</tr>
<tr>
<td>Rejection</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Learning opportunity consciously rejected.</td>
</tr>
<tr>
<td>Ambivalence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Conflict between emotions and rational thought.</td>
</tr>
<tr>
<td>Contemplation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Philosophical and spiritual reflective learning.</td>
</tr>
<tr>
<td>Emotional learning</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>This type has been defined by Goleman (1998).</td>
</tr>
<tr>
<td>Discovery learning</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Scientific research is often based on this type.</td>
</tr>
<tr>
<td>Action learning</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Taking action and reflecting in social settings.</td>
</tr>
<tr>
<td>Memorization</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Most teaching in school is based on this type.</td>
</tr>
<tr>
<td>Pre-conscious learning</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Learning through bodily senses, before thinking.</td>
</tr>
</tbody>
</table>

Experiential and action learning

The only learning type in Jarvis’ classification that fully takes thoughts, emotion and action into account is action learning. According to a review of action learning conducted by Marsick and O’Neil (1999), the main theoretical base of experiential and action learning comes from David Kolb (1984) and Reg Revans (1971), representing the experiential school and scientific school respectively. Kolb’s proposed experiential learning cycle has been widely used in entrepreneurial education theory and practice, and consists of four phases – concrete experience, reflective observation, abstract conceptualization and active experimentation (Kolb, 1984). But experiential learning did not start with Kolb’s seminal work. Hoover and Whitehead (1975) had earlier defined experiential learning as follows: “Experiential learning exists when a personally responsible participant(s) cognitively, affectively, and behaviorally processes knowledge, skills, and/or attitudes in a learning situation characterized by a high level of active involvement.” (p.25). This definition is illustrative of aspects important in this thesis in that it leans on activities involving all three faculties of mind, i.e. thought, action and emotion (Hilgard, 1980), and also is similar to the “whole person” approach. Kolb also
names Dewey (pragmatism), Lewin (action research) and Piaget (child and adolescent learning) as founders of the experiential approach (Kolb, 1984). Miettinen (2000) has explored the strong connections between experiential learning and Dewey’s pragmatism.

Revans did not consider the Kolbian cycle to be an appropriate theory base for action learning (Marsick and O’Neill, 1999). Instead Revans proposed three problem solving phases – Alpha, or situation analysis; Beta, or implementation of a solution; and Gamma, or the manager’s mindset and its development (Marsick and O’Neill, 1999, Dilworth, 1998). Revans was reluctant to define action learning due to the risk of opening up to shallow thinking, and stated that “the day it is accurately described in words will be the day to stop having anything to do with it” (Revans, 1983, p.49). In addition to Revans some other scholars also critique Kolb’s experiential learning theory (Jarvis, 2006, Holman et al., 1997), stating that it cannot be empirically validated and that it omits considering emotional aspects of learning. A theorist that explicitly studies emotional aspects of learning is Heron (Heron, 2009, Heron, 1992, Postle, 1993).

Situated learning theory

Studying learning in its socially situated context poses a serious methodological challenge of simultaneously isolating critical properties while considering the full context in a holistic manner (Nardi, 1996). One approach to overcome this challenge is to rely on activity theory. This theory was pioneered by Russian researchers Vygotsky, Leont’ev and Luria in early 20th century as a philosophical framework for understanding human activity and work practices (Jonassen and Rohrer-Murphy, 1999). In activity theory, human activity is broken down into subject, object and mediating tools. Subjects undertake activities using tools to achieve an objective, which is then transformed into an outcome. This is done in a situated social context of rules, community and division of labor (Uden, 2007). Activity theory emphasizes change, contradictions and development rather than stability (Haigh, 2007). Activity theory and social constructivism are complementary approaches (Holman et al., 1997, Jones and Holt, 2008). According to some scholars, activity theory provides an appropriate framework for analyzing constructivist learning environments (Jonassen and Rohrer-Murphy, 1999, Uden, 2007), making it a theory also appropriate for the study of entrepreneurial education with its theoretical roots in constructivism (Löbler, 2006). Activity theory also has many similarities to Deweyan pragmatism with its focus on human action and interaction (Miettinen, 2001).

Engeström (2009) has based his situated learning theory on activity theory, labeling it “expansive learning”. He has proposed a theoretical model consisting of a pyramid illustrating the activity system, see Figure 3. A principle stated by Engeström is that the entire activity system should be seen as the primary unit of analysis, thus “overcoming the split between the Cartesian individual and the untouchable societal structure” (Engeström, 2009, p. 54). This approach was first proposed by Leont’ev (1978) in a famous example of a collective hunt where ground beaters didn’t directly hunt nor get gratification for their activity – “an individual’s actions (to beat) has a goal (to scare the animals) which is different to the overall object motivating the activity as a whole (to successfully hunt and kill an animal)” (Fleer, 2011, p.67). The motive for an individual’s activity was seemingly counter-intuitively positioned outside the individual, but made perfect sense in a collective perspective, or as Leont’ev states: “behind activity there should always be a need” (Leont’ev, 1978, p.62).
Engeström also has stated that an activity system is "a virtual disturbance- and innovation-producing machine" (Engeström, 1987, p.11). This resonates well with entrepreneurship, and scholars have used activity theory when analyzing new venture creation (Jones and Holt, 2008), entrepreneurial learning (Taylor and Thorpe, 2004), entrepreneurship education (Ardichvili, 2003) and enterprise education (Deignan, 2010).

![Image](image.jpg)

Figure 3. The structure of a human activity system (Engeström, 1987, p.78)

The emphasis on contradictions in activity theory has similarities to what Jarvis labels "disjuncture". These contradictions trigger learning and “are the driving force of change and development” (Engeström, 2009, p.55). According to Engeström, the main source of instability and development in capitalist activity systems is the contradiction between “the use value and exchange value of commodities” (ibid, p. 57). Activities exploiting such contradictions can be labeled entrepreneurial activities (Murphy et al., 2006), and thus lead both to value creation and learning.

**Tools mediating learning**

One of the basic components in activity theory is the tools that mediate between subject and object. The concept of tools that mediate learning was proposed by Vygotsky in early 20th century, inspired by Hegel and Marx (Kozulin and Pressieisen, 1995). This concept was proposed as a reaction to the predominant acquisition-based model of learning in solitude explored by Piaget and others, where prepackaged knowledge is transmitted to passive recipients (Kozulin, 2003, Kozulin and Pressiseisen, 1995). While crucial among the Russian followers of Vygotsky, this concept has been largely neglected in Western societies (Arievitch and Stetsenko, 2000). Three kinds of mediators were proposed by Vygotsky; human beings, material tools and psychological tools. The idea of a human mediator was based on Vygotsky’s theory (1978) that each psychological function appears twice in the human mind; first in interaction with people such as parents or teachers, and secondly as it is being internalized by the learner. While material tools are directed towards objects of nature, psychological tools “mediate humans’ own psychological processes” (Kozulin and Pressiseisen, 1995, p.68). The terms “cognitive tools”, “mind tools” and “cultural tools” are used interchangeably in literature, but Vygotsky’s own term was “psychological tools” (Levykh, 2008).

The literature is full of examples of what can be considered a psychological tool. A common example is natural and artificial languages (Kozulin and Pressiseisen, 1995). Vygotsky regarded literacy as a
“special system of symbols and signs the mastery of which signifies a critical turning point in the whole cultural development of the child” (Vygotsky, 1997, p.132). This is different from the common but flawed understanding of literacy as a natural development of the human mind (Egan and Gajdamaschko, 2003). Another common interpretation of psychological tools can be found in the domain of information technology. Tools such as Excel, PowerPoint and MSN Messenger are put forward as “cognitive tools”, “mindtools” or “technologies of the mind” (Kirschner and Erkens, 2006, p.201). In this case it is not the tools itself that are considered psychological tool, but that they constitute an intellectual partner that “enhances the cognitive powers of human beings during thinking, problem solving, and learning” (ibid, p.201). Other common examples of psychological tools are signs, symbols, numeracy, schemas, models, methods, concepts, algorithms, graphic organizers, maps, diagrams and heuristics (Kozulin, 2003, Ariveitch and Stetsenko, 2000, Egan, 2008, Jonassen and Rohrer-Murphy, 1999). Some examples of psychological tools on a relatively high level of abstraction are also given in literature, such as emotions (Levykh, 2008), cultural-symbolic systems of different epochs and nations (Kozulin and Presseisen, 1995), social-organizational entities such as schools (Ardichvili, 2003) and entrepreneurship education programs (Deignan, 2010).

From a learning perspective psychological tools is more than a neat term, it is a perspective with potential to vastly improve learning outcomes. In Russia, around 800 studies have been conducted using a “systemic-theoretical instruction” approach based on Vygotsky’s concept of psychological tools (Ariveitch and Stetsenko, 2000). This comprehensive research initiative was led by one of Russia’s most influential educational psychologist Piotr Galperin (Haenen, 1996). Results have been compelling, such as “the formation of genuine mathematical concepts in children a whole age period earlier – in 6-year-olds rather than in 10-12-year olds, when it usually occurs” (ibid, p. 81). These results are explained by “operational schemas of thinking that qualitatively change the child’s whole way of viewing things, thinking about things, and operating with things in a given domain” (ibid, p. 86), an effect occurring “when the set of cognitive tools provided to the child is complete and based on theoretical concepts” (ibid, p. 87). This is contrasted to the “traditional type of instruction [that] still dominates most educational systems” (ibid, p. 75), influenced by Piaget’s learning theory which stipulates that learners go through natural development stages. According to Piaget, these stages require teachers to introduce content bit by bit in an empirical and trial-and-error manner, with simple tasks first and more difficult tasks later, revealing the conceptual and theoretical underpinnings at a rather late stage. The psychological tools approach suggests that this should be reversed, so that instruction starts with top-down generalizations through comprehensive orienting schemata. Galperin has outlined a six-stage teaching strategy to be followed in order to realize the benefits of his action-based “systemic-theoretical instruction” (ibid, p.131):

1. **Motivational stage** – actions to be learned are introduced and connected to relevant goals.
2. **Orienting stage** – a “cheat schema” outlining a complete framework for actions to be learned
3. **Material stage** – learning by taking action in actual practice or through simulation.
4. **Overt speech stage** – Transferring actions taken into oral speech, linking action with thought and facilitating theorizing / generalizing in a social setting of “communicated thinking”.
5. **Covert speech stage** – Inner dialog reflecting on previous stages by speaking “in the head”.
6. **Mental stage** – The action takes place in abbreviated form, has been transformed into a partly subconscious scheme or mental phenomenon, as a cognitive tool being “kept in mind”.

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This six-stage teaching strategy resonates with many teaching practices advocated in the domain of entrepreneurial education, where action-based approaches stipulate letting students learn by taking action in real-life practice settings and reflect on their actions. It also resonates with Kolb’s experiential learning cycle. It is however more explicit than many other situated learning theories in its emphasis on cognitive tools such as “cheat sheets”, in its emphasis on social and verbal interpretation of actions taken and in its final stages where internalization of actions into mental thought occurs (Rambusch, 2006). Rambusch considers Galperin’s theory to be “a necessary and long missing link between sociocultural learning theories and traditional, more cognitivist approaches to learning.” (ibid, p. 1998). To conclude, I posit that Galperin’s theory constitutes a promising framework for the field of entrepreneurial education.

In what has been labeled Imaginative Education (IE), Egan (1997, 2003, 2005, 2008) has proposed an extensive range of cognitive tools that mediate learning for example by infusing humor and emotions into the learning situation; by using storytelling to create a sense of meaning and purpose; by leveraging on emotionally charged binary opposites and extremes to give shape and meaning to events; by telling stories about the heroes behind important theorems and axioms; and by being open to anomalies. The school days can be divided so that in the morning learners focus on knowledge acquisition and in the afternoon they focus on socially connected projects where the knowledge is put to use through these cognitive tools (Egan, 2008, p.147). The IE approach has spurred a global movement with thousands of educators applying these tools. Quantitative research has shown that the IE based storytelling approach can yield significantly better results on knowledge specific tests without taking more time in class (Hadzigeorgiou et al., 2012), and at the same time significantly increase learner engagement. Egan’s theory is another promising framework for the field of entrepreneurial education.

The above outlined theoretical perspectives from the learning domain have informed this thesis in many ways, and constitute a crucial basis for the continually evolving research design and methodology applied in the appended articles as well as in ongoing further work. An objection that can be made in this thesis focusing primarily on higher education is that some of the learning theories described above have been developed by researchers primarily focusing on children and adolescents. Jarvis however states that it increasingly is “becoming apparent that it is false to try to separate adult learning from child learning” (Jarvis, 2010, p. 120). Still, some caution is warranted.

**Education**

Having briefly outlined some aspects relevant to this thesis in the domains of entrepreneurship, entrepreneurial education, entrepreneurial learning and general learning, we will now relate them to some current and pressing issues in the domain of education. This will later allow us to generate some implications and suggestions for further research in the domain of entrepreneurial education, which will be done in the discussion part of this thesis.

Jarvis defines education as “any institutionalized and planned series of incidents, having a humanistic basis, directed towards the participants’ learning and understanding” (Jarvis, 2010, p. 41). He further outlines formal learning, non-formal learning and informal learning (ibid). Formal learning is defined as any education and training occurring in an educational institution. Non-formal learning rather
occurs at the workplace or in the community. Informal learning refers to the everyday self-directed learning that we undertake individually or in a group.

**The battle in formal education**

Egan (2008) has outlined three main goals of education; achieving social cohesion, diffusing inherently valuable knowledge and facilitating growth of the individual mind. These three goals are in many ways conflicting. For example, it can be seen as contradictory to have a standardized curriculum while also allowing for full heterogeneity and adaptation to individual needs. And it is not obvious what knowledge is ultimately valuable for society, or for the individual. These conflicting goals are the root cause of a century-long battle between “traditionalists” and “progressivists”, a battle that was started by Rousseau (1762) with his book “Émile ou de l’éducation”, exposing the “fundamental conflict between forming the citizen and forming the individual” (Egan, 2008, p.23).

According to Labaree (2005), this battle was won already in early 20th century by the traditionalists. Utility won over romanticism, with a message more appealing to people in power and with far more convincing quantitative test results proving the behaviorist approach proposed by Edward Thorndike (ibid). The progressivists, with Dewey as their lead educational philosopher and a steady cadre of teachers and professors in education leading the way (ibid), have ever since been building on their case. Lately they have been informally joined by movements such as social constructivism (Garrison, 1995), qualitative research methodology (Atkinson et al., 1988, Lackéus et al., 2013) and entrepreneurial education (From, 2006, Löbler, 2006, Pepin, 2012). From the traditionalists, the usual accusations of romanticism, emotionalism, fuzziness and lack of guidance are still strong (Ernest, 1995, Lutz and White, 1986, Kirschner et al., 2006).

Progressivist arguments have also been raised lately by agitated critics of business schools (Bennis and O’Toole, 2005, Pfeffer and Fong, 2002), stating that today’s business schools represent a kind of teaching that is detached from real-world problems and issues. Business schools are thus attacked both from entrepreneurial education scholars as outlined previously and from general education scholars, with rather similar arguments. In general however, the battle between traditionalists and progressivists is not as fierce at the higher education level as at the level of schooling. Instead entrepreneurial education is often treated as a separate topic, allowing the teachers some level of autonomy.

**Contemporary challenges in education**

According to Ball (1998), globalization and increased uncertainty in our society have stalled the formerly ongoing processes of progressive experimentation in education, replacing them on an international scale with a set of “reinvented traditional pedagogies” (ibid, p.121). This has led to frequent creation of education markets where parental choice is in focus, a set-up grounded in neoliberal ideologies of marketization. This has been coupled with replacing “task specification by target setting” (ibid, p. 122), grounded in industrial practices sometimes called Mitsubishi-ism. These targets are then steered towards by principles of performativity, i.e. perform or perish, where performance is measured on national and international levels in high-stakes standardized tests. Altogether this becomes a system of steering at a distance, replacing interventions with
accountability and transferring blame and responsibility from the reformer to the self-managed educational institution (ibid).

For the learners this has resulted in an increased focus on the competencies that are measurable, i.e. cognitive skills, at the expense of competencies that are more difficult to measure with standardized test scores but crucial on the labor market, i.e. affective, social, behavioral and emotional competencies, often labeled non-cognitive skills (Levin, 2011, Heckman and Rubinstein, 2001, Lindqvist and Vestman, 2011). This narrowing of the curriculum is a huge challenge to the domain of entrepreneurial education, and is certainly not in line with a “whole person” approach to learning. On one side entrepreneurial competency development is promoted by national and international policymakers, on the other side the trend towards more neoliberal educational systems are increasingly excluding this very kind of competency development. This paradox is evident in the Swedish school system today (Falk-Lundqvist et al., 2011), and perhaps in many other education systems too.

Altogether, this focus on high-stakes testing and its resulting narrowing of the curriculum taught has contributed to major problems in education, such as difficulties to engage students in school (Broadfoot, 2000), increased rates of school drop-outs particularly among minorities and poor (Amrein and Berliner, 2002) and a view that educational institutions to some extent fail to be relevant in today’s society (Binks et al., 2006). According to Broadfoot (2000), contemporary education has failed to “recognize the key role that perceived relevance and emotion play in learning” (ibid, p.365).

**Some proposed ideas for the future of education**

The challenges described above in contemporary formal education seem to correspond inversely to what entrepreneurial education has been shown to be able to contribute to students, i.e. increases in motivation, perceived relevancy and school attachment (Surlemont, 2007, Nakkula et al., 2003). Another observation is that the kind of disjunctural experiences so important to learning according to Jarvis(2010), are largely missing in contemporary formal education with its focus on rote learning and test preparations, i.e. the learning type Jarvis labels “memorization”, see table 1 (ibid, p.89). This is yet another possibility for entrepreneurial education to contribute, with its abundance of disjunctural experiences (Pittaway and Thorpe, 2012).

A tools approach also seems to be a plausible way forward. According to Egan (2008), the way cognitive tools truly can bridge between traditional and progressive education is when they are put to work deeply within domains of knowledge in a way meaningful to the learner. Procedures, methods and tools need to be deeply tied into knowledge domains in actual possession by the learner, which requires substantial effort and dedication from both teachers and learners. This approach thereby constitutes a flexible “third way” between the rigidity of traditional education and the vagueness of progressivism (ibid, p. 143).

It lies within the ambition of this thesis to combine the two approaches of entrepreneurial education and the mediating tools approach, to explore possible implications for the entrepreneurial education and learning domain as well as for education and learning in general. Hopefully if these two domains are combined, some new avenues can be opened up, unlocking new ways to educate our citizens.
Methodology

Due to the perceived lack of systematic exploration into this area of research, a qualitative and explorative multiple case-study approach (Yin, 2008) has been used, aligning with methodological recommendations (Edmondson et al., 2007). Two major methodological phases can be distinguished in this thesis. The first phase was conducted with entrepreneurship programs as the chosen unit of analysis, aiming to qualify the entrepreneurship programs studied as a relevant and worthwhile empirical environment. The second phase was conducted with individual students as the chosen unit of analysis, aiming at understanding their process of developing entrepreneurial competencies, taking into account the context within which their development process was embedded in and dependent upon.

**Phase 1: Qualifying the empirical environment: Venture creation programs**

Employing an appropriate sampling strategy is key to any research design. The strategy applied in this thesis has been the extreme case sampling strategy (Flick, 2009, p.122), a strategy often applied when a certain phenomenon is rare enough to merit single case study research designs (Yin, 2009, p.47). Aiming to identify the extreme cases to study in this phase, a selection process was initiated by specifying an initial definition of a Venture Creation Program (VCP), allowing for a purposeful sample. The definition used was (Lackéus and Williams-Middleton, 2011, p.5):

Entrepreneurship or business educations at a higher education level with the on-going creation of a real-life venture as their primary learning vessel and thus part of formal curriculum, with intention to incorporate or in some other way indicate future operative status.

This resulted in 18 VCPs having been identified so far, and more VCPs being discovered occasionally. Ten of these programs were then studied using ten sensitizing concepts developed by reviewing literature on VCPs (Lackéus, 2010). This phase resulted in three conference papers (Lackéus and Williams-Middleton, 2011, Lackéus et al., 2011, Lackéus and Williams Middleton, 2013), one of which was decided to be submitted for publication and is included in this thesis (Lackéus and Williams Middleton, 2013). A general methodological outcome of this phase was that the empirical setting that Chalmers School of Entrepreneurship constitutes can be regarded as one of the most advanced and comprehensive VCPs out of the 18 identified, thus justifying a single case study approach as employed in phase two of this thesis. The first phase thus qualifies Chalmers School of Entrepreneurship as a “paradigmatic case”, i.e. a case with metaphorical and prototypical value deemed to be central for human learning (Flyvbjerg, 2006, p.232):

No standard exists for the paradigmatic case because it sets the standard. Hubert Dreyfus and Stuart Dreyfus (1987) saw paradigmatic cases and case studies as central to human learning. In an interview with Hubert Dreyfus, I therefore asked what constitutes a paradigmatic case and how it can be identified. Dreyfus replied: “Heidegger says, you recognize a paradigm case because it shines, but I’m afraid that is not much help. You just have to be intuitive. We all can tell what is a better or worse case—of a Cézanne painting, for instance. But I can’t think there could be any rules for deciding what makes Cézanne a paradigmatic modern painter. . . . In fact, nobody really can justify what their intuition is.” “
From a methodological standpoint it can be questionable when a researcher opts for studying the entrepreneurship program that he or she is deeply involved in, as is the case in phase two of this thesis. It is common in entrepreneurial education research that scholars apply a convenience based sampling strategy, studying their own environment. For these reasons the resource intensive first phase outlined above, aiming to qualify Chalmers School of Entrepreneurship as one of the world’s most advanced learning environments in the domain of entrepreneurial education by comparing it with other similar and equally rare learning environments, is of particular importance in this thesis. Building on this work, which included a two-day conference that attracted key people from 14 of the 18 identified VCPs to Gothenburg, Sweden, I posit that the three years spent getting to know the 18 identified VCPs worldwide were well spent, in that the findings outlined in three conference papers specified above establish the trustworthiness and relevancy of the empirical data which the subsequent phase is based on.

Based on this first phase it has been concluded (Lackéus and Williams Middleton, 2013) that VCPs in general, and Chalmers School of Entrepreneurship in particular, provide unique access to nascent stages of entrepreneurial competence development, allowing for observation of entrepreneurial behavior as it is taking place, instead of through hindsight. This constitutes a rare “clinical” laboratory environment (Schein, 1993) of high relevancy in research on entrepreneurial competence development primarily, but also on related issues such as technology transfer, general entrepreneurship issues and general education/learning issues.

**Phase 2: Exploring the development of entrepreneurial competency development**

In this still on-going phase, a longitudinal design has been applied, following 13 students since September 2012 and ongoing. These students are all following the action-based master program at Chalmers School of Entrepreneurship, Chalmers University of Technology, Sweden. This program is known for its active and hands-on approach, requiring student teams to start a real-life venture based on a technology supplied by external inventors at or outside the university. This specific program applies and defines the “venture creation approach” outlined by Ollila and Williams Middleton (2011) and described previously in this thesis.

11 out of the 13 students in this study work with intellectual property developed by university researchers, corporate researchers or individual inventors outside university, aiming to commercialize it through starting a venture. The remaining two students follow a sister program studying early-stage commercialization but with a project work rather than venture creation based approach. Five of the students were included in the study when they initiated their second year of the master program, and eight of the students have been followed from the start of the two-year master program.

A mixed-methods approach has been applied, using both quantitative and qualitative research methods. A quantitative approach has been developed to capture emotions as they occur through a mobile survey in an experience sampling method (ESM) approach (Morris et al., 2012, p.266), and a qualitative approach has been used to reveal underlying mechanisms through semi-structured interviews, primarily searching for connections between strong emotions and learning outcomes.
Quantitative approach: mobile survey engine

In the quantitative part of this phase, students are equipped with a mobile app in their smartphones connected to a mobile survey engine, and are asked to momentarily register every strong positive and negative emotion they experienced related to their educational experience, and rate it according to the circumplex model of affect (Russell, 1980, Posner et al., 2005), i.e. to rate valence and activation for each event deemed worthy of registering. They are asked to quantitatively rate the following two questions from 1-7 in a likert scale manner each time they make a report; Q1: “How do you feel? (1=very sad/upset versus 7=very happy/contented)”, and Q2: “How intensely do you feel this? (1=not at all versus 7=very intensively)”. The students are also encouraged to write a sentence or two on why they feel like they do in each app report produced.

The mobile app also contains a possibility to report critical learning events, since this kind of events constitutes an important source of both emotions and learning according to Cope’s entrepreneurial learning framework described previously in this thesis. The app probes for six different kinds of critical learning events. These critical learning event reports are also coupled with an opportunity for the students to write a sentence or two about the reason for the critical learning event occurring.

Qualitative approach: Semi-structured interviews

The app-based measurements are followed up with quarterly individual interviews aiming to uncover links between strong emotions and resulting entrepreneurial learning outcomes. A semi-structured approach has been applied, using an interview template with themes covering learning and themes covering emotions. In addition to the semi-structured parts, each interview also includes a discussion around app reports deemed to be particularly interesting from a research perspective, aiming to guide the discussion to interesting events having occurred between interviews. All interviews are recorded and some of them have been transcribed verbatim. To date 30 interviews have been conducted, and an additional 30-50 interviews are planned in the year to come.

Data analysis: Coding procedure

All data collected in this second phase will be coded in the qualitative data analysis software package NVIVO, using two coding frameworks – one framework for sources of emotions and one framework for entrepreneurial learning outcomes. So far six interviews have been coded, resulting in a conference paper on links between strong emotions and learning outcomes, included in this thesis (Lackéus, 2013). Each framework consists of 9 and 15 sub-themes respectively. The coding framework for sources of emotions is based on a working paper by Arpiainen et al. (2013), where the author of this thesis is included as equally participating author (not appended to this thesis). This working paper outlines main sources of strong emotions in two entrepreneurship education programs in Finland and Namibia and one entrepreneurship education course in Estonia, see Table 2. The coding framework for entrepreneurial learning outcomes is based on a framework developed by Fisher et al. (2008), and has been further developed by drawing on work by other scholars, see Table 3.
Table 2. Sources of strong emotions in entrepreneurship education (Arpiainen et al., 2013)

<table>
<thead>
<tr>
<th>Main themes</th>
<th>Sub themes used for coding in NVIVO</th>
</tr>
</thead>
<tbody>
<tr>
<td>New kind of learning environment</td>
<td>Uncertainty and confusion</td>
</tr>
<tr>
<td></td>
<td>Theory versus practice</td>
</tr>
<tr>
<td></td>
<td>Support from outside of the learning environment</td>
</tr>
<tr>
<td>Collaborative learning</td>
<td>Team-work experience</td>
</tr>
<tr>
<td></td>
<td>Time pressure</td>
</tr>
<tr>
<td></td>
<td>Individual differences between the students</td>
</tr>
<tr>
<td>Challenging tasks</td>
<td>Overcoming knowledge and skills gaps</td>
</tr>
<tr>
<td></td>
<td>Interacting with outside world</td>
</tr>
<tr>
<td></td>
<td>Leadership and managing people</td>
</tr>
</tbody>
</table>

Table 3. Entrepreneurial learning outcomes framework.

<table>
<thead>
<tr>
<th>Main theme</th>
<th>Sub themes used for coding in NVIVO</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Mental models</td>
<td>Kraiger et al. (1993)</td>
</tr>
<tr>
<td></td>
<td>Declarative knowledge</td>
<td>Kraiger et al. (1993)</td>
</tr>
<tr>
<td></td>
<td>Self-insight</td>
<td>Kraiger et al. (1993)</td>
</tr>
<tr>
<td>Skills</td>
<td>Marketing skills</td>
<td>Fisher et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Opportunity skills</td>
<td>Fisher et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Resource skills</td>
<td>Fisher et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Interpersonal skills</td>
<td>Fisher et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Learning skills</td>
<td>Fisher et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Strategic skills</td>
<td>Fisher et al. (2008)</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Entrepreneurial passion (“I want”)</td>
<td>Fisher et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy (“I can”)</td>
<td>Fisher et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Entrepreneurial identity (I am / I value”)</td>
<td>(Krueger, 2005, Krueger, 2007)</td>
</tr>
<tr>
<td></td>
<td>Proactiveness (“I do”)</td>
<td>(Sánchez, 2011, Murnieks, 2007)</td>
</tr>
<tr>
<td></td>
<td>Uncertainty / ambiguity tolerance (“I dare”)</td>
<td>(Sánchez, 2011, Murnieks, 2007)</td>
</tr>
<tr>
<td></td>
<td>Innovativeness (“I create”)</td>
<td>(Krueger, 2005, Murnieks, 2007)</td>
</tr>
<tr>
<td></td>
<td>Perseverance (“I overcome”)</td>
<td>(Markman et al., 2005, Cotton, 1991)</td>
</tr>
</tbody>
</table>

During the coding process more codes are added when the coding frameworks do not capture important dimensions in the data. This kind of coding is called “open coding”, and is a method suitable for developing theory or creating new theory (Corbin and Strauss, 1990). After the interviews are coded, a coding matrix will be produced using functionality for this in the NVIVO software package. In the working paper appended to this thesis (Lackéus, 2013), this matrix has tentatively been used to identify salient connections between emotions and learning outcomes in the data. Although it is based on only three out of the 13 respondents in this study, interesting links between emotions and learning outcomes have already surfaced, outlined in Figure 4. This is methodologically promising.
Summary of appended papers

<table>
<thead>
<tr>
<th>Paper</th>
<th>Authors</th>
<th>Status</th>
<th>Subject / relevance</th>
<th>Method</th>
<th>My role / contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotions in Entrepreneurial Education: A literature review</td>
<td>Lackéus, M.</td>
<td>Submitted. (Presented at ISBE, 2012. Will be submitted for publication in September before LIC finalization, editor of IJEBR has been asking for the paper since May)</td>
<td>Mapping out and clarifying a key domain for this thesis.</td>
<td>Qualitative systematic literature review.</td>
<td>Sole contributor and presenter.</td>
</tr>
</tbody>
</table>

Paper 1: “Venture Creation Programs – bridging Entrepreneurship Education and Technology Transfer”

The article explores how university-based entrepreneurship programs, incorporating real-life venture creation into educational design and delivery, can bridge the gap between entrepreneurship education and technology transfer within the university environment. Based on a literature review and snowball sampling over a two-year period, 18 entrepreneurship education programs were identified as applying a venture creation approach. Ten of these programs were selected for case study, including direct interviews and participatory observation during a two-day workshop.
Empirical findings were iteratively related to theory within entrepreneurship education and technology transfer.

The article identifies the bridging capabilities of venture creation programs (VCPs) across five core themes, illustrating the potential benefits of closer collaboration between entrepreneurship education and technology transfer in a university environment. A definition for ‘venture creation program’ is tested empirically. These programs are shown to be sophisticated laboratory environments, allowing for clinical research towards the understanding of entrepreneurship and technology transfer processes. Findings identify practical benefits of combining entrepreneurship educators and technology transfer activities, such as increased value creation through not only new firms, but also an entrepreneurially equipped graduate population. VCPs allow for ‘spin-through’ of innovative ideas in the university environment, while simultaneously contributing to entrepreneurial learning.

This article presents findings from the first multiple case study into entrepreneurship educations specifically designed to develop real-life venture as part of the core curriculum. Findings provide basis for investigating the value of integrating entrepreneurship education and technology transfer at the university.

**Paper 2: “Emotions in Entrepreneurial Education: A literature review”**

The article is a qualitative systematic literature review on previous research primarily on emotions in entrepreneurial education, but also on related research on emotions outside the domain of entrepreneurship and enterprise. Particular attention is paid towards the role of emotions in entrepreneurial learning and teaching – if, how and why the explicit acknowledgement and use of affect can improve human learning in an entrepreneurial context. No literature review has been conducted before on emotions in entrepreneurial education. A narrative approach was used to generate keywords. A selection of keywords deemed to be relevant were subsequently used in database searches. Citations from the 22 articles found were analysed in order to identify additional sources outside of the entrepreneurship domain to include in the analysis. A complementary search using a selection of keywords excluding the entrepreneurship domain was also made and combined with co-citation analysis.

Results indicate that the field of entrepreneurship education is largely disconnected from the emotional aspects discussed in the fields of psychology, education, neuroscience and creativity. There is an emotional revolution going on in psychology that has not yet reached the domain of entrepreneurship education. Kolb is the only theorist outside entrepreneurship widely used in the reviewed literature, and there are more contemporary alternatives to Kolb available that could be more useful. Dewey and Gibb emerge as two integrative scholars that are especially important, as well as the concept of constructivist learning environments. If concepts such as emotion, affection and temperament can increase the understanding of entrepreneurial education, there are ample opportunities to draw on literature outside of the entrepreneurship domain. The literature within the entrepreneurial education domain is however very limited.

An emerging cadre of scholars in a wide array of fields such as psychology (Damasio, 1994), sociology (Lutz and White, 1986, Heckman et al., 2006, Lindqvist and Vestman, 2011), philosophy (Hager,
2005), education (Boler, 1999, Schutz and Pekrun, 2007, Lakomski and Evers, 2010) and entrepreneurship education (Kyrö, 2008, Gibb, 2005) seem to increasingly argue that the traditional rationalist-cognitive model of studying human nature has reached its explanatory limit, and that more focus needs to be put on emotions, behaviour and other related non-cognitive constructs in order to advance our understanding of human nature. This article is an attempt to build a first foundation within the affective dimensions of entrepreneurship education to support further work in this direction.

**Paper 3: “Links between Emotions and Learning Outcomes in Entrepreneurial Education”**

This paper investigates links between strong emotions and entrepreneurial learning outcomes in an action-based entrepreneurship education program. Students’ own experiences were assessed during their participation in a master level university program where they were expected to start a real venture as formal part of curriculum. An explicit focus on emotions in action-based entrepreneurship education is unusual in previous research, but can trigger new insights on antecedents to entrepreneurial learning outcomes. It also represents a novel approach to assessing learning outcomes of entrepreneurial education. A longitudinal design was applied following three students during nine intensive months. Students were equipped with a mobile app-based survey engine in their smartphones, and were asked to momentarily register emotions and critical learning events related to their educational experience. These app-based measurements were followed up quarterly with semi-structured interviews to uncover links between strong emotions and resulting entrepreneurial learning outcomes. Links were identified by using software analysis package NVIVO and theoretical as well as open coding of data.

Findings indicate a large number of links between strong emotions and entrepreneurial learning outcomes. Some links seem stronger than others. Three sources of emotions that seem to be particularly linked to entrepreneurial learning outcomes are interaction with outside world, uncertainty and ambiguity in learning environment and team-work experience. These sources of emotion seem to be linked to formation of entrepreneurial identity, increased self-efficacy, increased uncertainty and ambiguity tolerance and increased self-insight. Strong emotions induced by action-based entrepreneurial education seem to primarily impact attitudinal learning outcomes. These findings represent a novel approach to assessing learning outcomes within entrepreneurial education. They also represent early empirical evidence for three seemingly effective design principles of entrepreneurial education. Educators aiming to develop entrepreneurial competencies should try to design a learning environment ripe of uncertainty and ambiguity where students frequently are able and encouraged to interact with the outside world in a working environment characterized by a team-based approach. This study also represents an attempt to open the “black box” of entrepreneurial learning, since it has been possible to uncover some of the mechanisms behind the links observed between emotions and learning. Important limitations of this study include a small number of interviewees, unknown transferability of results to other contexts and learning environments, risk for individual bias in the data coding procedure and a lack of established theoretical frameworks for strong emotions and learning outcomes within the domain of entrepreneurship education.
Discussion

Response to RQ1: Three tools that develop entrepreneurial competencies

This study set out to explore the global prevalence of entrepreneurship programs where students are expected to create a real-life venture, and then study some of them in-depth. This was based on previous research indicating that VCPs represent an interesting example of formal learning environments where entrepreneurial competencies are developed to a large extent. This study focus has resulted in the identification of three concepts anchored in the domain of entrepreneurship that can facilitate development of entrepreneurial competencies – value creation, venture creation and effectuation. I posit that all three concepts can be regarded as powerful psychological tools in line with the famous Vygotskian educational psychology tradition. They can all become mentally internalized by the learner, resulting in usage of these concepts to think with rather than to think about. A successful educational intervention can result in learners more or less consciously using them to do cultural work, asking themselves questions such as “How can I create value here”, “How can I turn this into a venture”, and “What effects can I create here?”. I will now outline the three concepts and their connection to development of entrepreneurial competencies as well as some interesting side-effects.

Value creation: a rare but powerful driving force to learning

One of the most common forms of entrepreneurial education is to ask students to create a plan for a venture (Honig, 2004). This contrasts to the very rare form of entrepreneurial education explored in this study where students are asked to create an actual venture. I posit that the underlying differentiating variable here is the notion of creating real value for stakeholders outside the educational institution. As an example, many VCP candidates examined in this study were excluded from the final sample due to their deliberate termination of students’ simulated ventures upon completion of the program. This indicates a common unwillingness or inability of educational institutions to engage students in real-life value creation activities as formal part of curriculum. It is often seen as incompatible to higher education values and goals (Lackéus and Williams Middleton, 2013, p.3 and 13). Judging from the rare occurrence of VCPs, where three years of snowball sampling yielded only 18 programs worldwide, I conclude that explicit focus on in-curricular real-life value creation is rare at higher education institutions worldwide.

Empirical data from this study supports the proposition of value creation as a key factor, in that many of the key interviewees at the studied VCPs emphasized the importance and ability of balancing between learning goals and value creation goals (ibid, p.14). Data also indicates that letting students create value for various stakeholders outside the university can cause them to reach a “tipping point”, engaging with a curricular task to a substantially higher extent than they had ever done previously in life (ibid, p.11). These students reach a level of motivation, commitment and emotional ownership for their venture project very uncommon in educational settings. The positive effects of high motivation on learning have been firmly established in previous research (Stipek, 1996), and are supported also in this study. When the students that participated in this study felt valued, valuable and appreciated by stakeholders outside their university, it increased their levels of happiness, motivation and effort, in turn leading to a number of highly sought after entrepreneurial learning outcomes such as increased perseverance, increased tolerance for uncertainty, increased self-
efficacy, increased entrepreneurial passion and developed entrepreneurial identity (Lackéus, 2013, p.17).

Previous research has identified the “venture creation approach” to learning (Ollila and Williams-Middleton, 2011). This study now adds to this line of research by proposing a “value creation approach” to learning, or as Dewey might have put it: “Learning by creating value” – a version of his famous approach “learning by doing”. Here one could argue that venture creation and value creation are variations of one same approach to learning. It is however quite possible to conceive an educational program emphasizing value creation without employing a venture creation approach. It is also possible and has indeed been observed in this study that there are programs employing a venture creation approach but excluding real-life value creation from the desired short-term outcomes, instead emphasizing learning outcomes exclusively.

It is surprising to find that learning goals are the norm and value creation goals are the exception in higher education, given the strong motivational and learning effects a value creation focus can have on learners. This leads us to a major proposition resulting from this study:

P1: Adding value creation goals to the curriculum can increase learners’ motivation and enhance the capacity to develop entrepreneurial competencies.

Venture creation: orchestrating value creation processes

Even if value creation can be integrated in curricular designs without a venture creation emphasis, it is evident from the studied VCPs that the use of a venture creation approach is a major driving force behind these programs (Lackéus and Williams Middleton, 2013). This approach allows a large number of different stakeholders to align to a unified process of creating a venture. It defines the rules of engagement, sets the stage in which value is created and contributes with a distinct set of procedures, vocabulary, practices and theory to draw from. The venture can be regarded as humanity’s most advanced vehicle for value creation, and thus becomes instrumental in an educational environment focused on tandem learning and value creation. Of particular importance is the role of a venture creation approach in connecting with a community of practice, which is one of the cornerstones of situated learning theory (Wenger, 1998, Lave and Wenger, 1991) and also a cornerstone of the studied VCPs (Lackéus and Williams Middleton, 2013).

In addition to aligning curriculum-based value creation activities in general, a venture creation approach can also contribute to university technology transfer processes. VCPs contribute to technology transfer processes in a number of ways according to this study (Lackéus and Williams Middleton, 2013). They increase the number of stakeholders engaged in the technology transfer process. They increase the assessment efficiency of inventions disclosed at a university. They also provide match-making between innovators and entrepreneurial individuals at the university. Some advanced and mature VCP approaches also generate consistent financial results in terms of a constant stream of created and fast-growing ventures, particularly at North Carolina State University in United States and at Chalmers University of Technology in Sweden (Lackéus, 2012b). VCPs constitute an opportunity to alleviate the dreaded “valley of death” (Barr et al., 2009) in early stages of university commercialization.
Despite these advantages of a venture creation approach and VCPs, it is a very rare phenomenon at higher education institutions worldwide according to this study. Some explanations have been uncovered (Lackéus and Williams Middleton, 2013), such as reluctance from technology transfer officials to consign valuable intellectual property to inexperienced students, interdisciplinary challenges in the usual silo structured university, unpredictability aspects of integrating venture creation in curriculum design and significant resource requirements.

Again, it is surprising to find that the venture creation approach is so rare, given the strong learning and value creation effects a venture creation focus can have for universities. This leads us to another major proposition resulting from this study:

**P2: Adding a venture creation program to the curricular offering of a higher education institution can increase its technology transfer efficiency and its capacity to develop entrepreneurial competencies.**

**Effectuation: An iterative and social learning process**

Many of the VCPs in this study emphasize the importance of a process-based and iterative curriculum design embedded in an entrepreneurial community, in contrast to the traditional content-based curriculum design largely detached from real-life stakeholders. This design approach is viewed as a prerequisite for learning to become entrepreneurial, mirroring the experience of real-life entrepreneurs. Empirical data also shows that frequent and iterative interactions with the outside world contribute to the development of entrepreneurial competencies among the students at a VCP (Lackéus, 2013, p.16). As highlighted in this study (Lackéus and Williams Middleton, 2013, p.13), these curriculum design principles are in alignment with the effectual logic proposed by Sarasvathy (2001) and also aligns with viewing entrepreneurship as a method for human action as proposed by Sarasvathy and Venkataraman (2011).

Such a curriculum design is however the exception rather than the norm in most educational institutions today (Leitch and Harrison, 1999, Mwasalwiba, 2010, Gibb, 2011, Tynjälä, 1999). I propose that the scholarly contributions by Sarasvathy and colleagues therefore constitute highly valuable tools for educators intending to implement a process-based, iterative and socially situated curriculum design. They legitimize an approach that has previously been difficult to implement at educational institutions due to cultural, paradigmatic and value-based constraints (Ardalan, 2008, Tynjälä, 1999). They also allow for giving some firm recommendations to teachers and learners through the practice oriented work by Sarasvathy and colleagues in terms of course books (see for example Read et al., 2011) and other teaching material (see for example www.effectuation.org). Thereby a third major proposition of this study is:

**P3: Applying effectuation theory to curriculum design can increase the organizational legitimacy and effectiveness of a process-based, iterative and socially situated learning environment.**
Response to RQ2: How these tools develop entrepreneurial competencies

Having outlined three psychological tools that have been found to facilitate development of entrepreneurial competencies in formal learning environments we will now continue by discussing how they do it. We will then need to explore deeper into the entrepreneurial learning “black box”, trying to understand what happens when students become more entrepreneurial.

A basic tenet of this study’s research design has been to explore emotional aspects of entrepreneurial education. This was in line with recommendations from leading scholars in the field, such as Dean Shepherd, Jason Cope, Paula Kyrö and Allan Gibb (see Lackéus, 2012a). The role of emotions in education is an under-researched area in general (Pekrun, 2005), but with particular explanatory power in the domain of entrepreneurship due to the “emotional complexity and intimacy of the relationship between the entrepreneur and the small business” (Cope, 2003, p.440).

This approach led to the exploration of links between disjunctural and emotionally laden experiences and developed entrepreneurial competencies in an action-based entrepreneurial education program. Using the methodology outlined earlier, this exploration uncovered numerous links, outlined in Figure 4. Interaction with the outside world resulted in increased self-efficacy. Uncertainty and ambiguity in learning environment resulted in increased tolerance for uncertainty and ambiguity. Team-work experience resulted in increased self-insight. This leads us to another major proposition of this study:

P4: A learning environment ripe of uncertainty and ambiguity where students are encouraged to interact with the outside world in teams can facilitate development of entrepreneurial competencies

If we now add to this the connection between educational design and disjunctural emotional events we reach an explanation to why the previously outlined psychological tools foster development of entrepreneurial competencies. Value creation, venture creation and effectuation all contribute to increasing students’ interaction with outside world. They all can cause increased uncertainty and ambiguity in a learning environment. In the case of the studied VCPs the most common format for applying them is the team-based approach. That gives us a link from educational design through emotional events to entrepreneurial learning outcomes, as shown in Figure 5. In Figure 6 these connections are exemplified with the case of interaction with outside world, the most frequent link in the empirical data of this study (Lackéus, 2013, p.12). From this we infer our next proposition:

P5: Emotional events and situations can be considered an explanatory proxy between educational design tools and developed entrepreneurial competencies.
Some additional implications

In addition to the above outlined primary propositions, there are some other implications stemming from this study. These are outlined in detail in Table 4.

From a theoretical perspective, escaping the usual rationalist bias and instead applying a qualitative, learner and emotion based approach to the domain of entrepreneurial education has proven quite
fruitful so far, at least to the extent that the findings from this study are deemed to be worthwhile and interesting. Some old and new frameworks and theoretical perspectives largely unconsidered previously in the domain of entrepreneurial education have been identified and to a varying extent applied in this study. These include the “whole person” based theory of human learning by Peter Jarvis, the activity theory based stepwise instructional design procedure by Piotr Galperin, the cognitive tools approach to education by Kieran Egan, the pragmatist perspectives on education by John Dewey, the theory of the person by John Heron and the still emerging constructivist education perspectives advocated by Päivi Tynjälä, Thomas Duffy and many others. Further research in the domain of entrepreneurial education can benefit from considering these theories and frameworks further, taking the field further than has so far been possible through titan scholars such as Allan Gibb and David Kolb. A framework for entrepreneurial competencies has also been compiled as a result of this study, which is lacking in the field.

From a practical perspective viewing emotional events as a proxy between educational design and developed entrepreneurial competencies opens up for new approaches to assessment in entrepreneurial education, a topic of interest to policymakers and educators. The VCP case study has also revealed and described a number of learning environments that can be interesting to study for educational practitioners. These VCPs represent interesting examples of truly action-based entrepreneurial education, and most of them exhibit strong treatment effects on students making them candidates for good practice studies. These environments are also interesting due to their evident capability to balance between multiple dualisms, such as theory versus practice, action versus reflection and learning versus value creation (Lackéus and Williams Middleton, 2013, p.14-15).

From a methodological perspective this study has explored some novel methods and empirics. The app-based experience sampling method combined with interviews and NVIVO software based data analysis with coding matrices is a novel approach well worth replicating in other settings. Indeed, we have already been contacted by three different groups in Sweden and Denmark showing interest in replicating parts of or the entire methodological design in their environments. Also the empirical setting itself in this study represents a novel approach to researching processes of entrepreneurial behavior, in that it can be regarded as a “clinical” laboratory environment (Schein, 1993) allowing for study of entrepreneurial behavior as it occurs as opposed to in hindsight. It is notable that none of the other VCP environments found in this study had done extensive research endeavors using their student base as empirics. The wide definition of entrepreneurship applied in this study also represents a useful approach still unusual in entrepreneurial education research. It can be concluded that this definitional approach has served its purpose well for a study in this field. Making students more entrepreneur-ial seems to be a more viable goal in entrepreneurial education than making students into heroic entrepreneurs.
Table 4. Some secondary implications and related contributions from this thesis.

<table>
<thead>
<tr>
<th>Area</th>
<th>Problem</th>
<th>Description</th>
<th>How this thesis addresses it</th>
<th>Implication</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>RQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. All areas below</td>
<td>Strong rationalist bias</td>
<td>Too much focus on behaviorist / cognitivist models, too little focus on emotions, meaning and non-cognitivism.</td>
<td>Emotion in entrepreneurial education has been explored through an in-depth literature review and by empirically studying emotions in entrepreneurial education.</td>
<td>Theoretical, methodological</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>2</td>
</tr>
<tr>
<td>1. Entrepreneurial</td>
<td>Desired outcome vague</td>
<td>No consensus around what entrepreneurial competencies are. Not even consensus on a competencies approach.</td>
<td>A tentative framework for entrepreneurial competencies has been developed and empirically applied, based on previous literature on entrepreneurial competencies.</td>
<td>Theoretical, methodological</td>
<td>X</td>
<td></td>
<td></td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td>Too narrow definitions used</td>
<td>Much focus is on creating Steve Jobs’-es, while the more interesting effects are motivational and attitudinal.</td>
<td>A wide definition of what it means to be or become entrepreneurial has been applied when empirically studying students developing entrepreneurial competencies.</td>
<td>Methodological</td>
<td></td>
<td></td>
<td>X</td>
<td>2</td>
</tr>
<tr>
<td>2. Entrepreneurial</td>
<td>Uninteresting empirics abound</td>
<td>Much research is based on learning environments that do not lead to strong entrepreneurial learning outcomes.</td>
<td>A strong focus on establishing the relevancy of the empirical setting. Research in phase one has shown that the setting studied in phase two is worthwhile to study.</td>
<td>Practical</td>
<td>X</td>
<td></td>
<td></td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td>Too reliant on old scholars</td>
<td>A domain largely reliant on Kolb and Gibb for its “theoretical” foundation, scholars with too weak theoretical, philosophical and empirical foundations.</td>
<td>Previously under-utilized scholars and frameworks applicable to the field have been identified. Scholars such as Jarvis, Dewey, Egan, Galperin and Heron. Frameworks such as constructivist education, activity theory and situated learning theory.</td>
<td>Theoretical</td>
<td>X</td>
<td></td>
<td></td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td>Too much dualism</td>
<td>“Do this not that”, we and them thinking, abundance of two-column tables, need for paradigm shifts.</td>
<td>Venture Creation Programs have been shown capable of balancing between multiple dualisms, thus bridging the gap between education and the outside world.</td>
<td>Practical</td>
<td>X</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Rationalist bias in assessment</td>
<td>Too much reliance on causal models of explaining entrepreneurial education and its outcomes.</td>
<td>A qualitative approach relying on emotional events as a proxy between educational design and entrepreneurial learning outcomes has been developed and tested.</td>
<td>Some early empirically driven results point to three effective design principles for entrepreneurial education – focus on interaction with outside world, encourage uncertainty and ambiguity in learning environment and work with a team approach.</td>
<td>Theoretical, practical</td>
<td></td>
<td>X</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Lack of practical principles</td>
<td>In theory there is consensus around action-based approaches, but this has not impacted practice yet due to inconclusive empirical evidence for practices.</td>
<td>Some early empirically driven results point to three effective design principles for entrepreneurial education – focus on interaction with outside world, encourage uncertainty and ambiguity in learning environment and work with a team approach.</td>
<td>Some early empirically driven results point to three effective design principles for entrepreneurial education – focus on interaction with outside world, encourage uncertainty and ambiguity in learning environment and work with a team approach.</td>
<td>Practical</td>
<td></td>
<td>X</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3. Entrepreneurial</td>
<td>Lab environments under-utilized</td>
<td>Too little research on formal learning environments where entrepreneurial learning can be studied as it occurs as opposed to in hindsight.</td>
<td>Venture Creation Programs have been identified as a relevant “clinical” laboratory environment, where entrepreneurial behaviour can be studied as it occurs.</td>
<td>Methodological</td>
<td>X</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Learning</td>
<td>“Black box” not understood</td>
<td>Patterns of entrepreneurial learning processes are under-researched and poorly understood.</td>
<td>A method has been developed and tested that can uncover chains of events from educational design to learning outcomes.</td>
<td>Methodological</td>
<td>X</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>4. Learning</td>
<td>Neglected role of disjunction</td>
<td>The importance of disjunctural events for learning has been neglected for long and on wide scale.</td>
<td>A method has been developed that explicitly probes for disjunctural events and explores antecedents and consequences of them.</td>
<td>Methodological</td>
<td>X</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Neglect of action and emotion</td>
<td>The importance of action and emotion in learning has been largely neglected, such as downplaying situated learning approaches.</td>
<td>A set of integrative theories taking into account “whole person learning” have been identified and applied empirically through a research design probing action-based educational programs for emotional events.</td>
<td>Theoretical, methodological, practical</td>
<td>X</td>
<td>X</td>
<td></td>
<td>1,2</td>
</tr>
<tr>
<td>5. Education</td>
<td>Strong focus on measurability</td>
<td>Marketization and neoliberal trends drive focus towards measurable knowledge and away from entrepreneurial competencies.</td>
<td>A method has been developed capable of highlighting and explaining entrepreneurial learning outcomes previously difficult to assess and legitimize.</td>
<td>Methodological, practical</td>
<td></td>
<td>X</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Embedded in larger battle</td>
<td>Unknowingly entrepreneurial education is part of a larger battle between traditional and progressive / constructivist education.</td>
<td>The entrepreneurship anchored “mind” tools identified in this thesis could turn out to be useful outside the field of entrepreneurial education in order to bridge between traditional and progressive / constructivist education, representing a “third way”.</td>
<td>Theoretical, methodological, practical</td>
<td>Covered in the kappa discussion</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Future research – mastering the balancing act

This study has revealed that entrepreneurial education suffers from a dualistic problem. Although VCPs seem to be quite capable of balancing between theory and practice or between reflection and action (Lackéus and Williams Middleton, 2013, p.14-15), this is not the case for most entrepreneurial education worldwide. Mwasalwiba (2010) states that in theory most scholars agree that action-based pedagogical approaches are the most suitable for entrepreneurial education, but in practice the most widespread pedagogical approaches are theoretical, traditional and passive – lectures, business plan creation, guest speakers and class discussions. The reasons for this are primarily cost, culture, lack of methods and lack of incentives (Mwasalwiba, 2010, Ardalan, 2008). This has led to a situation where most genuinely entrepreneurial initiatives at higher education institutions are extracurricular, leaving most students out of the entrepreneurial loop completely. Some scholars even suggest that “most educational programs are nothing but temporary fashion” (Lautenschläger and Haase, 2011, p.147).

The solution many leading scholars alongside international entities such as EU and World Economic Forum argue for is a paradigm shift in education from traditional to entrepreneurial approaches (Binks et al., 2006, Hynes and Richardson, 2007, Wilson, 2008, European_Commission, 2010, Gibb, 2002, Kyrö, 2005, Moroz et al., 2010, European_Commission, 2006, Volkmann et al., 2009). I however posit that we cannot afford to wait for a paradigm shift to come. Instead we need to explore alternative pathways. To find this “third way” for entrepreneurial education, we first need to map out the terrain for this dualistic problem.

I posit that the “fault line” between traditional and entrepreneurial approaches actually goes way beyond the domain of entrepreneurial education. It starts in the domain of philosophy of science with its binary opposition between positivism and interpretivism (Cunliffe, 2011). It passes through general educational philosophy and its century-long battle between traditionalists and progressivists for control over instructional design practices (Labaree, 2005). It arrives in the domain of entrepreneurship where scholars contrast a reductionist observation-based causal logic with a commitment and action-based effectual logic (Sarasvathy and Dew, 2005, Sarasvathy and Venkataraman, 2011). It finally reaches the domain of entrepreneurial education, where we find the aforementioned scholars and international organizations having spent decades sketching on their usual two-column tables of “their” and “our” approach to education (for an early example, see Cotton, 1991). I outline this “fault line” in Figure 7, consisting of five main dualisms cutting across four domains.

In Figure 7 we see many of the aspects covered in this study. The complex, social and process-based nature of a VCP approach has been described in-depth. Students’ appreciation of the emotional attachment and practice orientation of a VCP has been amply captured. Still the educational system demands also of a VCP to be manageable in terms of individual assessment, theory content of high academic standards and a detached faculty evaluating learners in the prevailing transaction-based educational model. Perhaps the rare VCP approach can help us finding a “third way” in entrepreneurial education.

I will now consider some solutions from domains outside entrepreneurial education. Egan (2008) has proposed a cognitive tools approach as a “third way” for general education, a flexible yet criteria based way between the rigidity of traditional education and the vagueness of progressivism (ibid, p.
Jarvis (2006) and Hager (2005) state that resolving dualisms such as mind/body, thought/emotion, theory/practice, are crucial to our understanding of human learning, so this endeavour seems worthwhile. Indeed, as Chen et al. (2010) state, “interaction between two forces of yin and yang would creatively evolve myriad objects and things.” (p.181). One could even argue that this kind of interaction is the primary task of universities, judging from educational philosopher Whitehead (1967):

> The justification for a university is that it preserves the connection between knowledge and the zest of life, by uniting the young and the old in the imaginative consideration of learning. The university imparts information, but it imparts it imaginatively. At least, this is the function which it should perform for society. A university which fails in this respect has no reason for existence. (p. 97)

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**Figure 7. Five different dualisms cutting across four different literature domains**

Using the developed framework in Figure 7 and other perspectives developed and described in this study we can now articulate some questions to guide further research addressing the five identified dualisms. They are:

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**Table:**

<table>
<thead>
<tr>
<th>POSITIVISM</th>
<th>INTERPRETIVISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRADITIONAL EDUCATION</td>
<td>PROGRESSIVE / CONSTRUCTIVIST EDUCATION</td>
</tr>
<tr>
<td>SCIENTIFIC METHOD</td>
<td>ENTREPRENEURIAL EDUCATION</td>
</tr>
<tr>
<td>Science as...</td>
<td>Complexity</td>
</tr>
<tr>
<td>Learning as...</td>
<td>holistic</td>
</tr>
<tr>
<td>Entrepreneurship education as...</td>
<td>localized and child-centered</td>
</tr>
<tr>
<td>A method to...</td>
<td>multidisciplinary</td>
</tr>
<tr>
<td>...reductionist</td>
<td>unleash human nature</td>
</tr>
<tr>
<td>...standardized</td>
<td>(Deshpande, 1983; von Bertalanffy, 1972)</td>
</tr>
<tr>
<td>...single-subject</td>
<td>(Tynjälä, 1999)</td>
</tr>
<tr>
<td>...harass nature</td>
<td>(Cotton, 1991)</td>
</tr>
<tr>
<td>Individual</td>
<td>(Sarasvathy and Venkataraman, 2010)</td>
</tr>
<tr>
<td>Scientist regards...</td>
<td>(Cunliffe, 2011)</td>
</tr>
<tr>
<td>Learning as...</td>
<td>(Jeffrey and Woods, 1998; Egan, 2008)</td>
</tr>
<tr>
<td>Entrepreneurship education as...</td>
<td>(Cotton, 1991)</td>
</tr>
<tr>
<td>A method for the...</td>
<td>(Sarasvathy and Venkataraman, 2010)</td>
</tr>
<tr>
<td>...reality a concrete structure</td>
<td>Content</td>
</tr>
<tr>
<td>...individual work</td>
<td>...process focus</td>
</tr>
<tr>
<td>...know that</td>
<td>...process</td>
</tr>
<tr>
<td>...objective</td>
<td>...iterative</td>
</tr>
<tr>
<td>Content</td>
<td>Process</td>
</tr>
<tr>
<td>...linear</td>
<td>...iterative</td>
</tr>
<tr>
<td>Learning activities with...</td>
<td>Attached</td>
</tr>
<tr>
<td>Entrepreneurship education as...</td>
<td>...meaning-making / ...value bound</td>
</tr>
<tr>
<td>A method that is...</td>
<td>...learner is passive</td>
</tr>
<tr>
<td>...product focus</td>
<td>...absolute detachment</td>
</tr>
<tr>
<td>...context</td>
<td>...transaction based</td>
</tr>
<tr>
<td>Science should be...</td>
<td>Theory</td>
</tr>
<tr>
<td>A classroom where...</td>
<td>...objective reality</td>
</tr>
<tr>
<td>Entrepreneurship education as...</td>
<td>...inert knowledge</td>
</tr>
<tr>
<td>A method that is...</td>
<td>...emphasis on theory</td>
</tr>
<tr>
<td>...dispassionate / value free</td>
<td>...emphasis on theory</td>
</tr>
<tr>
<td>...learner is passive</td>
<td>...emphasis on creation</td>
</tr>
<tr>
<td>...absolute detachment</td>
<td>...action &amp; co-creation</td>
</tr>
<tr>
<td>...transaction based</td>
<td>Practice</td>
</tr>
<tr>
<td>Science about...</td>
<td>(Weber, 2004)</td>
</tr>
<tr>
<td>Learning focusing on...</td>
<td>(Tynjälä, 1999; Egan, 2008)</td>
</tr>
<tr>
<td>Entrepreneurship education with...</td>
<td>(Ollila and Williams Milliron, 2011)</td>
</tr>
<tr>
<td>A method for...</td>
<td>(Sarasvathy and Venkataraman, 2010)</td>
</tr>
<tr>
<td>...observation &amp; &quot;law&quot; discovery</td>
<td>...&quot;laws&quot; &amp; discovery</td>
</tr>
</tbody>
</table>

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How can entrepreneurship contribute with psychological tools that...

1. ...simplify a complex, multidisciplinary and holistic constructivist learning environment?
2. ...preserve the concrete and individual aspects in a social learning environment?
3. ...inject more content and linearity into an iterative learning process?
4. ...facilitate detached reflection in an emotional and action-oriented learning environment?
5. ...absorb more theoretical knowledge into a practice-based experiential learning environment?

We will now finish this thesis by tentatively putting two of the identified psychological tools to the test on these five questions.

**Proposed psychological tool #1: Value creation**

Value creation addresses question no 1 in that it constitutes a simple yet powerful goal that complex constructivist learning environments can be organized around. It also addresses question no 2 in that it allows for an individually oriented and very concrete outcome of a social learning environment. The domain of entrepreneurship also contains various frameworks for value creation that can be used to give answers to question no 3 above, making the iterative and complex process slightly more manageable by an educational institution and thus perhaps quasi-linear. One example is the Business Model Generation approach proposed by Osterwalder (2004), which has reached global usage and acclaim in a very short time due to its simplification potential. Another similarly widespread example relevant to question no 3 is the “Customer Development Process” proposed by Blank (2005) as a means to control the early product development phase of starting a company. If we assume that success is not a prerequisite for learning, we can assume that failure to create value will yield equal amount of learning, or even more learning. This would then provide some answer to question 4 in that both success and failure will trigger reflection. Regarding question no 5, I propose a starting point of the value creation process to be some knowledge domain or theoretical concept coupled with the question “For whom can this knowledge be valuable / rewarding?”, and from that point initiate a process of value creation. This approach could then provide a balance between theory and practice.

From this analysis we can conclude that value creation as a psychological tool could be quite a constructive means to balance between traditional and progressive education. Some previous research supports this. Surlemont (2007) reports from a research project in Belgium where pupils participated in experiential learning projects where they created value for people outside their class, such as younger pupils, parents, friends, tourists, companies, etc. When initial teacher scepticism had been overcome, many were stunned with the levels of enthusiasm and commitment shown by the pupils. This was mainly due to increased ability to make sense of their own learning, increased self-confidence among learners and a sense of pride due to external exposure.

**Proposed psychological tool #2: Effectuation**

Addressing question no 1 and 3 we can see that the work of Sarasvathy and colleagues over the last decade has provided a framework that has the potential to greatly simplify complex constructivist
learning environments through, and to provide content through effectuation based teaching material and research articles. Question 3 can also be addressed with a call for teachers to focus on “the controllable aspects of an unpredictable future” (Sarasvathy, 2001, p.251), a way to render the iterative process more quasi-linear. Regarding question no 2 we can see that the four basic questions outlined in the effectuation approach - “Who am I?”, “What do I know?”, “Whom do I know?” and “What can I do?” – foster a concrete connection to the individual since they are so immediately focusing on the self. The “expanding cycle of resources” outlined by Sarasvathy and Dew (2005) always starts each iteration with self-oriented questions. If this recipe is followed in designed learning environments it could be said to promote repeated self-reflection, and thus address question no 4, promoting some kind of structured and detached evaluation of oneself. Question no 5 is also answered by one of these questions, i.e. the “What do I know?” question. This specific question could be connected to curriculum content, balancing between theory and practice in a relatively elegant way.

Also effectuation seems to be a powerful psychological tool possible to integrate into formal learning environments with a multitude of benefits related to dualistic problems in entrepreneurial education.

To summarize, a psychological tools approach to development of entrepreneurial competencies in education can be an alternative pathway to advancing the field of entrepreneurial education, both from a theoretical perspective when trying to understand how entrepreneurial competencies are developed, and from a practitioner perspective when trying to implement some of the methods and tools that are believed to lead to desired effects in terms of developing students’ entrepreneurial competencies. The proposed approach can also be of relevance outside the domain of entrepreneurial education, supplying new pedagogical tools anchored in the field of entrepreneurship to explore a “third way” in general education.
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