Rasmus Rahm

EPISTEMOLOGIES OF ENTREPRENEURSHIP EDUCATION

EXPERIMENTS AND OUTCOMES

STOCKHOLM SCHOOL OF ECONOMICS

EPISTEMOLOGIES OF ENTREPRENEURSHIP EDUCATION

Why is it that entrepreneurship education sometimes works and sometimes not? Does epistemology play a role in this process? These are the principal questions addressed in this thesis.

Currently, much research on entrepreneurship education outcomes implies that all entrepreneurship education is the same. In response thereto, this thesis situates at the intersection of entrepreneurship and education philosophy to derive two distinct classes of entrepreneurship education as a function of philosophical vantage points. Following this, a typology for the relationship between what is perceived to constitute entrepreneurship, approaches to epistemology in education, and different entrepreneurship outcomes is developed and operationalized. The typology and a realist perspective are then integrated to translate normative statements regarding variabilities of philosophical realms and human capital investment outcomes into a set of hypotheses.

For the empirical investigations, data were collected from two natural experiments of two higher education entrepreneurship courses. Data were collected on the outcome variables, particularly entrepreneurship behavior, entrepreneurship performance, and business performance, annually for ten years for all graduates. Background data were collected for all individuals up to 18 years prior.

The results show that epistemological design is crucial to the initiation and development of graduates' entrepreneurial processes. More specifically, the findings show that the epistemological design of entrepreneurship education influence whether graduates enter the entrepreneurial process, the speed by which they do so, and, if the firms they create survive, and for how long. Additionally and unexpectedly, this thesis finds empirical arguments in direct contrast to dominant entrepreneurship theory as to why this interaction would occur.

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Rasmus Rahm

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To Carina

Foreword

This volume is the result of a research project carried out at the Department of Entrepreneurship, Innovation and Technology at the Stockholm School of Economics (SSE).

This volume is submitted as a doctoral thesis at SSE. In keeping with the policies of SSE, the author has been entirely free to conduct and present his research in the manner of his choosing as an expression of his own ideas.

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As far back as I can remember, I always wanted to be a detective. To me, uncovering truth and solving crime appeared more fascinating than anything else. That never happened. This is probably for the good of many. Not least myself, as I am—amongst other things—afraid of the dark. Instead, I turned to academic life. To my relief, academia turned out to be filled with both unsolved mysteries and drama as well as enlightenment. Looking back at my academic journey so far, I specifically owe thanks to everyone who has helped me along the way with my dissertation.

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Finally, I wish to thank my family. My son Aldo and my daughter Kira: your barefaced curiosity remains my deepest source of inspiration in life. My dear wife, better half, and best friend, Carina: words cannot express how grateful I am for your loving support and yes-we-can attitude throughout this crazy project.

Älgö, July 25, 2019

Rasmus Rahm

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Introduction

This introductory chapter addresses the preliminaries of the thesis. It describes why entrepreneurship education outcomes are important, discusses how and why our knowledge about the relationship between entrepreneurship education and outcomes is insufficient, and specifically focuses on how the issue of ontology in relation to entrepreneurship in education is of particular importance but unfortunately neglected in previous academic work. The chapter also discusses how an appropriate theoretical framework and novel methodological approach may overcome problems in previous research and advance necessary knowledge to the purpose at hand. Lastly, the chapter describes a general outline of the thesis and provides a preview of coming chapters.

The Importance of Entrepreneurship Outcomes of Entrepreneurship Education

Since the first-ever offering of an entrepreneurship program sometime late in the first half of the 20th century,[1] and pioneering entrepreneurship education pedagogical works by Vesper in the early 70s (Vesper, 1971), scholarly inquiry on entrepreneurship education has expanded dramatically. Moreover, in Sweden alone more than 5,000 university students are involved in entrepreneurship education annually.[2] This number is larger than the number of students enrolling in Swedish doctoral programs in a given year.[3]

Globally, universities have embraced entrepreneurship in a variety of ways, including offering educational courses and/or full programs, supporting student clubs, creating and running incubation and acceleration programs, running and participating in business plan competitions, and handing out scholarships and awards to entrepreneurs among students and alumni. Engagement in entrepreneurship activities and research is also a popular way to attract funding from, for example, foundations, the government, and wealthy alumni. Moreover, a growing number of universities also raise and run funds to invest in student and alumni firms. Although the figure is hard to even estimate, the total sum of money allocated to entrepreneurship education annually is enormous.

The reason why entrepreneurship education is important is trivial. The seminal "Entrepreneurship Education in the Nineties" (McMullan, 1987) states, "In a word—economics. It pays!" (McMullan, 1987, p. 263).

Thirty years later, and given all of the above, one would think scholars have good insights into the relationship between entrepreneurship education and entrepreneurship outcomes. Unfortunately, this is not the case (Nabi, Liñán, Fayolle, Kreuger &, Walmsley, 2017).

Instead, rigorous reviews of academic efforts directed toward entrepreneurship education and entrepreneurship outcomes provide an

[1] I fact, some controversy exists as to when the first entrepreneurship course was in fact created: at Kobe University in Japan, 1938 (McMullan, 1987) or at Harvard University in the U.S., 1947 (Katz, 2003).

[2,3] According to publicly listed statistics at the Swedish Council for Higher Education, https://www.uhr.se/en/start/, accessed 10/11/17.

opaque understanding of their relationship (Rideout & Gray, 2013; Dickson, Solomon, & Weaver, 2008; Fayolle, 2013; Martin, McNally, & Kay, 2013; Thompson, Jones, Evans, & Kwong, 2010). Even inclusive of some recent exemplar academic contributions (Bae, Qian, Miao &, Fiet, 2014; Campos et al., 2017; Elert, Andersson, & Wennberg, 2015; Oosterbeek, van Praag, & Ijsselstein, 2010; Åstebro & Hoos, 2016; Souitaris, Zerbinati, & Al-Laham, 2007), we lack convincing evidence even for the existence of a coherent relationship between entrepreneurship education and entrepreneurship outcomes at all.

Additionally, academic knowledge about the relationship between entrepreneurship education and entrepreneurship outcomes is fragmented, and despite exemplar efforts to consolidate the field (Fayolle & Liñán, 2014; Nabi et al., 2017), no framework is broadly accepted to connect and sense-make individual contributions (Baptista & Naia, 2015; Fayolle & Gailly, 2008; Krueger, 2015; Neergaard, Tanggaard, Krueger, & Robinson, 2012).

In a way, our collective understanding of the relationship between entrepreneurship education and entrepreneurship outcomes is descriptive rather than explanatory as to why entrepreneurship education sometimes "works," and sometimes not.

Epistemology in Entrepreneurship Education Outcome Research

A central premise of this thesis is that variabilities in what is perceived to constitute knowledge, i.e., epistemic ideas, are overlooked in the entrepreneurship education literature. This neglect has previously been recognized but scarcely addressed and, to the best of my knowledge, has never been proposed as an explanation for the inconsistency in empirical findings relating to when entrepreneurship education "works."

This is surprising. Epistemic ideas are closely related to the design of curricula and affect students' conception of knowledge (Perry, 1970), can explain why students experience a given educational experience differently, and help in understanding how students place agency to their learnings. Moreover, epistemic ideas influence the design of pedagogics and the

intended learning of students. Epistemology is also widely debated in the entrepreneurship literature—specifically, regarding how realists and anti-realists represent irreconcilable positions on entrepreneurial opportunities and their formation and what it means to create knowledge about them. Unsurprisingly, whether it is believed that one may or may not attain truthful knowledge about opportunities is a central matter to how entrepreneurship education is designed and subsequently carried out. Epistemic ideas are thus central to both the education and entrepreneurship literature, respectively. But it is either not recognized as such or taken for granted in the context of entrepreneurship education outcomes.

Simply put, the large number of entrepreneurship research projects that have sought to investigate entrepreneurship outcomes of entrepreneurship education have done so whilst neglecting the epistemic divides of the entrepreneurship and education literature, respectively.

Purpose and Research Questions

In light of the above, the overall purpose of this thesis is to explore implications for entrepreneurship outcomes when entrepreneurship education is conducted under varying philosophical realms.

To this end, I will attempt to adequately answer each of the following sub-questions:

1. What constitutes entrepreneurship education under varying philosophical realms?
2. What is an appropriate theoretical framework for the relationship between entrepreneurship education and entrepreneurship outcomes?
3. What is the relationship between varying types of entrepreneurship education on one hand and entrepreneurship outcomes on the other?

Problems in Previous Research and Suggestions as to How They May Be Overcome

Theoretical Problems

Incumbent studies of entrepreneurship education and entrepreneurship outcomes are complicated by a number of theoretical problems.

First, it is widely recognized that studies of entrepreneurship education and entrepreneurship outcomes lack theoretical framing that successfully brings together the fragmented results the academic community has produced (c.f., e.g., Fayolle & Liñán, 2014; Nabi et al., 2017). By and large, the Theory of Planned Behavior (TPB) (Ajzen, 1991) has been used as the "go-to" framework.[4] For reasons discussed specifically below, this has proven an unsuccessful approach, perhaps because TPB is a theory of social psychology that connects beliefs and behavior but that disregards crucial aspects of dominant entrepreneurship theory (the "non-actor") as well as causal links of the entrepreneurial process (agency). Moreover, TPB studies of entrepreneurship education and entrepreneurship outcomes are noted to start anew every time (Liñán & Fayolle, 2015). It is likely that this is the result of a tendency of such research to focus on only one part of the entrepreneurship learning process—the characteristics of individual students themselves, the course instructors, or the courses they take—without consideration as to whether the explanations they offer have any explanatory power for, or even relationship to, other parts of the learning process examined in other academic efforts.

Second, contemporary literature on entrepreneurship education lacks consensus on what constitutes entrepreneurship education (Henry, Hill, & Leitch, 2005a). This is unfortunately not widely recognized in the literature today. Instead, entrepreneurship education is used as a broad label with a noteworthy degree of variance as to what is meant by it in different instances.

[4] TPB posits that attitudes toward behavior, subjective norms, and perceived behavioral control together shape an individual's behavioral intentions and behaviors. TPB is widely occurring in the literature on entrepreneurship, especially that on entrepreneurial entry. See Appendix 1 for a further description of TPB.

The main problem with such an approach is that it inhibits academic efforts to decisively and systematically separate entrepreneurship education from what it is not, i.e., other types of education.

An example of this problem is when business education for non-business students is conceptualized as entrepreneurship education. Disequilibrium of markets is a necessary condition for entrepreneurship (Eckhardt & Shane, 2003), but rarely at best is this a necessary condition for what is taught within business education. That said, many of the topics covered within business education—such as organization, leadership, and management—may be necessary for business owners, but if what constitutes entrepreneurship education varies as a function of the student, there is no notion of distinctness to the entrepreneurship education construct. Therefore, while certain aspects of business education may be useful to teach students entrepreneurship, it is necessarily insufficient for a given set of learning activities to be entrepreneurship education.

In my view, the label of entrepreneurship education includes three main categories of definitions in contemporary literature. The first category focuses on the entrepreneurship construct but does not elaborate much, or at all, on what constitutes education. The second category focuses on the education construct but does not elaborate much, or at all, on what constitutes entrepreneurship. The third category focuses on defining entrepreneurship education as a function of its outcomes. All of these approaches are necessarily incomplete to place a definition inside a framework to explain and predict the relationship between entrepreneurship education and its outcomes. To do so, knowledge about both entrepreneurship and education is needed.

Third, and in consequence to the definitional problems, there is little classificatory discussion pertaining to entrepreneurship education. The dominant classification was developed in the mid-80s (Jamieson, 1984). Residing on varying aims and objectives for education, three positions were developed for enterprise education.[5] Position one conceives enterprise education "narrowly as educating young people to start up their own small business" (Jamieson, 1984, p. 19). Position two describes enterprise

[5] "Enterprise education" is used in varied forms throughout the entrepreneurship education literature. In this instance it is understood to be used interchangeably with "entrepreneurship education."

education as a "curriculum which foster skills, attitudes and values appropriate to starting, owning, managing or working for a successful business enterprise" (Jamieson, 1984, p. 19). The third position is stated as a change in the noun "enterprise" to "enterprising," where "young people should learn skills, knowledge and attitudes to go out and create their own futures" (Jamieson, 1984, p. 19).

In general, the effort is important as it considers both education and enterprise (which may be a factor in its successful longevity[6]). However, the actual premise of the classification is enterprise in the 80s and not entrepreneurship as it is recognized today. Novel development on varying types of entrepreneurship education and their respective relationship to, for example, behavior and performance could guide future academic efforts in understanding the variability in entrepreneurship education outcomes.

Fourth, despite a large volume of entrepreneurship education outcome literature, there is but trivial development of outcome conceptualizations. In the education literature, the dominant model to evaluate education is the "Kirkpatrick" model, named by its inventor. Although the model was initially developed for the evaluation of training practices, it is a widely acknowledged evaluation model of any deliberate, organized, and formal educational activity (Nadler, 1984; Craig, 1996). The model structures the evaluation of education along a continuum of four different "levels," each representing different ideas of outcome upon which researchers can carry out evaluations. The first level refers to the learners' reactions, specifically focusing upon assessing how well the learners liked the learning process. In the context of entrepreneurship education, such evaluation could, for example, take the form of student surveys upon graduation from a business plan course. The second level refers to the students' actual learning, specifically focusing upon assessing what the participants learned in terms of gained knowledge and skills. In the context of entrepreneurship education, such evaluation could, for example, take the form of group and peer assessments of business plan development. The third level refers to behavior and specifically aims to assess what changes in, for example, performance in intended outcomes resulted from the learning process—in other words, the capability of graduates to put

[6] The Jamieson-classification has subsequently been interpreted as education "about," "for," and "in" entrepreneurship. This, however, is *not* the classification as it was developed by Jamieson in 1984.

acquired knowledge into practice. In the context of entrepreneurship education, such evaluation could, for example, be expressed as graduates entering into self-employment or the founding of a new business. The fourth level refers to evaluating the macro results of the learning program, specifically focusing upon assessing the tangible results of the learning process in terms of, for example, reduced cost, improved quality, and/or increased production or efficiency. In the context of entrepreneurship education, such evaluation could, for example, include studies of graduates' firm survival or achievement of an initial public offering (IPO).

Specifically, Kirkpatrick declared regarding higher level evaluations: "...make no mistake about it—it is the missing link between training and results" (Kirkpatrick, 2007, p. 81). This is why research projects struggle to understand and provide conceptual development of the relationship between entrepreneurship education and entrepreneurship outcomes; most impact studies of entrepreneurship education relate to reaction (level 1) and learning (level 2), which are important, too; but it is necessarily conceptually different from entrepreneurship outcomes, which occurs at higher levels.

Taken together, our understanding of the relationship between entrepreneurship education and entrepreneurship outcomes is held back by several gaps in the literature. This section concludes with two main suggestions to address this shortcoming. First, to be able to compare and contrast findings, it is necessary to advance our understanding of what constitutes entrepreneurship education and what sets it apart from other types of education. Second, to unclutter the fragmented and contradictory results currently occupying the literature, the development of novel frameworks that effectively explain and predict outcomes for a given entrepreneurship education activity are needed.

Empirical Problems

Contemporary entrepreneurship education literature strongly encourages empirically driven outcome studies (Elert et al., 2015; Martin et al., 2013; Nabi et al., 2017). However, attempting to understand the transfer of knowledge into entrepreneurship outcomes is an undertaking that requires considerable methodological rigor. Unfortunately, previous scholars have

noted that much research on entrepreneurship education outcomes has experienced challenges in living up to a satisfactory level of rigor in this effort.

First, the literature on methods in entrepreneurship research suggests such broad research questions as that of the relationship between entrepreneurship education and entrepreneurship outcomes to be addressed in a systematic, transparent, and, thus, replicable way (Armitage & Keeble-Allen, 2008; Lourenço & Jones, 2006; Pittaway & Cope, 2007). Outcome studies of entrepreneurship education rarely fulfill this healthy recommendation. They have been noted to start anew every time, and the same or similar phenomena are often dealt with differently, using varying constructs, operationalizations, and methods.

Second, at the heart of empirical problems in the study of entrepreneurship education and entrepreneurship outcomes lies the challenge to infer causality to the relationship. In the 1974 paper *Causation*, Lewis put forward the following definition of causal dependence between events: "an event E causally depends on C if, and only if, (i) if C had occurred, then E would have occurred, and (ii) if C had not occurred, then E would not have occurred" (Lewis, 1974, p. 556). Herein lies the dominant complexity of empirically carrying out research on the relationship between entrepreneurship education and entrepreneurship outcomes—to make it likely that it is, indeed, a given entrepreneurship education activity, and not any other factor, that affects an observed entrepreneurship outcome. From both practical and ethical standpoints, the design of such studies is especially challenging when it comes to the formation of treatment and control groups. Those few scholars that have been successful in creating valid and reliable control groups have done so by sophisticated matching approaches, by post-ante arguing for random allocation by coincidence or by true lottery (Campos et al., 2017; Elert et al., 2015; Fairlie, Karlan, & Zinman, 2014; Åstebro & Hoos, 2016; Souitaris et al., 2007; Oosterbeek et al., 2010, Martin et al., 2013).

Third, the shortcomings of research projects studying the relationship between entrepreneurship education and entrepreneurship outcomes are especially manifested in an overall provision of weak empirical grounds for evidence-based findings. This is manifested in a variety of ways, from an overall lack of simple moderator analyses and correlation tables to a dearth

of sophisticated longitudinal designs inclusive of both pre- and post-measures (Martin et al., 2013) as well as studies over longer periods of time (Nabi et al., 2017). The inclusion of consideration for such empirical contributions would largely improve the rigor of the individual and collective findings.

Taken together, previous research on entrepreneurship education and entrepreneurship outcomes suffers from a number of empirical shortcomings. As a general approach, future research projects should aim to move toward unified research approaches and at the very least find ways to overcome the practical and ethical challenges necessary to investigate causality and present evidence-based findings.

Suggested Solutions and Intended Contributions

The scholarly interest in the relationship between entrepreneurship education and entrepreneurship outcomes is still of recent vintage in the domain of entrepreneurship. Consequently, some of the theoretical and empirical challenges in previous research will, over time, be addressed and thus diminish. Moreover, researching entrepreneurship education's impact is a complex and cumbersome task, where an individual research project can only do so much to address all of the challenges outlined above in one go. That said, there is ample room to make contributions to the outlined challenges, and below I summarize how I intend to do just that.

From a theoretical standpoint, I will draw on both established theories of education and established theories of entrepreneurship to develop my framework. This framework purposely highlights the interdependence between the epistemology of a given entrepreneurship education and its understanding of what constitutes entrepreneurship. Specifically, I will develop a typology of entrepreneurship human capital investment effectiveness (EHCIE) that recognizes the relationship between entrepreneurship education and entrepreneurship outcomes as a function of this multidimensional interdependence. The broader entrepreneurship literature will specifically benefit from the contributions made with regard to the relative relevance of realism and anti-realism opportunities in the

entrepreneurship process. This duality is captured and introduced through the notion of realism and anti-realism entrepreneurship human capital.

From an empirical standpoint, I will strive to achieve a high degree of methodological rigor. To do so I will study two natural experiments of opportunity-based entrepreneurship education. As a consequence of the experimental designs, it is possible to infer causality. Because of the similarity of the courses, it is possible to compare them using the developed typology. As a function of the epistemic differences of the courses, it is also possible to contrast them using the developed typology.

The data collected for this study are unique and registry-based, comprising annual longitudinal data for each experiment. I collect up to 18 years of pre-intervention data for each experiment and 10 years post-intervention data for each experiment.

Moreover, by considering the entire population of which the courses are part, I intend to collect additional data to conduct robustness tests of the experiments to further ascertain the reliability of the empirical results.

Furthermore, in addition to the scant provision of high-rigor empirical examinations of outcomes from entrepreneurship education, there is a general void of empirical studies devoted to higher education. It is important that this gap be filled as what we do know about entrepreneurship education outcomes is not necessarily relevant to higher education. Therefore, I also intend for this thesis to specifically concern higher education.

Taken together, I will propose a theory-driven framework to explain and predict entrepreneurship-related outcomes of varying types of entrepreneurship education whilst overcoming the practical and ethical considerations required to achieve the degree of methodological rigor and reliability necessary.

Key Words, Definitions, and Worldview

The discussion on what is meant by entrepreneurship increasingly harmonizes toward the assertion that entrepreneurship is the process by which new economic activity emerges (Davidsson, 2015). This harmonization is promising as it brings together otherwise disparate yet complementary schools of thought of entrepreneurship (e.g., Davidsson &

Wiklund, 2001; Gartner, 1988; Shane & Venkataraman, 2000; Vesper, 1982; Wiklund et al., 2011) and finds a novel consensus on conceptualizations of what constitutes entrepreneurship. In the present thesis, I recognize this definition. Given this, I also recognize that the nexus of individuals and entrepreneurial opportunities—a situation in which new goods, services, raw materials, and organizing methods can be introduced and sold for more than their cost of production (Casson, 1982)—forms the basis of the entrepreneurial process.

Philosophy of science plays a central role in this thesis. The view that the universe described by science is real, regardless of how it may be interpreted (Dummet, 1963; Leplin, 1984), is referred to as scientific realism. Scientific anti-realism, however, denies the central proposition of realism that reality exists independent of the human mind and that entities hold an objective reality. As the converse of scientific realism, it reasons that the purpose of science is to provide a true description of the *observable* part of reality (Dummet, 1978). As an abstract entity, the entrepreneurial opportunity lies beyond the observational powers of humans, and therefore realists and anti-realists see fundamental differences as to what it means to provide a true description of opportunities.[7] This thesis takes a realist vantage point and thus acknowledges that opportunities exist objectively and not as a function of individuals. This position comes with implications. The three main points are outlined below:

1. First, a realist vantage point implies that mutually exclusive classifications of a realist and an anti-realist view on entrepreneurship and education exist. From an anti-realist perspective, this is not necessarily so.
2. Second, a realist vantage point implies that as an entrepreneur, you cannot exploit anti-realism opportunities because they do not exist. Individuals, however, may take an anti-realism perspective and reason that they do.
3. Third, however, a realist vantage point does not necessarily imply that creation activities in entrepreneurship are unrelated to

[7] Henceforth, I use the terms "entrepreneurial opportunity" and "opportunity" interchangeably.

> entrepreneurship.[8] This is because there are good reasons to assume that creation is related to the nature of *some* varieties of knowledge. This point is specifically discussed in the next chapter.

In this thesis, education is recognized as a process designed to facilitate learning, and, moreover, learning is the acquisition or modification of knowledge. Consequently, I define entrepreneurship education as a process designed to facilitate the acquisition or modification of knowledge about the process by which new economic activity emerges.

Given the above, the academic inquiry of entrepreneurship education outcomes incorporates in its realm explanations for why, when, and how students learn entrepreneurship education; the process of learning in relation to the emergence of new economic activity; the sources of impact and the conditions under which it happens; and why, when, and how some students acquire knowledge to discover, evaluate, and gather resources for and exploit opportunities, but others do not.

In this thesis entrepreneurship outcomes are studied as entrepreneurship behavior, entrepreneurship performance, and business performance. To this end, definitions recognized in established entrepreneurship research are relied upon. Entrepreneurship behavior is studied as "entry" into entrepreneurship. Entry occurs when an individual founds a firm, i.e., a business venture or not-for-profit organization that previously did not exist. I include in this the forming of self-employment, meaning performing work for personal profit rather than for wages paid by others. Firm founding is crucial to entrepreneurship as only firms in existence can perform. I study entrepreneurship performance as accumulated entrepreneurship behavior on the individual level in relation to one or several entrepreneurial processes.[9] Specific interest is directed toward "re-entry," which occurs if an individual repeatedly enters into entrepreneurship, and "entry speed," referring to how quickly individuals initiate agency in relation to the entrepreneurship process. As business performance measures, I study "survival," "survival rate," and

[8] In this thesis, creation activities refer to individual-level activities that strive to form new or modify existing unobservables. In the context of entrepreneurship education those unobservables are commonly knowledge, opportunities or the entrepreneurship process itself. As a function of their purpose, creation activities originate from the anti-realism realm.

[9] This is different from business performance, which relates to performance of the *firm* (c.f. below).

"extreme performance." Firm survival is a crucial aspect of entrepreneurship outcomes as performance cannot happen without survival and because very few entrepreneurial efforts in fact survive (Wennberg, Wiklund, DeTienne, & Cardon, 2010). I study firm survival as the continued existence of a firm. I study survival rate as the number of days a firm has endured continued existence. I define extreme performance as the achievement of an IPO. The study is conducted in Sweden, with data collected from a Swedish program of higher education.

Structure of This Thesis

This first introductory chapter has presented why outcomes of entrepreneurship education are important to study. It specifically describes how and why our knowledge about this remains insufficient, that the issue of philosophy in relation to entrepreneurship education outcomes is neglected in previous academic work but is of particular importance, and how an appropriate choice of research approach and theoretical framework may overcome contemporary problems and advance necessary knowledge.

The second chapter develops a theoretical framework and a set of hypotheses. It is divided into three individual yet complementary parts. In the first part, I turn to the ontological and epistemic debate in the fields of entrepreneurship and education, respectively. By residing at the intersection of entrepreneurship literature and education philosophy, I derive two classes of entrepreneurship education as a function of philosophical vantage points. In the second part, prior conceptual work on the relationship between entrepreneurship education and entrepreneurship outcomes is studied. Specific attention is given to the shortcomings of TPB as a framework to study entrepreneurship outcomes. Following this, human capital theory (HCT) is proposed as a fruitful avenue to explore in order to address and overcome the challenges of TPB whilst also addressing the purpose of this thesis. In the third part, I develop and operationalize a typology for the relationship between what is perceived to constitute entrepreneurship, approaches to epistemology in education, and different entrepreneurship outcomes. By marrying the insights from what constitutes knowledge in varying classes of entrepreneurship education with HCT, this typology offers

a broader perspective on the issue of outcomes of entrepreneurship education than offered in prior research. The developed framework and the realist perspective are integrated to translate the normative statements regarding variabilities of philosophical realms and human capital investment outcomes into a set of hypotheses. These hypotheses specifically concern variation in outcome effectiveness for human capital investment under different philosophic vantage points.

The third chapter concerns the methodological and empirical part of the thesis. First the empirical setting is described; two independent natural experiments of entrepreneurship courses, of different philosophical vantage points—whilst also exhibiting similarities—form the basis of this effort. Following this, the process of data collection and how dependent and independent variables as well as control variables are operationalized is described. In total, 292 individuals are represented in the treatment and control groups, of which the study is able to follow 156. Registry data are collected on background variables for all individuals up to 18 years prior and on outcome variables, especially concerned with entrepreneurship and entrepreneurship performance, annually between 2006 and 2016. Next, the sample is described in depth and a missing data analysis is provided.

The fourth chapter concerns the results of the thesis. The chapter treats entrepreneurship behavior (entry), entrepreneurship performance (entry speed and re-entry), and business performance (survival, survival rate, and extreme performance) as composite outcomes. The analytical strategies are provided continuously throughout this chapter.

In the fifth and concluding chapter, the findings are discussed, especially in light of previous research. The theoretical framework is assessed and further developed, covering an assessment of the usefulness of the developed typology and a modification of the model. Implications for practitioners and policy makers are then provided on the basis of these results. Finally, the limitations of the present study and suggestions for future research are discussed.

Theoretical Framework & Hypotheses

The purpose of this chapter is to propose a framework to explain, predict, and test entrepreneurship outcomes of varying types of entrepreneurship education. To that end I have divided the chapter into four distinct yet complementary parts. In the first part I discuss the concepts of entrepreneurship and education, respectively, in general, and in the context of philosophy of science, specifically. From this I am able to derive two different classes of distinct entrepreneurship education. This is followed by the second part, in which I discuss the benefits and shortcomings of extant frameworks for entrepreneurship education outcomes. In the third part, I propose a typology of entrepreneurship education human capital investment effectiveness. In the fourth and concluding part, normative statements regarding variabilities of philosophical realms and outcomes of education derived from the typology are then translated into hypothetical statements to allow for empirical testing and refinement of the typology.

Entrepreneurship Education: Equal Parts Entrepreneurship and Education

Just as entrepreneurship has been used as shorthand to address topics ranging from venture capital to small business management, so has entrepreneurship education developed into a broad conceptual label including anything from basic negotiation skills to idea generation in content and extra-curricular student-led activities to accredited studies in format. Consequently, the concept of entrepreneurship education has become pluralistic in nature: rather than being a distinct type of structured education to bring about learning something unique and distinct, what appears to constitute conceptualizations of entrepreneurship education is more a function of varying views on what constitutes entrepreneurship and what, if any, components of such a view of entrepreneurship individuals are believed to be able to learn. This is an empirical problem of conceptual consequence that outcome studies of entrepreneurship education need to consider. Against this background, the purpose of this part of the chapter is to discuss variations of knowledge-based entrepreneurship education activities. But what constitutes entrepreneurship knowledge? In my pursuit to answer this question, I discuss ontological and epistemic concerns of entrepreneurship and their influence on the content of education in entrepreneurship. More specifically, I discuss the philosophical attributes of entrepreneurial opportunities in general and in the context of education specifically. In the subsequent section I draw on insights from this discussion and understandings of HCT to develop a typology of outcome effectiveness from entrepreneurship education.

Background

In this thesis, entrepreneurship is understood as the process by which new economic activity emerges (Davidsson, 2015; Wiklund et al., 2011). The entrepreneur has always held a central position in the research agenda of this process, and in the nascence of its inquiry, attention within entrepreneurship scholarship was particularly focused on the differentiating traits of those that

create new organizations vis à vis those that do not (Gartner, 1988). However, to have entrepreneurship, you must first have opportunities.[10] Therefore, researching the individuals alone, but not the attributes of the opportunities they pursue, disregards the varying qualities of opportunities (Shane & Venkataraman, 2000) and their interaction with individuals. Consequently, both opportunities and individuals are central to entrepreneurship, and today there is broad consensus that the nexus of individuals and opportunities forms the basis of the entrepreneurial process.

This, however, is not a trivial setting; ever since their broader introduction into the entrepreneurship literature, scholars have continuously struggled to find common ground for the discussion on opportunities in general and the nature of their formation specifically. At the heart of this struggle lies the metaphysical problem of whether the existence of opportunities is a function of individuals' cognition, or not. Alvarez and Barney (2010) summarized the two principal positions:

> Whether entrepreneurial opportunities are like lost luggage in a train station; existing, just waiting to be claimed by alert individuals who know of their existence, or if the individual decide what opportunity to create and then uses available resources to accomplish this task. (Alvarez & Barney, 2010, p. 26)

Scientific realism is the view that the universe described by science is real, regardless of how it may be interpreted (Dummet, 1963; Leplin, 1984). Scientific anti-realism, however, denies the central proposition of realism that reality exists independent of the human mind and that entities hold an objective reality. As the converse of scientific realism, it reasons that the purpose of science is to provide a true description of the *observable* part of reality (Dummet, 1978). As an abstract entity, the opportunity lies beyond the observational powers of humans, and therefore realists and anti-realists see fundamental differences as to what it means to provide a true description of opportunities.

[10] An opportunity is a situation in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production (Casson, 1982). For other popular definitions, c.f. Davidsson, 2015, p. 679.

Generally, those who are scientific realists assert that scholarship in entrepreneurship can truthfully describe the opportunity. Per se, realists contend that it is possible to make valid claims about opportunities and that knowledge about opportunities is unrestricted by humans' observational powers. Realists thus ascribe the same ontological status to opportunities as they do to the observable entities of the universe.[11] Consequently, from a scholarly realist standpoint, there is a finite number of opportunities, and what we know about them is a description of an underlying reality. The position of opportunities as being formed without the participation of individuals, but that are *discoverable* to them, is a consequence of this view.

Anti-realists, however, take an agnostic stance toward opportunities; rather than considering scholarly work on opportunities as an attempt to describe the underlying nature of reality, anti-realists claim the opportunity to merely be an abstract conveniently designed by and for scholars to predict its behavior in the world of observables. As such, anti-realists do not ascribe the same ontological status to an opportunity as they do to the observables. Per se, they claim that realists make no odds whether what scholarly work says about opportunities is true or not. From a realist standpoint, the view of anti-realists means that we actually cannot attain knowledge about opportunities. The position of opportunities as being *created* by individuals is a consequence of this view.

In sum, and therefore, realists and anti-realists exhibit irreconcilable positions on opportunities, their formation, and what it means to attain knowledge about them. Unsurprisingly, whether one may attain knowledge about opportunities, and what constitutes such knowledge, is of central concern to entrepreneurship education.[12,13]

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[11] That is not to say that realists treat reality synonymously with materiality.

[12] Henceforth, I use the words student, graduate, and learner interchangeably. I also use the words entrepreneurial opportunity and opportunity interchangeably.

[13] I will subsequently use the opportunity construct as the point of departure for contrasting between epistemologies in entrepreneurship. This decision follows 1) the central position the construct holds in the entrepreneurship literature; 2) that the opportunity is an unobservable, which divides realists and anti-realists; and 3) that many advances remain for the opportunity construct and will, in my view, benefit from an epistemological approach.

Opportunity-based Curricula

A curriculum is a system of specialized knowledge (Young, 2014). The design and implementation of a curriculum invariably involve philosophical stances (Uljens, 2006), however explicit or implicit. Moreover, the acquisition of new knowledge requires at least tacit assumptions about what knowledge is and how it is constructed (Carter & Little, 2007). Ontologies, and related educational philosophies, thus influence the curricular emphasis and teaching methods of the entrepreneurship curriculum (Cohen, 1999). They dictate the aim of education, the functions of school, the role of teachers, the role of students, the purpose of teaching and learning, and the nature of interaction between teachers and students (Tan, 2006). However, what specific facts, information, descriptions, and skills are taught is a function of how the entrepreneurial process is understood, for example, how individuals are taught to interact with opportunities and how individuals are taught that opportunities relate to themselves. Consequently, in entrepreneurship education, the relationship between entrepreneurship and what is perceived to constitute knowledge influences how the entrepreneurship process in general, and opportunities specifically, is related to students' own cognition and the social conditions of truth (Gordon, 2009).

Herein, I therefore discuss the variability of how the philosophical vantage points of education are related to what understanding of opportunities that students are taught to interact with in the entrepreneurial process, how to conduct that interaction, and how opportunities relate to themselves as individuals in the process. Unfortunately, however, although the entrepreneurial opportunity construct holds a central position in the entrepreneurship literature, there is yet but sparse progress—both theoretical and empirical—in the literature on the interaction of individuals in relation to opportunities (Davidsson, 2015). In this respect, the literature on entrepreneurship education is no exception and offers but cursory such references. Nevertheless, integrating the discussion on ontological and epistemic concerns of opportunities into philosophy of education makes it possible to derive added insights.

Realist Curricula of Opportunity-based Entrepreneurship

The roots of realism as a broader philosophy, or worldview, can be traced back to Aristotle and his break with Plato. Other central proponents and contributors are Thomas Aquinas, Francis Bacon, Bertrand Russell, and Alfred North Whitehead. Contrary to Plato's idealism, where ideas were the only true reality, Aristotle stated that in order to make sense of and understand an object, then its ultimate form—which does not change—has to be understood. At the heart of a realism approach lies the notion (Hunt, 1991; de Regt, 1984) that "the long-term success of a scientific theory gives reason to believe that something like entities and structure postulated by the theory actually exists" (McMullin, 1984, p. 26).

Thus, an epistemology committed to realism considers an absolute and unchanging truth to exist and moreover states knowledge to be an approximation of this reality. Consequently, realism posits that reality exists independent of the human mind. Entities of a certain type thus hold an objective reality, which invariably is ontologically independent of any human cognition, conceptual scheme, or belief. Therefore, the existence of any entity is also independent of, for example, its name or perceptive agency.

Realists contend that the objective reality is possible for humans to detect using their senses and that what they perceive is real and the true entity of the world. Truth and knowledge thus become a direct relationship between an actual statement and objective reality, for which the accuracy and extensiveness of humans' understanding is always capable of being improved. Moreover, realism emphasizes reason and experience and posits that the approximation of reality that makes up knowledge is best harvested from rational thought and discovery. The scientific method is considered to create knowledge of superior value, for which the ultimate purpose of being put to practice is the survival and success of life.

In an opportunity-based realism entrepreneurship education, entrepreneurial opportunities—i.e., situations in which students and future graduates can introduce and sell new goods, services, raw materials, and organizing methods at greater than their cost of production—are thus treated as objects, or bodies, and exist whether or not the student is aware of them. Using their senses, students can detect the opportunity, and what they perceive is presumed to be real and true. Entrepreneurial opportunities can

exist in the minds of students without being physically present, but ultimately, the opportunity shares properties with all other opportunities; however, one opportunity may be a function of, for example, new goods and another a function of, for example, new organizing methods. Being objects, opportunities are detectable, recognizable, or discoverable by students, albeit not necessarily observable.

In the realism view, it is not necessarily so that all students know about a given opportunity, nor are they all predisposed to exploit it (Venkataraman, 1997). Therefore, if students gain access to this knowledge, then they become different from those that do not have it; consequently, one may talk about such a thing as some students being "entrepreneurs" and therefore also other students as "non-entrepreneurs." As previously noted, much entrepreneurship scholarship has devoted itself to understanding how entrepreneurs are different from non-entrepreneurs; under the realism realm those differences constitute important distinctions and especially with respect to how students may be alert to the possibility to acquire knowledge others do not have (Kirzner, 1973; Shane, 2000). Therefore, realism entrepreneurship education focuses on learners becoming skilled at detecting opportunities and to exploit them using the appropriate decision-making frameworks (Alvarez & Barney, 2010; Casson, 1982; Shane, 2003). These are the opportunities Alvarez, Barney, and Young (2010) explained as "lost luggage in a train station; existing, just waiting to be claimed by alert individuals who know of their existence" (Alvarez et al., 2010, p. 26).

To date, the realist literature has discussed two main types of such opportunities, defined as a function of their assumed formation: weak-premise and strong-premise opportunities (Drucker, 1985; Venkataraman, 1997).[14] Entrepreneurship education taught under the realism realm may teach either of these two types or, as a dominant strand of entrepreneurship literature argues, the two in harmony (Shane, 2003). Both premises hold similarly that there is a base assumption of economies as systems of continuous change; that there is a continuous provision of the respective type

[14] Weak-premise opportunities are also known as "Kirznerian" opportunities and strong-premise as "Schumperterian" opportunities. There is broad consensus on the dual existence of these two types of opportunities (Shane, 2003).

into the economy; and that enterprising individuals may discover, evaluate, and exploit them (Shane, 2003).

Strong-premise opportunities were introduced in the literature by Schumpeter (1934), well before the very first entrepreneurship course (Katz, 2003; McMullan, 1987). Schumpeter argued that in order for such situations as described above to form, individuals require access to new information in order to understand how to combine or recombine resources in novel ways. Such information, in turn, Schumpeter noted, originates from changes in, for example, regulation, technology, politics, macro-economic factors, or social trends. Strong-premise opportunities thus form and exist independently of students' cognition, beliefs, or conceptual schemes. Students or graduates with such information are able to access and recombine resources at lower prices than the value of their subsequent combination. The gap between the cost of acquisition and processing and output price is the profit the student entrepreneur thus can seek.

What we know about weak-premise opportunities originates from the scholarly work and debate spurred by Kirzner (1973, 1985, 1997). From the perspective of philosophy, such scholarly work especially subscribes to the ideas promoted by Hume, Berkeley, and Locke—accordingly, combining the strengths of logic and empiricism, respectively (Rosenberg, 2011). Kirzner thus argued, differently from Schumpeter, that the formation of entrepreneurial opportunities necessitated *varying* degrees of access to existing information across individuals and that individuals' ability to access information varies. Consequently, no new information is required for the emergence of weak-premise opportunities in a given economy. As individuals possess imprecise decision-making frameworks, their behavior creates shortages and surpluses in markets. This in turn creates situations for students to access resources, recombine them, and sell them at a cost greater than their cost of production—the profit the student entrepreneur thus can seek (Nelson & Winter, 1982). As well as for strong-premise opportunities, weak-premise opportunities thus also exist independently from the cognition of learners, their beliefs, or conceptual schemes.[15]

[15] It is interesting to note that some (influential) scholars change their stance on opportunities over time: for example, there are notable differences in the ontological underpinning of the works presented by, e.g., Venkataraman over time (c.f., e.g., Venkataraman [1997] and the co-authored Sarasvathy et al. [2003]).

Following their formation, Shane (2003) outlines several ways that the type of opportunity the individual pursues affects the entrepreneurial process. This is why the type of opportunity that student entrepreneurs discover, and exploit, affects the economic activity that they are taught to experience through their entrepreneurial process. First, strong-premise opportunities in nexus with enterprising learners eventually destroy the equilibrium that a given market approaches, while for weak-premise opportunities it is an equilibrating activity. As a consequence, students' exploitation of strong-premise opportunities acts as a mechanism to disrupt the status quo, whereas for weak-premise opportunities their exploitation acts as a mechanism to bring markets toward a harmonizing equilibrium (Aldrich, 1999). Second, it follows from the dis-equilibrating nature of strong-premise opportunities that they are more rare than weak-premise opportunities. Thus, all else equal, students are less likely to discover them than they are to discover weak-premise opportunities. The dis-equilibrating nature of strong opportunities should also make them more profitable, than should the equilibrating nature of weak opportunities, for students to exploit. Taken together, it is plausible that strong-premise opportunities are more attractive for students to learn how to best exploit them. Third, whereas weak-premise opportunities require students to access information others do not possess, strong-premise opportunities require that students possess the ability to access *new* information. Consequently, strong-premise opportunities distance a student's entrepreneurial process from the status quo. By default, this is a more innovative process; therefore, all else equal, the risks students are exposed to through the exploitation of strong-premise opportunities are larger than those associated with weak-premise opportunities. Lastly, it holds for both weak- and strong-premise opportunities that an entrepreneurship education is unable to provide students with knowledge about whether an opportunity in fact is a "true" entrepreneurial opportunity. This is a result of the definition of opportunity

This is an example of how individuals' philosophic stances may vary over time. Another example of this complexity can be found in Koorsgard et al.'s (2016) discussions about perceived variabilities in Kirzner's view on entrepreneurship. However, beyond broader consequences for the scholarship of entrepreneurship, the focal area in this thesis is not the variation of individual scholars' epistemic views over time. Rather, this thesis is focused on what constitutes entrepreneurship and entrepreneurship education under varying philosophical realms.

holding that any thorough exploitation is necessarily successful, and thus realism education cannot explain unsuccessful outcomes beyond the student. Put differently, any entrepreneurial failure would be reduced to the exploitation behavior of the students, not the varying characteristics of the opportunity they pursue.

In summary, in realist curricula the opportunity exists whether or not the student is aware. The number of opportunities that exist is finite and not for everyone to exploit. Students need to learn to be alert and learn how to best exploit a given opportunity. The opportunity stays constant, and *how* students exploit it defines the success of their performance.

Anti-realist Curricula of Opportunity-based Entrepreneurship

Contrary to realism, anti-realism does not hold reality constant, and there is no absolute and unchanging truth (Gutek, 2014). Reality is regarded as constantly varying as a function of human observation and experience. Only that which is experienced or observed is real, and learnings are best achieved by applying experiences and beliefs to problems as they emerge. Consequently, entities hold a subjective reality, which is ontologically dependent on human cognition, conceptual schemes, and beliefs. Truth, therefore, is not an approximation of a static "what is" reality; rather truth is "what works." Compared to realism, anti-realism is less authoritative and a more liberal education philosophical approach (Tan, 2006); and where the realist view focuses on opportunities as discovered through inductive processes, the anti-realist focuses on opportunities as created through abductive processes (Sarasvathy, Dew, & Velamuri, 2002). However, while the realist literature offers a sparse provision of theoretical and empirical work on the relationship between individuals and opportunities, the anti-realist literature unfortunately does so even more. To date, the entrepreneurship literature has offered two types of such entrepreneurial opportunities, which both fall under epistemologies committed to the anti-realism realm: those that form from social construction (Alvarez & Barney, 2010) and those that form from individual cognition (Dimov, 2011; Sarason, Dean, & Dillard, 2006; Sarason, Dillard, & Dean, 2010). For the purpose of clarity, I will henceforth refer to these as external- and internal-creation opportunities.

External- and internal-creation opportunities both deny the realist dichotomy of opportunity classification but are somewhat different in their view on how opportunities form. In the external-creation view, the student is regarded as someone who participates in social construction with her surroundings to form the opportunity (c.f. Berger & Luckmann, 1966). In contrast to the internal-creation view, where the opportunity is a function of a student's cognition, the opportunity is herein considered a function of students interpreting their surroundings *differently* than do others. This causes individuals to have varying beliefs and information in a given market and in a way informs students that they create their own reality to direct their behaviors (Katz & Gartner, 1988). Thus, external-creation entrepreneurship education would be designed under the assumption that entrepreneurial opportunities depend on asymmetries of information and beliefs in the market. Therefore, an entrepreneurship education under the external-creation view would be reminiscent of the discovery view, specifically the weak premise, while the internal-creation view would fully refute it. However, there are important differences between their views of reality; external-creation opportunity education allows students to attach meaning to raw data and leaves it open for their *subjective* interpretation. Scholarship on weak (and strong)-premise opportunities refutes that.

The dilemma of a realist philosophy that incorporates (social) construction of knowledge has received some attention in the broader philosophy of science debate, in particular with respect to organization science. To that end, some scholars have proposed an evolutionary realist epistemology (Campbell, 1998; McKelvey, 1999). In the entrepreneurship literature, this perspective was cast as a way to explain external-creation opportunities under the realism realm (Alvarez & Barney 2007, 2010; Alvarez et al., 2010), refuting specifically that social construction takes place "only at the margin" (Shane, 2003). However, while acknowledging the evolutionary realist epistemology as an alternative way to understand external-creation opportunities, their existence denies the central proposition of realism that reality exists independent of the human mind, even if the social construction takes place only "at the margin" of the process. More importantly, evolutionary realism treats reality synonymously with materiality, which

realism does not (Ramoglou & Tsang, 2013). Thus, external-creation opportunities belong to the anti-realist realm.

The internal-creation opportunity, however, is completely inseparable from students' cognition throughout the process. The internal-creation opportunity starts out as the student having an idea of the future that over time emerges toward an opportunity (Dimov, 2007; Shackle, 1979). Over the course of time, the opportunity may both change substantially and emerge toward increased objectification (Wood & McKinley, 2010). In this aspect the process students are taught to experience exhibits important similarities to effectual logic, where entrepreneurs' decision-making frameworks are directed by self-fulfilling prophecies rather than, for example, firm survival (Sarasvathy, Dew, Velamuri, & Venkataraman, 2003). However, the placing of effectuation logic in this spectrum of different opportunities should be treated with some caution as the opportunity per se is not part of the original effectuation theory. As the internal-creation view argues that the opportunity cannot be disentangled from the students, such an education model is unable to provide both theory and empirical assessment of opportunities per se, nor is it able to provide students with frameworks to understand the influence of the opportunity upon themselves.

In summary, in an epistemology committed to the anti-realism realm, students cannot discover opportunities; there is no "right" opportunity for them to exploit. Rather, entrepreneurial opportunities are not alike and created by students themselves. Anti-realists consider an infinite number of opportunities to exist, and students need to let exploitation be a function of available resources.

Conclusion

Realist and anti-realist curricula of entrepreneurship exhibit important and conversing differences with respect to how opportunities are understood and how students are taught to relate to them in the entrepreneurial process. This dual variability is reflected in Table 1 below.

Table 1: Summary of juxtaposition of realist and anti-realist education curricula.

	Realism		**Anti-realism**	
Opportunity types available for students	Weak-premise Opportunities	Strong-premise Opportunities	External-creation Opportunities	Internal-creation Opportunities
Opportunity discovery by students	Possible.		Impossible.	
Opportunity creation or modification by students	Impossible.		Possible.	
Number of opportunities for students to exploit	Finite.		Infinite.	
Students' knowledge about opportunities	Students' knowledge about opportunities is scientific.		Students' knowledge about opportunities is not scientific.	
Exploitation is taught as a function of…	The varying qualities of the opportunity the student has discovered.		The students' available resources.	
Success is taught as a function of…	How well students collect information about a given opportunity and how they subsequently do in exploiting it.		Why the student decides to exploit the opportunity.	
Prime task for student	Become skilled at detecting and exploiting opportunities. Decide what opportunity to create and then use available resources to exploit.		Decide what opportunity to create and then use available resources to exploit.	Experience iterative opportunity creation and in tandem use available resources to exploit.
Proponents	Kirzner (1973, 1985, 1997).	Schumpeter (1934).	Alvarez & Barney (2007), Alvarez et al. (2013), Ardichvili, Cardozo, & Ray (2003), Cornelissen & Clarke (2010),	Dimov (2011), Sarason et al. (2006, 2010).

			Wood & McKinley (2010).	
Proponents cont.	Eckhardt & Shane (2003, 2010, 2013), Shane (2000, 2003, 2012), Shane & Venkataraman (2000),			

Summary

In conclusion, the epistemological debate in the entrepreneurship literature warrants entrepreneurship education under different philosophical realms to have varying vantage points in regard to opportunities. This variability influences a plethora of aspects of a given entrepreneurship education activity, especially what students are taught to constitute entrepreneurship in general and its interaction with entrepreneurial opportunities specifically. In particular, two unique classes of entrepreneurship education have been derived.

Theoretical Frameworks for the Impact of Entrepreneurship Education

The purpose of this section of the chapter is to propose a framework that allows the theoretical development and empirical testing of entrepreneurship outcomes of varying kinds of entrepreneurship education. The section takes its point of departure in conclusions following a systematic literature review (SLR) of the literature on the relationship between entrepreneurship education and entrepreneurship outcomes over the past three decades that I conducted (provided in full in Appendix 2).[16] Specifically, the SLR concludes that more than 45% of all published papers chose not to provide one. This should be considered in light of broadly voiced concerns from influential scholars regarding the importance of such frameworks to understanding outcomes of entrepreneurship education (c.f., e.g., Fayolle et al., 2006). This is problematic as it suggests that theories for the relationship between entrepreneurship education and entrepreneurship outcomes is either "taken for granted" or of little interest in the literature.

In the same review, one can also note that among those papers that do present theoretical framing, the intention-based frameworks stand out in volume, and in particular TPB. In principle, every second of all theoretically framed outcome studies employs TPB. Unfortunately, as will necessarily be discussed in detail below, TPB has not proven to provide a sound foundation for systematic progress of entrepreneurship education outcome research.

Moreover, despite some rigorous and enlightening contributions on entrepreneurial intentions (e.g., Bae et al., 2014; Oosterbeek et al., 2010), nearly all outcome studies of entrepreneurship education that are theoretically grounded and in tandem deemed to meet a high level of methodological rigor conceptualize the relationship differently, particularly

[16] This concerns a systematic literature review (SLR) of all peer-reviewed research from 1989 to 2016 on the impact of entrepreneurship education (138 journal articles) I conducted. Please refer to Appendix 2 for the precise protocol and a detailed summary. The SLR is not part of the body text because including it would increase the length of the chapter without adding a corresponding increase in information.

through HCT.[17] This observation shows promise for HCT in advancing our understanding of entrepreneurship education in general and in relation to entrepreneurship outcomes specifically. Yet, taken together, barely a handful of all outcome studies are grounded in HCT.

Against this backdrop, I will discuss why outcomes as intentions in general and as conceptualized through TPB specifically are insufficient to advance necessary knowledge on the relationship between entrepreneurship education and entrepreneurship outcomes. Moreover, I will outline the foundations of HCT and then describe its contributions to entrepreneurship in general and its promise to entrepreneurship education outcome studies specifically. Following this, I will develop an HCT based theory for the effectiveness by which entrepreneurship human capital is likely to form through entrepreneurship education.

Problems with the Theory of Planned Behavior (TPB) as a Theory of Impact

For a theoretical framework to have usefulness, it must explain and predict a set of recognized empirical phenomena. For the relationship between entrepreneurship education and entrepreneurship outcomes, it thus follows that a conceptual framework must explain why it is that the acquisition or modification of entrepreneurship knowledge through education translates into new economic activity and predict phenomena following this reality. TPB falls short in four aspects of this requirement.[18]

First, TPB does not conceptualize outcomes as individual behavior, performance, or firm performance. In the context of entrepreneurship education, the basic hypothesis of TPB is that future entrepreneurial behavior among students and/or graduates is shaped by the education, which impacts their attitudes, subjective norms, perceived behavioral control,

[17] High methodological rigor follows the four suggestions made by Martin et al. (2013). The identified studies are Elert et al., 2015; Martin et al., 2013; Fairlie et al., 2012; Oosterbeek et al., 2010; and Åstebro & Hoos, 2016.

[18] TPB posits that attitude toward behavior, subjective norms, and perceived behavioral control together shape an individual's behavioral intentions and behaviors. TPB is widely occurring in the discourse on entrepreneurship, especially that on entrepreneurial entry. See Appendix 1 for a further description of TPB.

and/or intentions to said behavior. Thus, TPB does not thoroughly address entrepreneurial outcomes understood as actual individual behavior. This suggests that there are problems in terms of *explanandum* for the emergence of new economic activity conceptualized from TPB.

Second, TPB disregards non-individual aspects of entrepreneurship. To entrepreneurship, the individual is key. In this respect, TPB is promising as it is an individual-centric theory. However, researching the individual alone disregards the varying qualities of entrepreneurial opportunities. Consequently, knowledge about the individual, as proposed by TPB, cannot satisfactorily explain entrepreneurial outcomes. Put differently, TPB disregards the varying qualities and traits of the opportunities that students and graduates subsequently interact with. TPB thus falls short in a central task for the study of entrepreneurial processes—i.e., to conceptualize the interaction of opportunity characteristics and the characteristics of students and/or graduates. Thus, the relationship between entrepreneurship education and entrepreneurship outcomes as recognized and conceptualized by dominant entrepreneurship theory follows no logical consequence as to the *explanans* offered by TPB.

Third, entrepreneurship is widely recognized to be studied at different levels, for example, individual, firm, and market. TPB, however, is an individual-level framework only, which inhibits both conceptual and empirical development of entrepreneurship education and outcomes beyond those that arguably may be influenced by beliefs and behavior. Therefore, the relevance of firm-level outcome studies, such as those interested in firm performance and/or growth, is hampered by this shortcoming.

Lastly, and maybe most importantly, despite the numerous and ambitious efforts by many scholars, the literature that models and conceptualizes the relationship between entrepreneurship education and entrepreneurship outcomes by TPB has contributed disappointingly scarcely to our growth in understanding the relationship. While this has been recognized in previous literature, it has primarily been ascribed to the methodological challenges of thoroughly studying entrepreneurship education. As shown above, it also stems from more fundamental challenges relating as well to the explanandum and explanans of TPB in the specific context of entrepreneurship education and outcomes.

In summary, TPB has been used extensively to explain and predict outcomes of entrepreneurship education. Yet, there is a but a scarce body of systematic knowledge that explains and predicts phenomena of entrepreneurship education that have emerged from this scholarship (c.f., e.g., Bae et al., 2014; Oosterbeek et al., 2010). Moreover, the theory has fallen short in explaining why it is that the acquisition or modification of entrepreneurship knowledge through education translates into new economic activities and into predicting phenomena following this reality. After all, outcomes studied as intentions in general and through TPB specifically may not provide a sound foundation for the progress of entrepreneurship education outcome research. There is, however, a growing strand of literature on the relationship between entrepreneurship education and entrepreneurship outcomes grounded in HCT that shows conceptual promise, notwithstanding methodological and empirical soundness to build further upon (c.f., e.g., Elert et al., 2015; Kozlinska, 2016; Martin et al., 2013).

The Promise of Human Capital Theory (HCT) as a Theory of Impact

Foundations of HCT

In 1928, economist Arthur Pigou was likely the first to use the term "human capital." He stated:

> There is such a thing as investment in human capital as well as investment in material capital. So as soon as this is recognised, the distinction between economy in consumption and economy in investment becomes blurred. For, up to a point, consumption is investment in personal productive capacity. (Pigou, 1928, p. 29)

The main constituents of human capital as a cohesive theory, however, were not formulated until some three decades later, in the middle of the 20th century, in large by Schultz (1961), Becker (1964), and Mincer (1974). The original work on human capital focused much on explaining the varying wages of workers by examining the role of education and training in increasing skills and knowledge. Yet, the principal ideas of what was to

become the HCT were conceived much earlier than when Becker and his colleagues popularized them. Prominent economists such as Adam Smith, John Stuart Mill, and Alfred Marshall addressed issues of human capital as early as in the middle of the 18th century (Sweetland, 1996).

Notably, Smith (1776) discussed labor in the context of productivity, akin to, for example, machines, buildings, and land, as yet another resource. He reasoned that improvements in the capabilities of workers would be important to future production; his view on the "aquired and useful abilities" of workers and those abilities as "a capital […] in his person" still make up the fundamental building blocks of contemporary HCT (Nahapiet, 2011).

As HCT rose to fame, its basic ideas were widely criticized, not only from within the community of the then contemporary economists but also in large from sociology, social psychology, and political science (Lewin, 2011). Much of this critique resided upon skepticism toward considering humans as "static" capital, thereby thought to obscure their individuality and humanity. Other controversy by early critics gravitated around the perception that the theory reduced individuals and their ideas, skills, competencies, and knowledge to a form of commodity, which in turn was demeaning to the individuals themselves.

Critics of the theory have also argued that directing attention toward education and training as an "investment" runs the risk of being misleading in that it disregards the personal and cultural origins of why individuals seek to participate in educational activities and why they seek to master certain skillsets. Other social scientists have argued that education and training should be regarded as an activity of consumption, not one of investment (Becker, 1964). Moreover, it has been argued that the theory conceals and simplifies the underpinning mechanisms at work when studying the link between education or training and increase in productivity by oversimplifying it merely as an "investment."

Today, however, HCT has grown to penetrate most fields of economic studies, from macroeconomics to the theory of the firm. In fact, human capital is increasingly promoted as the most important factor of production and as an indispensable engine of economic growth and source of economic wellbeing (Blair, 2011). Across the social sciences and sociology, human capital is widely regarded as an important conceptual tool and used to frame

economic discussions about, for example, facets of economic growth and firm performance, and its recent contributions to management studies also make it a stock of trade within the entrepreneurship literature.

A Specific Type of Investment

Despite its broad application, there is no common agreed upon definition for the concept of human capital. Broadly, the term human capital is used as shorthand to refer to a stock of knowledge, competencies, capabilities, and skills that allows individuals to carry out work that in turn creates economic value. As noted by Clifford and Obaro (2017), Becker declared human capital as: "…the stock of knowledge, habits, social and personality attributes, including creativity, embodied in the ability to perform labor so as to produce economic value" (Clifford & Obaro, 2017, p. 2).

The "assets" of this stock vary across approaches and may refer to varying entities, for example, something that exists within a firm or something within a population. It can also be more loosely defined as something within, for example, a network of relationships. As such, human capital is a multidimensional concept, while its core features of knowledge, competence, and skills tend to be reoccurring in its definitions. In his Nobel Lecture, Becker posits the following[19]:

> The various kinds of behavior included under the rubric of human capital help explain why the concept is so powerful and useful. It also means that the process of investing or disinvesting in human capital often alters the very nature of a person: training may change a life-style from one with perennial unemployment to one with stable and good earnings, or accumulated drinking may destroy a career, health, or even the ability to think straight. (Becker, 1993, p. 1)

Habits and social and personality attributes, including, for example, creativity, are increasingly occurring in definitions and approaches to human capital. Blaug (1976) states:

[19] In 1992, Becker received the Nobel Memorial Prize in Economic Science for his pioneering application of economic analysis to human behavior. And in all of his work, it was that on human capital which was recognized by the Nobel Committee as his most important contribution to economics. Much of his other work—which spanned as diverse areas as discrimination, family, and education—also focused attention on understanding behavior as non-habitual and promoting it as no more irrational but rather a rational response to an estimate of expected costs and returns.

> The hard core of the human capital research program is the idea that people spend on themselves in diverse ways, not for the sake of present enjoyments, but for the sake of pecuniary and non-pecuniary returns. All these phenomena—health, education, job search, information retrieval, migration, and in-service training may be viewed as investment rather than consumption—whether undertaken by individuals on their own behalf or undertaken by society on behalf of its members. (Blaug, 1976, p. 829)

As pointed out, human capital can also be understood at different levels. Much research on human capital focuses on the individual level; however, group-, firm-, and population-level analysis are equally as frequent.

Furthermore, Blaug touches on a fundamental constituent of HCT, namely the idea of investments into human capital. Since the genesis of HCT, the relationship between investments in human capital and rates of return have held a central position. Becker defined an investment of human capital as an activity "that influence[s] future monetary and psychic income by increasing the resources in people." The evidences of the relationship between investments into human capital and future incomes, and the ease of measurability of human capital investments through, for example, education or on-the-job training, played a crucial role in establishing the theory's wide popularity and applicability across fields and disciplines (Nonaka, Toyama, & Peltokorpi, 2011).

More recent work with human capital regards such a "static" view of human capital, however, as somewhat limiting in its disregard of informal education and training, such as on-the-job learning, workers' previous experiences, and the non-identical reality of individuals. In response thereto, much of the applications of human capital have transcended into focusing on the assets part of the equation, positioning learning, knowledge, and skills at the focal point. More specifically, a "dynamic" approach to human capital whereby investments are separated from assets, and in turn separated from outcomes, has been developed. Yet, the academic literature applies the theory of investments into human capital as a framework to understand a plethora of economic phenomena, and not least the link between education, knowledge, and skill acquisition among individuals and outcomes. And across all forms of investments into human capital, it is that of education which has seen the most prominence. The early works within human capital,

especially those of Becker (1964), showed that tertiary schooling raises a person's income—even after adjusting for, for example, family backgrounds and costs of education. Consequently, education is firmly established as the center of gravity for the economic application of HCT and as the most important investment into human capital.

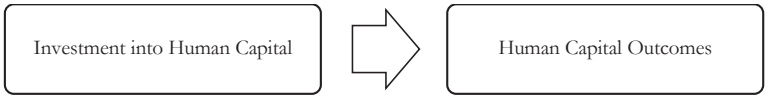

Figure 1: Simple model for the relationship between investment into human capital and outcomes.

Human Capital within the Entrepreneurship Literature

HCT focuses extensively on the concepts of learning and firms, respectively. Consequently, the theory has been extensively referenced by scholars of entrepreneurship, too, and especially in the discussion on entrepreneurial success and performance. Assets of the above-mentioned stock that makes up human capital—such as education, experience, and creativity—have all been traditionally regarded as important drivers of entrepreneurial success and performance. Unsurprisingly, human capital has therefore gained a central position in the literature on entrepreneurship and the entrepreneurial process, too (Davidsson & Honig, 2003). Despite this, while HCT is used in the entrepreneurship education outcomes literature (c.f., e.g., Bae et al., 2014; Martin et al., 2013; Hahn et al., 2017), it remains relatively uncommon.

A principal topic of the human capital literature within entrepreneurship studies is the distinction between general and specific human capital (c.f., e.g., Becker, 1964; Cooper, Gimeno-Gascon, & Woo, 1994). Briefly put, general human capital regards human capital assets that are generally valuable, for example, across several industries. Such human capital is traditionally conceptualized in terms of years of general education or the total labor market experience of individuals or groups of individuals. Specific human capital, in contrast, refers to assets of particular value to a specific industry or workplace, such as running a business, which is of less value

elsewhere. Such specific human capital may be conceptualized as, for example, the level and quality of business management education attained, experience in running a business, or one's upbringing by parents running their own business. Although the idea of general versus specific human capital was presented early on in the original works of Becker, it is a constituent of HCT that still remains in its nascence. Becker first made this distinction for firms alone, i.e., human capital was specific to a certain firm, or not.

Since then, however, specific human capital has come to be treated as more of a multidimensional concept encompassing a spectrum of specifics, such as industries, products, tasks, firms, countries, etc. Some scholars even add a dimension of temporality to human capital assets, making them alternate between being general and specific depending on what is valuable in a specific context at a certain point in time (Sherer, 2011). The dominant view of general human capital, however, still regards it as static and as if education increases the marginal output by exactly the same amount for all products, firms, or industries, etc., whereas investments into specific human capital does not.

Evidently, many investments into human capital are neither fully general nor fully specific but increase marginal productivity differently across a product category, across industries, or within a given firm. For human capital to be defined as specific, it needs to increase marginal output more within the entity of specifics than outside it (Becker, 1964). Consequently, other human capital is defined as general human capital.

The economics literature has a strand of research studying the differential effects of general versus specific human capital (c.f., e.g., Gimeno et al., 1997). Unger, Rauch, Frese, and Rosenbusch (2011) treat general and specific human capital by differentiating between human capital related to a certain task and human capital not related to a task. Specifically, they state that tasks in entrepreneurship that are relevant to all business owners include "…environmental scanning, selecting opportunities, and formulating strategies for exploitation of opportunities, as well as organization, management, and leadership" (Unger et al., 2011, p. 344). Moreover, they conclude that the relationship between human capital and firm success is higher for entrepreneurship-related human capital than for general human

capital. As Becker defines the distinction between general and specific human capital by its outcome, this suggests that entrepreneurship should be considered a type of *specific human capital,* with a higher degree of relatedness to entrepreneurship than to other tasks.

Cooper et al. (1994) also studied general human capital and specific human capital and found both to contribute to the survival as well as the growth of new ventures. Although the study suggests a relatively weak coefficient of determination for the correlation, entrepreneurship performance is concluded to co-vary with specific skills and knowledge with a high degree of entrepreneurship task relatedness with such tasks as negotiation techniques or idea generation (for similar studies c.f. also Kuratko, 2005; Pittaway & Cope, 2007).

Dickson et al. (2008) studied the relationship between general education (general human capital), specific forms of entrepreneurship education (specific human capital), and different entrepreneurship activities. They found strong support for a relationship between levels of general education and a set of entrepreneurship activities. The relationship between general education and individuals' choice to enter into entrepreneurship was, however, somewhat unclear. A positive relationship was specifically established between different types of specific entrepreneurship education, entry into entrepreneurship, and subsequent entrepreneurial success.

Furthermore, Unger et al. (2011) found the relationship with assets to be higher for the outcomes of human capital investments than for human capital investments themselves. The contributions of Unger et al. thus follow the tradition of relative recent vintage within the broader literature on HCT, whereby investments, assets, and outcomes are studied separately and from a less static perspective. A model for investments in entrepreneurship-related human capital, entrepreneurship-related assets, and outcomes following this dynamic perspective can be found below.

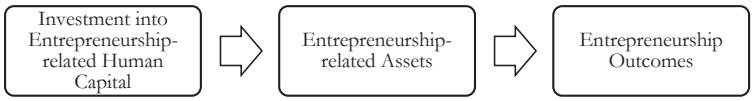

Figure 2: General model for a dynamic relationship between investment into entrepreneurship human capital and outcomes.

Human Capital within the Entrepreneurship Education Literature

Provided the broad application of HCT to studies of education and the contributions of human capital to studies of entrepreneurship, it maintains a surprisingly low profile in the literature on entrepreneurship education. Yet, research on entrepreneurship education in the context of human capital is a promising avenue to further our understanding on the crucial issues regarding, for example, the formation of entrepreneurship-specific human capital (Bae et al., 2014; Elert et al., 2015; Nabi et al., 2017).

Specifically, Martin et al. (2013) followed this approach and concluded that there is a significant relationship between entrepreneurship education and training, and entrepreneurship-related human capital assets and entrepreneurship outcomes, albeit stronger for the former than the latter.

Moreover, Martin et al. (2013) found the relationship between entrepreneurship outcomes to be stronger for investment into academic-focused entrepreneurship human capital than training-focused such. The study thus successfully quantifies the relationship between entrepreneurship education and entrepreneurship-related human capital assets as well as that between entrepreneurship education and entrepreneurship outcomes. In other words, the researchers follow the dynamic approach to human capital in the model above. Moreover, they find strong empirical support for a direct relationship between investments in entrepreneurship education and subsequent entrepreneurship outcomes.

A specific model for investments into entrepreneurship-related human capital through the medium of entrepreneurship education and entrepreneurship-related human capital assets and outcomes can be found below.

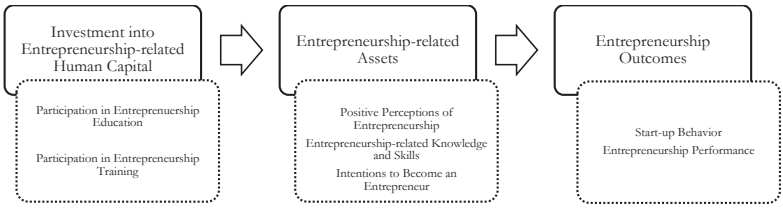

Figure 3: Specific model for a dynamic relationship between investment into entrepreneurship human capital and outcomes, exemplified by findings from Martin et al. (2013).

Despite the promise of HCT to understand the impact of entrepreneurship education, and while the entrepreneurship literature has indeed successfully conducted human capital research across varying levels of analysis—individual level (e.g., Cassar, 2006), group level (e.g., Zarutskie, 2010), and firm level (e.g., Colombo & Grilli, 2005)—the provision of studies linking investments into entrepreneurship-specific human capital through the medium of entrepreneurship education to entrepreneurial behavior, entrepreneurial performance, and business performance still remains scarce across all levels and in relation to epistemic ideas specifically.

Summary

In summary, HCT, in contrast to TPB, is a promising avenue to frame studies of entrepreneurship outcomes in the context of entrepreneurship education—especially as it shows promise to explain why it is that the acquisition or modification of entrepreneurship knowledge through education translates into new economic activities and in predicting

phenomena following this reality. In the broader entrepreneurship literature, a specific kind of entrepreneurship-specific human capital has been concluded to exist, with links to different entrepreneurship outcomes across several levels of analysis, including both individuals and firms. This allows theoretical development and empirical testing of entrepreneurship outcomes of varying kinds of entrepreneurship education.

A Typology of Entrepreneurship Human Capital Investment Effectiveness (EHCIE)

Contemporary entrepreneurship education literature strongly encourages empirically driven outcome studies (Rideout & Gray, 2013; Martin et al., 2013). To that purpose, a handful of scholarly efforts stand out in terms of exemplary methodological rigor (Bae et al., 2014; Elert et al., 2015; Fairlie et al., 2014; Nabi et al., 2017; Åstebro & Hoos, 2016; Souitaris et al., 2007; Oosterbeek et al., 2010, Martin et al., 2013). Taken together, even these studies that live up to meeting a high level of methodological rigor paint an inconclusive picture of the relationship between entrepreneurship education and entrepreneurship outcomes: sometimes it "works," sometimes not. However, seen through the lenses of HCT, this is not surprising; despite occupational choice being a rational response to an estimate of expected cost and returns, it is widely recognized that not all human capital investments lead to outcomes. Moreover, philosophical vantage points influence what is understood to constitute entrepreneurship as well as how a given education activity is designed and carried out. In response to this, the purpose of this section is to relate outcomes from investments in entrepreneurship-specific human capital to the interdependence between the epistemology of a given entrepreneurship education and its understanding of what constitutes entrepreneurship. More specifically, a typology predicting the likelihood by which a given entrepreneurship education activity produces entrepreneurship outcomes will be proposed. To that end, and in light of previous chapters and sections, the assumptions of the typology are discussed, and the unidimensional constructs used to describe the ideal types and their relationships are specified. In the subsequent section, the normative statements regarding the variabilities of philosophical realms and human capital investment outcomes are translated into hypothetical statements to allow for empirical testing and refinement of the typology.

Dimensions of Entrepreneurship Human Capital Outcome Effectiveness

A central premise of this thesis is that not all entrepreneurship human capital investments lead to outcomes. Instead, entrepreneurship human capital investment activities may vary in their effectiveness in bringing about a given entrepreneurship outcome. Henceforth, the degree to which it is likely that a given entrepreneurship education activity will yield entrepreneurship outcomes is referred to as "entrepreneurship human capital investment effectiveness" (EHCIE). However, as outlined in the previous part of this chapter, the design of a given entrepreneurship human capital investment activity is directly related to understandings of what constitute entrepreneurship and education, respectively. Therefore, EHCIE is a multidimensional construct. From the perspective of theory building, EHCIE is thus proposed as a function of several levels of theory that are otherwise not connected. Therefore, bivariate or interaction theories are insufficient to capture the complexity of EHCIE. Instead, a framework of arguments that specifies the concepts and constructs of the ingoing levels of theory and connects their relationships is required. To that end, a typology of EHCIE will be proposed. Importantly, a typology is different from a classification as the latter provides decision rules for the allocation of varieties of entities to mutually exclusive sets of categories (Doty & Glick, 1994), whereas the former represents "theoretical statements developed to predict variance in dependent variables" (Doty & Glick, 1994, p. 243).

In the proposed typology, EHCIE is theorized, on one hand, as a function of the degree to which de facto entrepreneurship-specific human capital, and not any other human capital, is present (henceforth referred to as "entrepreneurship congruity") and, on the other hand, the degree to which the human capital is made transactional (henceforth referred to as "epistemic fit"). For example, if a given entrepreneurship education activity has a strong entrepreneurship congruity and a strong epistemic fit, then it is posited to efficiently produce entrepreneurship outcomes. As a typology, the proposed framework thus explains the EHCIE of a given entrepreneurship education in consequence to its similarity to any one of the ideal types derived from the typology.

Entrepreneurship congruity is important for EHCIE because it stipulates whether actual entrepreneurship-specific human capital is present for a given entrepreneurship education activity. Entrepreneurship congruity thus reflects how related to entrepreneurship the human capital that is made accessible by the investment activity de facto is, which is necessary because entrepreneurship human capital is a genre of specific human capital (Becker, 1964; Cooper et al., 1994, Unger et al., 2011). Specifically, entrepreneurship congruity is a proxy for the degree to which a given entrepreneurship education activity considers the entrepreneurship process and industry conditions, respectively.[20] This thesis recognizes entrepreneurship as the process by which new economic activity emerges. Moreover, individuals and opportunities are recognized to form the basis of this process. Thus, process consideration relates to the extent to which a given entrepreneurship education activity mirrors this understanding of entrepreneurship—i.e., warranting that the human capital in fact is *entrepreneurship* human capital and not any other form of human capital. Industry consideration relates to the extent to which the activity recognizes specific industry conditions. Distinguishing industry conditions is important because they may change over time. Consequently, the marginal human capital return of a given entrepreneurship education may change over time. Thus, this is an example of the temporality of human capital (Sherer, 2011). Epistemic fit is important for EHCIE because it influences the degree to which the present human capital is made transactional. For specific human capital to be made transactional, the perception of knowledge of a given educational activity needs to mirror the perception of knowledge for the relevant specificity (De Long & Fahey, 2000; McCann & Buckner, 2004), such as entrepreneurship. Epistemic fit is thus a proxy for how well the philosophical vantage points toward entrepreneurship and education, respectively, of a given investment activity synchronize. High epistemic fit means harmony in the philosophical vantage point toward entrepreneurship and to education, respectively, notwithstanding an explicitly formulated approach to entrepreneurship.

Both entrepreneurship congruity and epistemic fit are thus important influencers of the entrepreneurship-specific human capital investment

[20] As such, entrepreneurship congruity is a modern extension of human capital task relatedness in entrepreneurship, but which recognizes entrepreneurship beyond running and owning a business.

effectiveness of a given entrepreneurship education. For all ideal types, the reciprocal interdependence between the entrepreneurial congruity and epistemic fit of an entrepreneurship education activity underlies the respective relationships to entrepreneurship outcomes. The crucial interaction is between entrepreneurship process relatedness and epistemic vantage point as both are input and constraint to each other. In this thesis, entrepreneurship outcomes are studied as entrepreneurship behavior, entrepreneurship performance, and business performance, which subsequently will be regarded as multiple outcomes because entrepreneurship congruity and epistemic fit relate to them all. This variability is captured in Figure 4. For empirical deviation analyses of the matrix, it should be assumed that the relative importance of the first-order constructs are equal. Moreover, the same holds for the second-order constructs that make up entrepreneurship congruity, too, although the recognition of the individual-opportunity nexus of entrepreneurship is a threshold characteristic of high entrepreneurship congruity (henceforth referred to as opportunity-based entrepreneurship education).

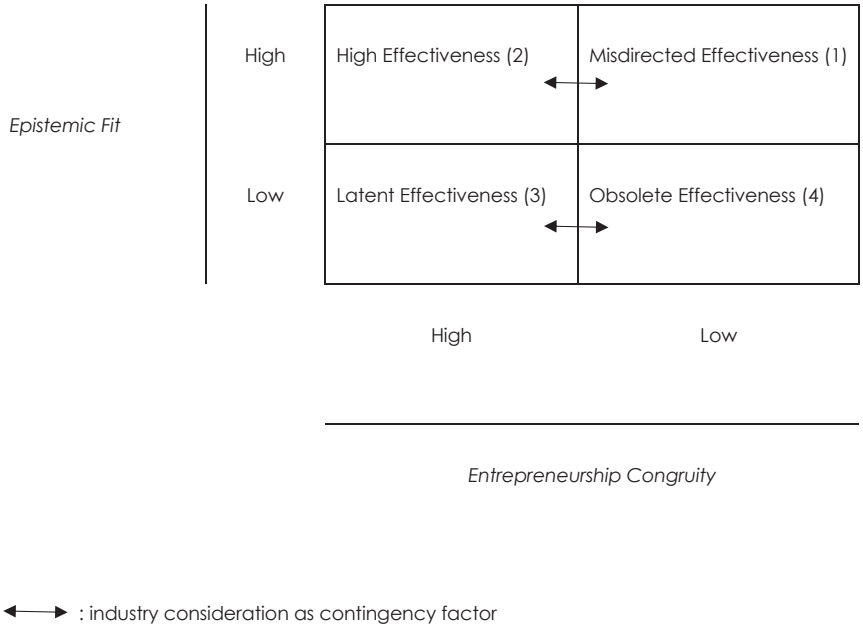

Figure 4: The EHCIE matrix.

Moreover, industries change over time. Therefore, external forces, such as industry shocks, apply pressure on a given investment activity in entrepreneurship human capital to, over time, change in entrepreneurship congruity. Over time, this change may either increase or decrease entrepreneurship congruity depending on how the entrepreneurship education activity originally considered the industry and its specific conditions. In other words, over time, the industry consideration of a given entrepreneurship education makes it volatile to changes in entrepreneurship congruity. This contingency factor is captured by the arrow in the typology. As an exception, industry agnostic entrepreneurship education should maintain its congruity over time.

Four Ideal Types of Entrepreneurship Education

Taken together, the four different ideal types of the EHCIE matrix represent four conditions under which entrepreneurship-specific human capital investment activities are engineered under the auspices of entrepreneurship education. As ideal types they are rare, if not impossible, to find in practice; thus, it is the deviation from the respective ideal type that is posited to predict variability in EHCIE.

Type I: Misdirected Effectiveness

The Type I profile is a combination of a harmonizing view on knowledge in entrepreneurship and education but where it necessarily exhibits a low congruity to entrepreneurship. Entrepreneurship education Type I is thus an activity that makes human capital transactional, but which fails to produce EHCIE due to its low congruity to entrepreneurship. The outcome effectiveness is misdirected because it offers a high degree of access to human capital but to human capital that is not entrepreneurship-specific. Over time, industry conditions may change, which either decreases entrepreneurship congruity even more or increases the congruity to entrepreneurship. In fact, this means that misdirected effectiveness may transition into true effectiveness. The latter necessitates the threshold criterion of opportunity-based entrepreneurship to be recognized. Any impact from Type I entrepreneurship education would arise from chance.

Type II: High Effectiveness

Entrepreneurship education Type II is an activity that makes entrepreneurship-related human capital both accessible and transactional. It is outcome-effective because it has a high degree of congruity to entrepreneurship and thereby meets the threshold criterion with a high epistemic fit, which, in combination, offers a high degree of access to entrepreneurship-specific human capital. Over time, external forces may move it toward an entrepreneurship education of misdirected effectiveness, even for opportunity-based entrepreneurship education. Moreover, an extreme type of high effectiveness exists, which is "hyper effectiveness." Hyper-effective entrepreneurship education is resilient to changing industry

conditions because it is industry agnostic, which makes its entrepreneurship congruity a function uniquely of being extremely process considerate.

Type III: Latent Effectiveness

The Type III profile is a combination of high entrepreneurship congruity but with conflicting views of philosophy toward education. Entrepreneurship education Type III is an activity that thus makes entrepreneurship-related human capital accessible but, despite this, fails to produce effectiveness due to its low epistemic fit. However, by virtue of changing the epistemic fit, the effectiveness would transition toward becoming effective. Over time, external forces may either enforce the latency or move it toward an entrepreneurship education of obsolete effectiveness, even if the basis of individual and opportunities in its relation to entrepreneurship remains recognized. Any impact from Type III entrepreneurship education would arise from chance.

Type IV: Obsolete Effectiveness

Type IV entrepreneurship education is an activity that makes human capital neither transactional nor entrepreneurship-specific. This is because the entrepreneurship congruity is low and because the epistemic fit is low. Over time, external forces may either enforce the obsolete effectiveness position or shift it toward a low effectiveness, provided it recognizes the basis of the individual and opportunities in its relation to entrepreneurship. Any impact from Type IV entrepreneurship education would thus arise from chance.

Two Variations of Each Ideal Type

The purpose of this thesis is to explore implications for entrepreneurship outcomes when entrepreneurship education is conducted under varying philosophical realms. Moreover, the outcome effectiveness typology describes four conditions under which entrepreneurship-specific human capital investment activities are carried out as entrepreneurship education. The previous section described in detail the two vantage points toward opportunities that, while being mutually exclusive, represent different ways to relate to entrepreneurship, albeit not necessarily in a consequent variability

in strength. Type II is the only entrepreneurship education conjectured to produce outcomes, and thus specific attention henceforth will be directed thereto.

Realism and anti-realism represent irreconcilable positions on the metaphysical status of unobservables. Particularly, realists contend that knowledge about unobservable entities is unrestricted by humans' observational powers and that what we know about them is a description of an underlying reality. Yet, without negating their own epistemological doctrines, realism and anti-realism may overlap in what they consider to be necessary activities of the entrepreneurship process.

Some of this overlap is irregular and isolated to a specific instance of education; for example, realists may argue that education efforts inclusive of effectuation logic (inadvertently) train individuals in discovering opportunities where others would see risk. This is an overlap without any broader epistemic consequence. The creation of knowledge (which is also an unobservable) in the entrepreneurship decision-making process, however, is an instance that demonstrates overlaps beyond "happy coincidences" and with consequences of wider epistemic range. In general, creationary activities (i.e. individual-level activities that strive to form new or modify existing unobservables) are assigned central significance in close to all aspects of the entrepreneurship process as regarded from the perspective of anti-realism. Conversely, the contemporary realism literature deemphasizes creationary activities, at most explicitly ascribing them peripheral importance and to occur "only at the margin" (Shane, 2003). Under realism, the individual remains a discoverer and exploiter of opportunities. Implicitly, however, this is not always so; under some rare conditions, realism concurs that entrepreneurs make non-optimizing decisions through formations of new means-end relationships (e.g., Casson, 1982; Sarasvathy, 2001). Generally, this is a position on the status of reality in which the formation of an unobservable materializes as a function of the individual and her actions (creation activities)—i.e., anti-realism. More specifically, those rare conditions may come about when opportunity discovery is conducted by way of recombining resources. In other words, discovery may involve the formation of means-end relationships that *previously did not exist*. Therefore, certain methods of opportunity discovery—even those recognized under the

"nexus theory"—are necessarily related to activities of creation, and specifically on behalf of the individual's agency.[21] The mainstream realism entrepreneurship literature is still at odds with *why* this is, but nevertheless, consequently and therefore, realism may overlap with anti-realism in what is considered to be necessary activities of the entrepreneurship process, however rare that may be. This is important because it follows that Type II entrepreneurship education conducted from both perspectives of realism and anti-realism may be related to entrepreneurship.

Thus, if varying instances of human capital investment activities relate *differently* to the relationship between knowledge and entrepreneurship, they are not necessarily negated the possibility to relate *equally* to entrepreneurship. In the EHCIE typology, this is reflected in the entrepreneurship congruity assumption, which stipulates that human capital investment activities relating *differently* to entrepreneurship may still have *equal* relevance to the entrepreneurship process, either purposely or inadvertently. This is an important assumption as it dictates the principles that govern the relationship between investments in entrepreneurship education and entrepreneurship outcomes for varying bodies of entrepreneurship knowledge. Moreover, it makes two variations of each ideal type possible—a variant based in realism and a second variant based in anti-realism.

The epistemic fit criterion of Type II entrepreneurship education dictates a realist vantage point toward opportunities as only compatible with a realist perspective toward education and, respectively, an anti-realist vantage point toward opportunities as only compatible with an anti-realist perspective toward education. To understand the consequences of this variability, I will next juxtapose an ideal type of realist education and an anti-realist education and discuss implications for entrepreneurship education in this context.[22]

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[21] This progressive epistemological contradiction is an important complexity of the otherwise conservative realism-committed nexus view. In my view it presents a central overlap of realism- and anti-realism-committed epistemologies of the entrepreneurship literature. This contraction of the original nexus view "hides in plain sight" but has still received only marginal scholarly attention in the literature.

[22] What might broadly be regarded as philosophical reflections about education have never been seen as constituting a distinct discipline or branch of philosophy (Ben-Peretz, Brown & Moon 2004). This makes the outlining of varying philosophies of entrepreneurship education challenging. However, broadly put, educational philosophies refer to complete bodies of thought that present a worldview of which education is a part (Ornstein & Levine, 2003). In this section I therefore rely on philosophical reflections on education

An Ideal Type II Realism Education in Entrepreneurship

Realism in Education

In a general sense, an education philosophy subscribing to realism has the inherent belief regarding itself to act as an institution through which individuals can be constructed and developed to both their own and society's benefit (Brown, 2016). Realism considers theory more valuable than practice and, in addition to the scientific method, emphasizes logic and critical thinking (Brown, 2016). With the purpose to be of value to individuals and society, respectively, realism emphasizes the importance of instilling individuals with a sort of societal consciousness through which they subsequently put their learnings into practice for the betterment of society as well as passing it on to a new generation of learners. In this, realism specifically stresses the teaching, training, and learning of skills and, over time, individuals' specialization thereof in particular (Ornstein & Levine, 2003). Consequently, while highlighting the value of professionalism, such aspects of individuals as feelings or emotions rarely receive much attention in education under the realist model (Ozmon & Craver, 2003).

The relationship between learners and their educational ability guides much of the educational journey of individuals under realism (Ornstein & Levine, 2003). Specifically, realism aligns learners along a spectrum of educational ability, and in the carry-out and design of education, large emphasis is placed on their cognitive development along this continuum. As learners are considered to be of varying degrees of educational abilities, they should experience the depth and complexity of skills schooling as a function thereof. Over time, they should specialize accordingly and, as learners, experience the educational range—those with higher ability should continue specialized schooling, whereas those of lesser ability should be directed toward vocational training. Yet, the educational approach also makes a claim to develop individuals in physical, mental, and moral aspects, in particular preparing them for a knowledge-based economy (Cushner, 1992).

As a consequence of the relationship between learners and their educational ability, realism is dependent on the possibility to quantify abilities

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that have been intertwined and made part of broader discussions on, for example, epistemology, ethics, and politics.

and that they be measurable. Realists believe that the assessment of learners should be continuously executed to understand their ability and to monitor the development of learners (Ozmon & Craver, 2003). Assessment is designed for students to demonstrate skills and recite facts, both in absolute terms and relative to other learners, with narrowly defined standards of excellence. In other words, the idea of assessment as a yardstick of ability, and the notion of standardized assessment, holds a principal position in any realism education.

In the realist model, the student is thus necessarily expected to take a subservient role to the curriculum. The teacher, however, is an expert and someone who masters the subject matter and curriculum. The teacher does not focus on what the student wants to learn but what the learner needs to learn (Tan, 2006). The teacher is someone who is pedagogically skillful, presenting materials both structured and organized. The teacher is also able to understand the ability and development of the learner, especially using standardized testing and assessment. The curricula that teachers and learners follow are designed to be divided into specialized and theoretical subjects.

Type II Realism Entrepreneurship Education

Translated to the context of entrepreneurship, the ideal type Type II realism education aims to prepare the learners so that they are able to successfully solve the problems of the entrepreneurial process as they are subsequently experienced. The central notion of such an education is that individuals can be constructed as entrepreneurs through the acquisition of new, or the modification of existing, knowledge in entrepreneurship. Within academia, entrepreneurship education develops the individual per se and instils her with a sense of entrepreneurial service to society. As far as possible, a complete body of knowledge of entrepreneurship should be given by teachers. Thereby the learner understands the nature of entrepreneurship, and entrepreneurial motivations and needs, and is best suited to succeed in a knowledge-based entrepreneurial life. In this, entrepreneurship education also has a responsibility to diffuse the cultural and historical heritage of entrepreneurship to learners.

An entrepreneurship curriculum under the realism realm is centered on the subject matter of entrepreneurship and entrepreneurship skills and

designed to incrementally teach the skills of entrepreneurship, with a progressive specialization thereof according to the ability of individual learners. The curriculum is designed for entrepreneurship to be learned in the context of logic and critical thinking in a systematic and coherent way, with a focus on given facts of entrepreneurship to be learned. In general, realism advocates education to pass on and train learners in the perennial ideas and knowledge that is universal and lasting; consequently, while not immune to change, the realist entrepreneurship curriculum changes slowly and rarely.

Under the realism realm, the ideal entrepreneurship teacher is someone educated beyond entrepreneurship—preferably also in entrepreneurship, although the youth of entrepreneurship as a discipline itself limits this possibility. The teacher is in general knowledgeable, in entrepreneurship specifically, and an exemplar of intellectual pursuit in entrepreneurship and the moral character of entrepreneurs. The ideal Type II realist teacher is also well read in the classic works of entrepreneurship and able to teach the texts by highlighting enduring themes of entrepreneurship and its scholarly debate. Skillful teachers are able to draw out and systematically present truths of entrepreneurship that are timeless and will endure. Moreover, teachers of entrepreneurship in a realism realm are able to passionately share the ideas of scholarly work in entrepreneurship, and other fields, that are issues of concern to students' future lives as entrepreneurs.

Within higher realism education, entrepreneurship is a specialized form of education, where students are necessarily broadly educated. In the context of entrepreneurship, the use of Western civilization's great books and other classic pieces of art, literature, and music form a pedagogical basis for the essence of future entrepreneurs' search for what is true, good, and beautiful. Learners' ability and development within entrepreneurship is necessarily quantified and measured through the teacher's use of standardized assessment.

Realism curricula thus focus on training students in skills and tasks such as environmental scanning, alertness to opportunities, selecting opportunities, and formulating strategies for the exploitation of opportunities as well as organization, management, and leadership. An

atypical skill and task for a realist entrepreneurship education is opportunity creation.

In summary, the purpose of realist Type II entrepreneurship education is to construct more and better entrepreneurs. It takes its point of departure in entrepreneurship and what the student needs to know. Students are subservient to the curriculum, teachers are experts, and learning materials are authority. Ability defines what a student can learn, and theories, facts, and perennial ideas of entrepreneurship are more important than the entrepreneurial experience of students. The realist Type II curriculum is rigid.

An Ideal Type II Anti-realism Education in Entrepreneurship

Anti-realism in Education

Within education philosophy, there are several variations of anti-realism. Henceforth, I specifically draw on the dominant type of anti-realism—pragmatism, which is commonly treated as synonymous to instrumentalism and experimentalism. In contrast to other anti-realistic vantage points toward education, it is less specific concerning issues relating to one's existence (c.f., e.g., existentialism) and more of a complete body of thought than a perspective or viewpoint (c.f., e.g., postmodernism) (Ornstein & Levine, 2003; Tan, 2006). Yet, being anti-realistic vantage points, they share attributes of and differences to realism, and in terms of entrepreneurship education, as I will discuss below, anti-realism stands in stark contrast to realism.

The origin of anti-realism as pragmatism is ascribed to the works of Peirce in the 1870s. Peirce—an interdisciplinarian, trained in philosophy, chemistry, and mathematics—considered that thought should lead to action rather than remain passively in the mind and lead to indecisiveness. The main proposition of Peirce's work is the so-called "pragmatic maxim," which he first described as follows: "Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object" (Peirce, 1878, p. 293).

The epicenter of the pragmatic maxim is the notion that the purpose of thought is to create experimental mental reflection and through action arrive at new realities in terms of plausible confirmatory and dis-confirmatory

circumstances.[23] As a method, it embraces the generation of explanatory hypotheses and encourages the usage and improvement of verification. Therefore, under anti-realism knowledge originates from humans' interaction with reality, rendering it indirect and instead a direct function of humans' cognition, beliefs, or mental schemes.

Peirce's work was largely further developed by William James and John Dewey. James argued that contradictory and competitive understandings of reality can only be tested from the vantage point of the actual difference it makes to our approach to what it concerns (James, 1907). Truth, he argued, is the level of preciseness and degree to which a statement fits theory and practice as well as what new possibilities the statement makes possible. Consequently, anti-realism, contrary to realism, does not consider truth and knowledge as a direct relationship between a statement and an objective reality but as something that is a result of an ongoing process of inquiry, led by scientific studies, analysis, and actual experience. Dewey labeled this alternative view of truth and reality as "warranted assertability" (Dewey, 1916a). Today, warranted assertability is a widely accepted central proposition of pragmatism. Moreover, Dewey is accredited for the ideas underpinning the concept of "learning by doing," where learning is accelerated and enriched by elements of skills training and practical application of the subject matter. As put by Dewey: "Learn to do by knowing and to know by doing" (Dewey, 1916b, p. 711).

In pragmatism, neither values nor knowledge claims withstand time (Dewey, 1916b). Under a pragmatic realm, therefore, learning is best performed in relation to an individual's own experiences and reflections on problems as they arise—in other words, not from studying the learnings of others and their existing knowledge. Contrary to realism, where the ideas and themes that persist over time in a society receive particular attention, pragmatism dismisses the search for such enduring ideas of tradition and cultural heritage and instead considers knowledge as means to an end for individuals to reach their own desired outcomes, however short- or long termed.

[23] In later work by Peirce, he asserts pragmatism as a method of reflection with the purpose to make ideas clear (Peirce, 1902).

In a general sense, an education philosophy subscribing to the pragmatism model sees the aim of education to support students in their growth as individuals, thereby generating a new social order (Dewey, 1916b). On this journey to personal growth, it is the student's relationship to the ever-changing reality that is the focal point. By encouraging students to explore new and personally meaningful ways to relate to reality, education can help guide students on the course of their current and future life (Gutek, 2004). Consequently, little credit is given to the idea of education as a cast for society to construct individuals according to its own needs.

Anti-realism education is consequently different from realist education in a number of important ways. In the pursuit to specialize individuals in certain skills, realism education rarely explores such aspects of individuals as their feelings or emotions. In an anti-realistic educational model, however, the social aspects of education are underscored. In parallel, the academic aspects of education in general are less dominant. Moreover, anti-realists believe that the best way students can prepare for their futures is by applying their view of reality and their own knowledge to actual situations through *experimental* inquiry. Consequently, rather than the structured and standardized presentation of facts, teaching methods focus on engaging the students in hands-on problem solving, actual experimentation, and project work. In classrooms, different cultural and ethnic groups are actively mixed to create networks of social relationships. Thereby individuals are especially encouraged to collaboratively form realities and to work cooperatively. Specifically, the higher education curriculum of anti-realism frequently brings different disciplines together to focus on solving actual problems in an interdisciplinary way. More than interdisciplinary, and rather than being divided into specialized and theoretical studies, anti-realist curricula are to be integrated across subject matters and in tandem carried out in an action-oriented manner.

An anti-realism epistemology reasons that, rather than relying on knowledge from tradition and cultural heritage, students should experience and solve problems themselves and instead learn to create their own realities, values, and knowledge (Dewey, 1916a). Thus, pragmatism downplays, and in part refutes, the notion of individuals' educational suitability and wherewithal and the role of assessment to function as a yardstick to quantify and measure

the development and ability of students. Instead, an education should primarily be designed to prepare students for a democratic society. A particular emphasis of a student's personal growth is therefore placed on the experience of making decisions in groups, where others' experienced consequences of the decision are especially stressed. To that end, education under a pragmatic model considers itself less of an academic institution and more of a social one, which is able to provide individuals with the necessary conditions for learnings dependent on the context of place, time, and circumstances.

Education under the pragmatic realm is student- and experience-centric, and therefore the teacher is less of a typical expert on the subject matter than under the realist model; instead, the individual experiences of students form an integral part of the curriculum expertise. Rather than passing down organized bodies of knowledge to new learners, the ideal teacher is skillful at empowering the student in fulfilling the personal vision of that individual. As an educator, the teacher's approach to students' learning is not restricted to a given set of materials that are presented and assessed in a standardized manner. Rather, the ideal educator is someone who functions as a facilitator of learnings and iterates the curricular design in response to the educational needs of the individual students and their educational wishes. Whereas in realism educational materials are ascribed a central role and by default considered the authority, they are not under anti-realism. Instead, teaching materials are a form of tool that may or may not facilitate the learning process of students. A specific challenge for educators, therefore, is to balance the individual learning with the exploration of a topic at depth. The teacher is therefore required to be able to empathize with students in order to initiate and extend fruitful discussions, to introduce and explore topics of interest to students, to encourage collaboration, to mitigate conflicts in group work, and to assist students in putting their own knowledge to practice in real situations. The ideal teacher is someone who masters providing students with experiences through which they can learn by doing, who stresses collaboration over competition, and who can holistically develop individuals in equal parts emotionally, intellectually, and socially.

Type II Anti-realism Entrepreneurship Education

Under an anti-realist approach, Type II entrepreneurship education should prepare students to actively participate with their entrepreneurship in democratic societies. Students should be taught to relate to entrepreneurship in a variety of perspectives—in their careers, in their role as citizens, and in their own daily living. Anti-realist entrepreneurship education specifically makes the claim to support individuals in their internal growth as entrepreneurs. As far as possible, entrepreneurship teachers should work to design and nurture an open environment for learning entrepreneurship in which students' individual entrepreneurial ambitions emerge and come to fruition through collaboration. By encouraging students to explore new and personally meaningful ways to relate to entrepreneurship, entrepreneurship education can help guide students on the course of their current and future lives.

Anti-realist Type II entrepreneurship curricula are rarely fixed; instead, they are flexible for teachers to adopt the content and format according to the entrepreneurial needs and problems of individuals. Such a curriculum takes it point of departure in the students and their individual entrepreneurship rather than in entrepreneurship itself or the teacher's mastery of certain entrepreneurial skills. Theories of entrepreneurship falling under the anti-realist realm—for example, effectuation and bricolage—should inform how teachers curate the tailored educational routes of students, but not dictate it.[24] The curriculum stresses that students partake in experimentation with entrepreneurship and actively test, develop, and challenge their own entrepreneurial ideas. Students' learnings of entrepreneurship are then reaped from those questions that arise from experimentation activities.

To make meaning of entrepreneurship and to construct their own knowledge of entrepreneurship, students are actively encouraged to solve problems of entrepreneurship and to think about various aspects of their entrepreneurship experiences. There are no universal facts about

[24] Both effectuation and bricolage are social construction theories of entrepreneurship, but neither the duality of effectuation-causation nor bricolage takes it point of departure in the opportunity construct (Sarasvathy, 2001; Fisher, 2012; Davidsson, 2015; Levi-Strauss, 1966; Baker & Nelson, 2005) or the discussion on philosophy of science.

entrepreneurship to be taught, and students' knowledge about entrepreneurship does not necessarily benefit from being informed about previous generations' experiences. Students are entering a society where the environment is constantly changing, and entrepreneurship education may teach necessary abilities to interact with the surroundings of one's entrepreneurship. Therefore, in terms of teaching skills and attitudes relevant to entrepreneurship, that aspect of the curriculum is present but not dominant. However, entrepreneurship-related problems are treated to be of a multidimensional nature, and solving them is especially crucial to prepare students for future market participation. Therefore, it is imperative that higher education entrepreneurship curricula encourage interdisciplinarity.

Entrepreneurship educators in an anti-realist Type II setting are empathic and skillful at nurturing students who are concerned with personal and global problems, ready to change society. They are able to facilitate dialogue about entrepreneurship and are masters of a broad range of learning activities relevant to entrepreneurship, including problem solving, field trips, creative expressions, and projects to get students to work on activities based on their shared entrepreneurial experience (Ornstein & Levine, 2003). Such educators rarely encourage students to compete in entrepreneurship—for example, idea pitching competitions or business plan competitions—and instead encourage entrepreneurship and the sharing of ideas through active collaboration across disciplines, cultures, and ages.

Anti-realism Type II curricula thus focus on training students in skills and tasks such as idea generation, effectuation, design thinking, creativity, trendspotting, future thinking, and self-leadership. Atypical of an anti-realist entrepreneurship curriculum would be traditional business planning, whereas contingency-based business planning (Honig, 2004) would not.

In sum, anti-realist Type II entrepreneurship education takes its point of departure in the experience of students. Its purpose is to support students in their internal growth as entrepreneurs and prepare them for an ever-changing future. Students are treated as authorities on their own needs, teachers are curators of learning by doing, and the form of teaching is a function of necessity. Collaboration and interdisciplinarity are essential features, and the assessment of ability and performance is given little attention. The anti-realist Type II curriculum is flexible.

Summary

Realist and anti-realist Type II entrepreneurship forms of education exhibit important differences, including the functions of school, the role of teachers, the role of students, the purpose of teaching and learning, and the nature of interaction between teachers and students. This dual variability is outlined in Table 2 below.

Table 2: Characteristics of realist and anti-realist Type II entrepreneurship education.

	Realism Type II	***Anti-realism Type II***
Purpose	Construct more and/or better entrepreneurs.	Support the internal growth of students as entrepreneurs.
Point of departure	Entrepreneurship itself, or skills mastered by the teacher.	The students themselves and their experiences.
Content	What the student is presumed to need to learn.	What the student wants to learn.
Student role vis à vis curriculum	Student is subservient to the curriculum. Function follows form.	Curriculum is subservient to the student. Form follows function.
Teachers' role	Experts of entrepreneurship.	Curators of learning entrepreneurship by doing entrepreneurship.
Learning materials	Authority.	Supplementary tools.
Students' ability	Central to what students can learn.	Given little attention.
Students' emotions	Given little attention.	Central to how students learn.

Knowledge progress	Incremental learning of given facts of entrepreneurship.	Active experimentation activities emphasizing collaboration and bringing disciplines together.
Assessment	Assessment is possible. Needed to quantify ability.	Assessment is not treated as a yardstick for learning in entrepreneurship.
Facts and information about entrepreneurship	More important than students' own experiences.	Less important than students' own experiences.
Interdisciplinarity	Agnostic.	Essential feature.
Collaboration	Encouraged if deemed necessary by the exploitation strategy.	Generously encouraged.
Structure of curriculum	Changes rarely. Rigid.	Changes regularly. Flexible.

Relative EHCIE of the Two Variations

A Realism Vantage Point

HCT and the entrepreneurship literature posits a direct and positive relationship between investments in entrepreneurship human capital and entrepreneurship outcomes. The theoretical premise of this thesis is an acknowledgement thereof. This theoretical premise is also broadly supported in empirical works across a variety of outcomes within the entrepreneurship literature: entrepreneurship behavior (Unger et al., 2011; Gimeno et al., 1997), entrepreneurship performance, and business performance (Bruderl, Preisendörfer, & Ziegler, 1992; Evans & Leighton, 1989; Gimeno et al., 1997). Nevertheless, some empirical findings insist that entrepreneurship education sometimes "works," but sometimes not (Bae et al., 2014; Elert et al., 2015; Fairlie et al., 2012; Nabi et al., 2017; Oosterbeek et al., 2010; Souitaris et al., 2007; Åstebro & Hoos, 2016). The EHCIE typology posits that the effectiveness by which outcomes emerge is in function of both the degree to which actual entrepreneurship human capital is present and the

degree to which it is made transactional. Moreover, the EHCIE matrix posits that Type II entrepreneurship education is the sole form of entrepreneurship education for which outcomes do not appear by selection bias or chance. These two dependencies have not been considered in previous studies of entrepreneurship education, yet this thesis posits them as a fruitful avenue to address why scholars note a variability in the empirical findings on the relationship between investment in entrepreneurship human capital and entrepreneurship outcomes.

Influential empirical work corroborates that entrepreneurship human capital is a genre of specific human capital with a higher degree of relatedness to entrepreneurship than to other specifics (Becker, 1964; Cooper et al., 1994, Unger et al., 2011). As demonstrated above, however, variabilities in what is perceived to constitute knowledge under the realism and anti-realism realms influence the characteristics and attributes of human capital investment activities. Consequently, all else equal, such human capital investment activities that strive to provide knowledge about entrepreneurship from the perspective of realism relate differently to, for example, opportunities than do human capital investment activities that allow individuals to acquire knowledge about opportunities from a vantage point of anti-realism. Henceforth, this duality of entrepreneurship human capital will be referred to as realist entrepreneurship human capital and anti-realist entrepreneurship human capital, respectively. Moreover, as discussed, this thesis holds a realism perspective and, thus, by default, attributes the empirical findings in support of a direct and positive relationship between investments in entrepreneurship and outcomes in general to investments in realist entrepreneurship human capital specifically. Thus, investment activities in realism entrepreneurship human capital provide knowledge that makes it possible for individuals to increase marginal output in entrepreneurship more than in other genres of specifics. Taken together, this leads to the following null hypothesis:

> **H_{01}:** There is no direct positive relationship between investment in realist Type II entrepreneurship human capital and entrepreneurship outcomes (H_{01a}: entrepreneurship behavior, H_{01b}: entrepreneurship performance, H_{01c}: business performance).

The Entrepreneurship Congruity Assumption

As previously discussed, whilst realist entrepreneurship human capital and anti-realist entrepreneurship human capital differ in views on what constitutes entrepreneurship, they may still share an understanding on certain aspects of how knowledge is created by individuals throughout the entrepreneurship process. In the EHCIE typology, this is captured in the entrepreneurship congruity assumption stating that human capital investment activities that relate *differently* to entrepreneurship may still have *equal* relevance to the entrepreneurship process. The entrepreneurship congruity assumption for two variations of entrepreneurship education with equal epistemic fit is summarized in Figure 5.

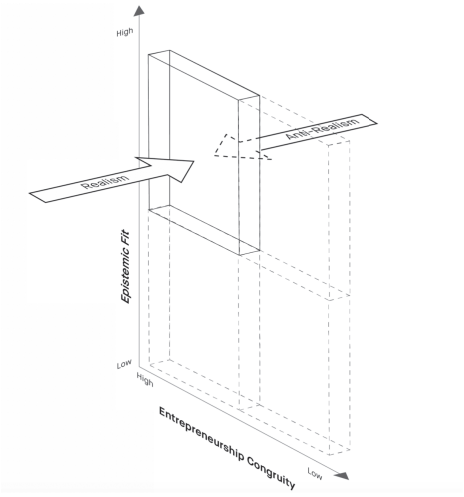

Figure 5: The entrepreneurship congruity assumption.

There are two main reasons as two why human capital investment activities that relate differently to entrepreneurship may have equal relevance to the entrepreneurship process. First of all, while originally designed for other purposes, anti-realism entrepreneurship investment activities may inadvertently provide human capital of relevance to the entrepreneurship process as it is understood from a perspective of realism. As previously

stated, an example of this concern effectuation logic which unintentionally may train individuals in discovering opportunities where others see risk. Secondly, and more importantly, realism literature contends that rare conditions may come about when understandings of entrepreneurship overlap with anti-realism for what is considered to be necessary activities of the entrepreneurship process; i.e., knowledge creation activities.

Under realism, both opportunities and knowledge are ascribed the same ontological status as observables. Moreover, realism regards the scientific method as superior to any other method for the successful creation of knowledge with respect to all facets of entrepreneurship. However, varying approaches to realism allow for shifting functions of creation activities in relation to the entrepreneurship process: from peripheral (Shane, 2003) to essential (Ramoglou & Tsang, 2016). Therefore, while the realist and anti-realist approaches to entrepreneurship human capital may differ in views on what constitutes entrepreneurship, they may still share an understanding on certain aspects of why knowledge needs to be created by individuals throughout the entrepreneurship process. This is important because it follows that Type II entrepreneurship education conducted from both perspectives of realism and anti-realism may be related to entrepreneurship outcomes. Consequently, it is theoretically plausible that investment activities in anti-realism entrepreneurship human capital, provide knowledge that makes it possible for individuals to increase marginal output in entrepreneurship more than in other genres of specifics. Therefore, the following null hypothesis is formulated:

> **H_{02}**: There is no direct positive relationship between investment in anti-realist Type II entrepreneurship human capital and entrepreneurship outcomes (H_{02a}: entrepreneurship behavior, H_{02b}: entrepreneurship performance, H_{02c}: business performance).

Relative Effectiveness

As ideal types, the respective variations of entrepreneurship education with equal epistemic fit are rare, if not impossible, to find in practice. Therefore, it is the *deviation* from the respective ideal type that is posited to predict

variability in EHCIE. However, the relative magnitude by which inclusion or lack of creation activities in a given Type II entrepreneurship education increases or decreases deviation from the ideal type is not clear. This is because theory supports the notion that investments in anti-realism human capital may be related to entrepreneurship outcomes, both intentionally and unintentionally, without providing any clear empirical prediction on variation in similarity or dissimilarity to an ideal type as creation is either emphasized or deemphasized. Yet, while theory does support both realism and anti-realism entrepreneurship to be related to outcomes in a direct and positive manner, the philosophical vantage point of this thesis, however, predicts investments in realism entrepreneurship human capital *ceteris paribus* to be *more* related to outcomes than investments in anti-realism entrepreneurship human capital. Therefore, the following null hypothesis is formulated:

> **H_{03}**: Investment in Type II realist entrepreneurship human capital is less related to entrepreneurship outcomes than is investment in Type II anti-realist entrepreneurship human capital (H_{03a}: entrepreneurship behavior, H_{03b}: entrepreneurship performance, H_{03c}: business performance).

Summary

In summary, the theoretically derived typology predicts variance in the likelihood of entrepreneurship education activities to produce outcomes. More specifically, it does so as a function of the reciprocal interdependence between its entrepreneurial congruity and epistemic fit. Notably, only one ideal type of entrepreneurship education is posited to produce outcomes, namely that of high entrepreneurial congruity and high epistemic fit. For this ideal type, two variations contingent on philosophical vantage points were derived, and three hypotheses were formulated for the relationships. Importantly, the typology resides on a theoretically grounded congruity assumption stating that varying vantage points toward opportunities do not necessarily imply varying strengths in the congruity to entrepreneurship.

Method

In this chapter the empirical setting is described and discussed. More specifically, I first describe the empirical context. Next, I outline the dependent, independent, and control variables used in the subsequent analysis. I discuss my independent variables especially in light of the typology derived in the previous chapter. Third, I outline my methodological approach, which has its basis in a random event that led to the opportunity of studying two natural experiments of entrepreneurship education. Fourth, I outline my process of data collection. The chapter then thoroughly describes the samples in depth and concludes with a missing data analysis.

Empirical Context

In Sweden, 5,000 students graduated from higher entrepreneurship education in 2016.[25] Twenty percent of this population graduated from the same program: the academic program at the Stockholm School of Entrepreneurship (SSES). This program is the empirical context of this thesis and is described in detail below.

Background: The Stockholm School of Entrepreneurship (SSES)

SSES was created on July 1, 1998 by three Swedish universities and institutes of higher education: the Stockholm School of Economics (SSE), the Royal Institute of Technology (KTH), and the Karolinska Institute (KI). According to its mission statement, SSES strives to "Promote the Stockholm region as one of the world's entrepreneurial hotspots." Since its inception, Stockholm University (SU) and the University College of Arts, Crafts, and Design (Konstfack) have joined the collaboration. The participating universities and institutes of higher education are referred to as "members" of the collaboration.

The academic program at SSES is designed to allow for the program students at the respective members to jointly participate in entrepreneurship courses as part of their Master's studies. As such, the program offers entrepreneurship courses where students of engineering, business, medicine, design, and other disciplines all study together. The program is designed as a smorgasbord of open elective single-standing courses. The courses are offered during the evening, twice a week for seven weeks. Successful graduation from one course is equivalent to 7.5 ECTS points at the student's "home" member institution. The program strives to conduct interdisciplinary entrepreneurship education and follows a strong degree of formality; each learning activity outlines the intended learning outcomes for participants as well as the way in which such development is rewarded.

[25] According to publicly listed statistics at the Swedish Higher Education Authority, english.uka.se, accessed 10/11/17.

The course program is described as follows (SSES's website, accessed 05/30/16):

> Our courses are designed by, and recognised as internal courses, at all five member schools. This means that you will study applied entrepreneurship in interdisciplinary groups with students from different backgrounds. Any gained ECTS credits will be counted towards your degree. The courses are split into three categories: core courses, context courses, and skills courses.

Core courses mirror different phases of venture creation, from pre-idea to managing a growing business. Though they are independent from one another, they are designed to reflect different stages of a venture creation process: "Ideation—Creating a Business Idea," "Planning—Developing a Venture," "Execution—Running Your Company," and "Growth—Managing Your Firm."[26] The core courses are based on the opportunity construct and designed by a group of entrepreneurship scholars. Yet, as will be discussed in detail below, they relate differently to opportunities and have different philosophical vantage points. Context courses address subjects in the context of a specific area or industry, such as design, biotech, and developing countries, while skills courses teach certain skills and practical techniques that cover a variety of areas, such as negotiation and financing.

Academic Program in Numbers

According to SSES's academic records, the program has seen 26 unique courses offered in a total of 200 course offerings (as most courses are offered more than once) between July 1, 1998 and July 1, 2016. During the same time period, the program has seen 8,056 individual students graduate from at least one course (447 on average per annum). The total number of course examinations from this student body corresponds to 11,034 examinations (613 on average per annum), or 1.37 courses per participating student. The accumulated allocation of students per member institute during that same period is as follows: KTH: 35%, SSE: 30%, SU: 25%, KI: 10%, and Konstfack: <1%. On average, 31% of the participants have been female

[26] "Business Model Innovation" replaced the Planning course in 2012.

students, and 40% have been international students. As a comparison to the accumulated averages, the academic year 2015/2016 is also outlined below.

Table 3: Summary of empirical context 1998–2016.

Measure	**N / %**
Students in total	8,056
Engineering	35%
Medicine	10%
Business	30%
Other (e.g., design, ethnography, linguistics)	25%
Female	31%
International	37%
Students per annum, average	447
Course examinations in total	11,034
Examinations per annum, average	613
Courses per students, average	1.37

Table 4: Summary of empirical context 2016.

Measure	**N / %**
Students in total	839
Engineering	39%
Medicine	8%
Business	26%
Other (e.g., design, ethnography, linguistics)	27%
Female	51%
International	41%

The dominant course within the SSES program is *Ideation—Creating a Business Idea*. A total of 25% of all course examinations in 1998–2006 from SSES were from this one course. The second most dominant course within the SSES

program is *Planning—Developing a Venture,* representing 16% of course examinations, until the course was discontinued in 2012.

Dependent Variables: Entrepreneurship Outcomes

Background

In this thesis, I acknowledge that entrepreneurship is the process by which new economic activity emerges. Entrepreneurship requires human agency (Shane, 2003), and I recognize that individuals and the opportunities they pursue form the basis of this process. Consequently, entrepreneurship behavior is an individual-level activity necessary for the process to unfold over time. In relation to a particular entrepreneurial process, therefore, entrepreneurial behavior may be carried out by either one or by several individuals, throughout the process or in part(s). Thus, a given individual may exercise entrepreneurial behavior in relation to a given process at various times. As the relationship between a given entrepreneurship process and an individual varies over time, it is not necessary that one individual remains "entrepreneur," and, vice versa, it is not necessary for the initiator(s) of the process to remain the entrepreneur(s) as the emergence of new economic activity continues to unfold. Consequently, a given individual may also relate to several entrepreneurship processes at a given time.

Entrepreneurship Behavior

In this thesis, I study entrepreneurship behavior as "entry." Entry occurs when an individual founds a firm, meaning a business venture or not-for-profit organization that previously did not exist (Shane, 2003). Firm founding is crucial to entrepreneurship as only firms in existence can perform.

Entry is operationalized as an event that occurs for an individual if he or she on the day of the inception of a given firm exercised a managerial role therein. Inception is understood as the company's registration with the Swedish Companies Registration Office; the managerial role is the direct

control of the entity and accountability thereto. While the data enable me to follow all kinds of legal entities in Sweden (c.f. below), I consider this event to occur either for the founder of a sole trader, limited partnership, or trading company; CEO; or a permanent board member (excluding substitutes and auditors) in a private or publicly limited company. I include in this the forming of self-employment, i.e., performing work for personal profit rather than for wages paid by others (Le, 1999; Shane, 2003). In other words, for entry I do not consider anyone who joins the company in any form or function after the firm's inception date to have founded the firm. To me, this is an intuitive approach.

Entrepreneurship Performance

As an entrepreneurial process of a new firm unfolds over time, the firm founder may remain in the role of entrepreneur or choose not to. Moreover, a given individual may exercise entrepreneurial behavior in relation to several entrepreneurship processes over time (Scott & Rosa, 1996; Westhead & Wright, 1998), either one-by-one or in tandem. Therefore, in this thesis I study entrepreneurship performance as accumulated entrepreneurship behavior in relation to one or several entrepreneurial processes.[27]

More specifically, entrepreneurship performance is studied as "re-entry" and "entry speed." Following the operationalization of firm founding above, I operationalize re-entry as an individual who has founded more than one firm.[28] This operationalization takes into consideration how often a given individual exercises the role of becoming an "entrepreneur." Entry speed is operationalized as time in days to the first firm founding of an individual.[29] This operationalization regards, in relation to a given event, how soon an individual takes on the role of becoming an entrepreneur.

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[27] This is different from business performance, which relates to the performance of the *firm* (c.f. below).

[28] Such an individual is usually referred to as a serial or habitual entrepreneur (Amaral, Baptista, & Lima, 2011).

[29] This is similar to Kim, Wennberg, and Toft-Kehler (2015), who study time through the entrepreneurial process.

Business Performance

In this thesis, I study business performance at the firm level. Firm survival is a common performance measure in entrepreneurship education (Elert et al., 2015; Unger et al., 2011; Van der Sluis, van Praag, & Vijverberg, 2008; Van Praag, van Witteloostuijn, & van der Sluis, 2013; Chrisman & McMullan, 2004) and a crucial aspect of a business as performance cannot happen without survival and because very few entrepreneurial processes in fact survive (Wennberg et al., 2016; Aldrich, 1999).

In relation to the firm, survival may concern the performance by which the entrepreneurship process is kept alive either before (Brush, et al., 2008) or after the firm is founded (Wennberg, et al., 2016). I define firm survival as the continued existence of a firm in the Swedish Companies Registration Office records. I operationalize it as the number of days a given firm has continued to exist. Moreover, I study firm survival only for firms founded by my respective samples. Survival rate is the number of days a founded firm survives.

Moreover, extreme business performance is a rare event of an entrepreneurial process. I operationalize extreme business performance as the achievement of an IPO, which is also registered with the Swedish Companies Registration Office.

Summary

In summary, I operationalize entrepreneurship behavior as follows:

Entry: An event that occurs for an individual who had a controlling *and* accountable role in a sole trader, trading company, limited partnership, or limited company at the day of inception. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Entry.

I operationalize entrepreneurship performance in two distinct ways, as follows:

Entry Speed: Time in days to first entry. Continuous variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Entry_Speed.

Re-entry: If an individual has founded more than one firm. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Re_Entry.

I operationalize business performance in three distinct ways, as follows:

Survival: An event that occurs for a firm that was still in existence at the end of the study, irrespective of onset. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Survival.

Survival Rate: Number of days a firm has been in existence in the Swedish Companies Registration Office records. Continuous variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Survival_Rate.

Extreme Performance: If a firm achieves an IPO. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Extreme_Performance.

Independent Variables: Investment in Entrepreneurship Human Capital

Background

Attained level of education is one of the most common ways to conceptualize investment in human capital. In the context of entrepreneurship education, the same approach has been used previously (c.f., e.g., Elert et al., 2015; Martin et al., 2013). In this thesis, I am interested in variabilities of outcomes as a function of philosophical vantage points.

Given the relative effectiveness of ideal types in the EHCIE matrix, Type II investment activities are of specific interest. Below, two specific entrepreneurship education activities are presented in detail, representing Type II realist entrepreneurship education and Type II anti-realist entrepreneurship education, respectively. Following this, I then operationalize my independent variables "investment in realism entrepreneurship human capital" and "investment in anti-realism entrepreneurship human capital" thereon.

Investment in Realist Entrepreneurship Human Capital

Background

In name, "business planning" is the world's most common entrepreneurship education activity (Honig, 2004)[30], but not all business planning courses are alike (Honig, 2004; Sarasvathy, 2001; Alvarez & Barney, 2010). Below follows an outline of a business planning courses within the SSES program, namely Planning—Developing a Venture. Specifically, I will examine the 2006 iteration of the course (henceforth referred to as PDV06), which at the time was the second most popular course within the program, and discuss it in light of the typology developed in the previous chapter. Taken together, I outline the reasons why I conclude PDV06 to hold its closest similarity to the Type II realism entrepreneurship education. First, I descriptively outline the investment activity and next derive its typological proximity. For a copy of the syllabus, please refer to Appendix 4.

Description

PDV06 is an opportunity-based course. Students are taught how to "identify a business opportunity" (i.e., not how to create it). Semantics can be intentional or unintentional, and thus this alone is not sufficient to say the

[30] Honig (2004) concluded this by having "examined the 2004 college catalogs of all of the top 100 universities in the United States (*U.S. News and World Report*, 2004) for courses that specifically referred to business plan education in their course descriptions." (Honig, 2004, p. 258). From this approach, they found "78 of the top 100 universities offered such courses, typically in the area of entrepreneurship or small business management." I conducted a follow-up in 2017 and concluded the number was similar, although somewhat higher: 79 of the top 100 universities now offered such courses.

course holds a realist vantage point toward opportunities. However, as required readings, the course entails "Alvarez, Barney (2006), *Discovery and Creation—alternative theories of entrepreneurial action*, working paper series, Ohio University Press," which signals a certain degree of consciousness regarding the scholarly discussion on opportunities. Moreover, specific attention is directed toward the notion of strong-premise opportunities (referred to as disruptive opportunities). No room is given to creation activities inside of PDV06.

The commitment of PDV06 is to "lead the participating students through a business development process," with the end goal being to "evaluate the possibility of successfully launching the different businesses." With the venture at the epicenter of the purpose, rather than the student, and the upfront aim to *successfully* launch a venture—otherwise not—the purpose of PDV06 lies close to the construction of more and better entrepreneurs.

There is no indication in the documentation of PDV06 that supports the internal growth of students as entrepreneurs to be ranked as superior to the construction of more and better entrepreneurs; in fact, it is nowhere mentioned. Before PDV06 starts, students are asked to submit their business ideas. Those ideas are then ranked by the teacher and the *best* ones selected "to be developed further and have business plans written based on them." Thus, the learning process that students follow is strongly reliant on the entrepreneurship skills mastered by the teacher in this first stage, but then also throughout. PDV06 relies on established knowledge about entrepreneurship that the student is expected to need to learn. There are theory sessions: "three weeks of seminars and lectures on the theory of innovation and entrepreneurship." The purpose of these sessions is to inform learners about a common language for innovation. Thus, existing facts and information about entrepreneurship are more important to formulate this language than are the experiences of the students themselves.

In other words, the learning process of the course is designed in such a fashion that the point of departure is entrepreneurship itself and that the education will be delivered as a function of the skills mastered by the teacher and coaches, not as a function of the students' view on entrepreneurship and their experiences. The course revolves around what students are perceived to need to learn as opposed to what the students want to learn; in fact, it is

possible that the ideas a student wants to relate to in relation to learning entrepreneurship may not be selected.

Moreover, students are required to relate to a *required* list of readings, and nowhere is it mentioned that content might or will change as the course goes along; while it does not say that students *cannot* affect or change the content of the course, nowhere does the syllabus encourage students to do so.

Taken together, the student and her entrepreneurship are subservient to the PDV06 curriculum, and the entrepreneurship process as understood in the course is designed for students to follow, not form. A notion of expertise in entrepreneurship is invariably attributed to the teacher; for example, the teacher ranks the entrepreneurship progression of students and controls theory, and out of 23 hours of class—with topics varying from networking to funding—there is but one guest lecture.

As previously mentioned, the learning materials are *required,* supplemented by additional *recommended* readings. In other words, the learning materials—such as literature—are not treated as a supplementary tool. Instead they are ascribed a sense of truth and gravitas for what students can and should learn.

PDV06 is intended to train learners in skills and tasks, described as key topics: "identification of the customer, market analysis, internationalization, resource acquisition, bootstrapping & risk capital, exit, business model, management team, negotiations, planning, governance, IPR, licensing, contracts, legal issues, pitching." No room is given to creation or idea generation activities inside the scope of PDV06. There is a continuous provision of pitching exercises with the purpose to "[raise] interest in the invention from an investor's point of view."

Furthermore, PDV06 describes entrepreneurship as a process that is not appropriate for all students: "the commercialization of an idea into a business is highly dependent on the will power, persistence and competence of the people involved." Moreover, entrepreneurship ability is understood as crucial for the knowledge progression of students in PDV06: "the team must be highly motivated and have a real belief in their project as well as the competence to develop the idea into a business." Moreover, PDV06 is designed in phases, where the gradual learning of individual sets of given facts develops competent students' entrepreneurship ability along a virtual

continuum. Grading and examination are structured, thoroughly standardized, and designed to measure and assess learners' development along this continuum, taking both the individual learner in isolation and the group into consideration. The grading is structural, transparent, and comparable between learners.

Students are instructed "to either recruit students to your group (if your idea was chosen) or look for a group to join (if your idea was not chosen)." Collaboration is thus mandatory. However, it is plausible that this is a function of the course load for the individual teacher rather than a general view of the PDV06 to in all instances *recommend* collaboration and not see its necessity as a function of the exploitation strategy. Moreover, the multidisciplinary audience of learners follows the design of the school. That said, *interdisciplinarity* collaboration is neither mandatory nor recommended; PDV06 states an agnostic view on interdisciplinarity.

In PDV06 students get to compete with their entrepreneurship "The two best business plans presented during the course will have the opportunity to participate in the competitions 'European Business Plan of the Year' organized by London Business School and INSEAD and 'Venture Challenge' organized by San Diego State University." The purpose of the competitions relates to the overall purpose of PDV06: "Previous participants at this event from the SSES are today managing successful enterprises."

In total, there have been seven different iterations of the planning course. The SSES academic records show that there has been but one major revision of the course and its contents. Judging by the documentation of syllabuses and course descriptions, the change was more in name than content, while a vast majority of actual content, design, aim, and form survived since the first offering of the course in 1998. Put differently, the PDV06 curriculum provides a strong degree of rigidity and has remained so over time.

Type II Proximity

The proximity of PDV06 to Type II realist entrepreneurship education can be modeled through profile similarity. The chosen modeling method assesses the Euclidean distance deviation (D) of a human capital investment activity in entrepreneurship education (EE) from the ideal type (i) on attribute j through equation X below.

$$D_{iEE} = \sqrt{W(X_i - X_{EE})(X_i - X_{EE})'}$$

- X_i is a 1 x j vector that represents the value of i on attribute j.
- X_{EE} is a 1 x j vector that represents the value of EE on j.
- W is the diagonally weighted j x j matrix.

As attributes, I use the 14 characteristics of realism entrepreneurship education summarized in Table 2. As it should be assumed that the relative importance of the first-order constructs are equal, the weight of each individual attribute to the ideal type is estimated as 1. I estimate distance as full proximity (1), no proximity (0), and some proximity (0,5). The estimated distances are derived from the descriptive outlining above, with scoring assessed in the attribute table below.

Table 5: Realism Type II proximity estimation.

	Realism Type II	**Proximity**	**Weight**
Purpose	Construct more and/or better entrepreneurs.	1	1
Point of departure	Entrepreneurship itself, or skills mastered by the teacher.	1	1
Content	What the student is presumed to need to learn.	1	1
Student role vis à vis curriculum	Student is subservient to the curriculum. Function follows form.	1	1
Teachers' role	Experts of entrepreneurship.	1	1

Learning materials	Authority.	0,5	1
Students' ability	Central to what students can learn.	0,5	1
Students' emotions	Given little attention.	0,5	1
Knowledge progress	Incremental learning of given facts of entrepreneurship.	1	1
Assessment	Assessment is possible. Needed to quantify ability.	0,5	1
Facts and information about entrepreneurship	More important than students' own experiences.	1	1
Interdisciplinarity	Agnostic.	0	1
Collaboration	Encouraged if deemed necessary by the exploitation strategy.	1	1
Structure of curriculum	Changes rarely. Rigid.	1	1

Thus the total Euclidean distance deviation of PDV06 to Type II entrepreneurship education $D_{II,PDV06}$ is summarized below:

$$D_{II,PDV06} = 9 + 4\sqrt{0,5}$$

Summary

Taken together, I will operationalize my independent variable "Investment in Realist Entrepreneurship Human Capital" as the full completion of the PDV06 course iteration. As an investment activity, it has an estimated distance from Type II entrepreneurship education of $D_{II,PDV06}$.

Investment in Anti-realist Entrepreneurship Human Capital

Background

The dominant course within the SSES program is Ideation—Creating a Business Idea. A total of 25% of all course examinations in 1998–2006 from SSES were from this one course. Contrary to Planning—Developing a Venture, the course has changed substantially in terms of scheduled contents over the years, with a total of three major revisions at the time of the 2006 iteration. The Ideation—Creating a Business Idea 2006 iteration will henceforth be referred to as ICB06. Below is an outline of ICB06 and a discussion in light of the typology developed in the previous chapter. Taken together, below I outline reasons why I conclude ICB06 to hold its closest similarity to the Type II anti-realism entrepreneurship education. First, I descriptively outline the investment activity and next derive its typological proximity. For a copy of the syllabus, please refer to Appendix 4.

Description

Overall, as a first observation, in relation to PDV06 the tonality of the syllabus and course description for ICB06 is more relaxed and less authoritative. ICB06 is also an opportunity-based course, and there is no reason to argue for an unintentional or uninformed view on opportunities. On the contrary, the very first sentence of the course description states the aim as "To give students knowledge about the process of creating and developing a business opportunity." Only opportunities that do not exist can be created, and thus ICB06 lends itself to the anti-realist view of opportunities. Importantly, ICB06 provides an exercise on "the basics of opportunity recognition." As the *recognition* of opportunities signals an objective existence to opportunities, this may at first seem complicating. However, the exercise and its approach to opportunities allow students to attach meaning to raw data and leave the opportunity open for their own *subjective* interpretation. Thus, this very exercise of ICB06 lends itself closer to the anti-realist view of individual cognition rather than social construction, still being anti-realism. This overall anti-realist vantage point toward opportunities of ICB06 is further strengthened by the view of the

relationship between ideas and opportunities: "[the] idea must be developed into a business concept and a true business opportunity."

The course philosophy is outlined and states, "The course wants to inspire the participants to see entrepreneurship as a worthwhile endeavor, and will focus on the personal development, drive and desire of the participants." Thus, through inspiration the course appeals to the emotional basis of learners, and it is the inner growth of learners and their entrepreneurship—rather than venture growth—that is the purpose.

Students may without discrimination from the teacher freely choose what opportunity or opportunities to work with in the course. Throughout the course, the student works without assessment or interference from the teacher although it is encouraged to invite feedback from peers. There is no notion of a point of departure in ICB06 with respect to skills necessarily mastered by the teacher or entrepreneurship itself. In fact, assignments are referred to as "simple" and with little notion of a rich body of given knowledge and facts students need to penetrate to master entrepreneurship.

Instead, the point of departure is described as the "assumption that students participating in the course do so out of an interest to develop themselves." ICB06 is designed to allow for students to shape and form the course from their own extant entrepreneurship experiences.

ICB06 is presented as a smorgasbord of classes, all *optional* for students to partake in. As outlined, "the course will not focus unduly on compulsory aspects, and instead celebrates the participant's active choice to take part." Thus, students are free to select and cherry-pick that which they find most rewarding for their own learnings. All assignments carry recommended readings, but for each assignment there are several, and students may relate to them in whatever way they find rewarding for the purpose of the assignment. Thus, there is a set of activities and lectures outlining what is believed to be necessary for students provided the purpose, but from this the students are free to form the educational process as they wish. The ICB06 curriculum thus holds a subservient relationship to the students, and the teacher takes a combined role of expert and curator of students' possible and active choice to take part. Thus, in part, the teacher is someone who functions as a facilitator of learnings and iterates the curricular design of ICB06 in response to the educational needs of the individual students and

their educational wishes: "The program above is indicative. Changes, such as guest-lectures and changes according to the continuous development of the course, may occur."

Nowhere are reading materials stated as compulsory, nor is the grading a function of the learners' acquisition of given facts of entrepreneurship therein. Instead, grading is done "through a so-called portfolio method," where

> In order to get credits for the course, participants are to complete these assignments, and hand them in as a portfolio, i.e. the individual assignments are not handed in to the teacher, but instead kept, collected and handed in as a complete set at the end of the course.

Thus, gradual assessment and grading hold no place in ICB06, and there is little notion of a yardstick of learning along which students develop provided initial ability of the subject matter. Moreover, participants are "expected to conduct readings, take an active role in the lectures and be prepared to present in front of the class when asked to do so," but never is this expectation assessed.

Moreover, while the purpose of pitching in PDV06 is to "[raise] interest in the invention from an investor's point of view," the purpose of pitching in ICB06 is described as "to make you more comfortable talking about ideas in front of an audience, as well as having a stimulating discussion about several ideas in a group-setting." In terms of the school's design, ICB06 has a multidisciplinary audience through which students are encouraged to interact. The ICB06 materials continue: "The point is not to rip ideas apart or prove that something cannot be done." Nor is pitching mandatory in ICB06: "You are not required to present any idea you feel less than comfortable with." Just as for the relationship between learning and students' comfort in presenting, ICB06 returns to the emotional aspects of learning throughout; for example, the ICB06 aims to "inspire" individuals to entrepreneurship and select whichever case to analyze "you like."

The course aims to give "practical knowledge about the process of creating and developing a business idea." In the knowledge progression of learners, the assignments invite learners to interact with the world around

them, and they are encouraged to interpret the world using cognition. An example is given:

> Kids are getting fatter, and this seems to be linked to the fact that they play video games all the time. This might be an opportunity both for creating new kinds of games and creating ways to make kids play less.

In fact, entrepreneurship is explicitly referred to as a need for society—"the need of entrepreneurial ventures in society"—but students are not directed toward any specific type of entrepreneurship, such as social entrepreneurship. In relation to entrepreneurship, the unit of analysis for ICB06 is the student rather than the venture: "The course wants to inspire the participants to see entrepreneurship as a worthwhile endeavor, and will focus on the personal development, drive and desire of the participants."

In any anti-realist education, the teacher needs to be skillful at presenting real-world examples from which learning can be reaped. ICB06 states: "Using real-world examples and analysis emphasis is placed on the creative process." Moreover, the design of assignments in the ICB06 curriculum stresses that students partake in experimentation and actively test, develop, and challenge their own entrepreneurial ideas; but in no way does this entail between-students comparative or competitive aspects of the outcomes of this experimentation.

The examination of the ICB06 is done as a one-off, with little transparency and no provided structure for students in terms of breakdown. Thus, little attention is paid to the notion of assessment and the gradual development of entrepreneurship ability.

Moreover, "Ideation is a course about ideas, entrepreneurship and creativity, and aims to give students practical knowledge about the process of creating and developing a business idea." In total, the course description has 21 instances of mentioning the word "create," or iterations thereof (including create, creativity, creation). Thus, ICB06 leaves ample room for creation and creativity exercises throughout based on the interest of the learners themselves.

Taken together, the above constitute the reasons why I conclude ICB06 to hold its closest similarity to Type II anti-realism entrepreneurship education. Below, I derive its typological proximity.

Type II Proximity

As for PDV06, the proximity of ICB06 to Type II entrepreneurship education can be modeled through profile similarity. As attributes I again use the 14 characteristics of anti-realism entrepreneurship education summarized in Table 2. For the vector W, all attributes j for $D_{II,ICB06}$ are inversely located to $D_{II,PDV06}$. As it should be assumed that the relative importance of the first-order constructs are equal, the weight of each individual attribute to the ideal type is estimated as 1. I estimate distance as full proximity (1), no proximity (0), and some proximity (0,5). The estimated distances are derived from the descriptive outlining above, with scoring assessed in the attribute table below.

Table 6: Anti-realism Type II proximity estimation.

	Anti-Realism Type II	**Proximity**	**Weight**
Purpose	Support the internal growth of students as entrepreneurs.	1	1
Point of departure	The students themselves and their experiences.	1	1
Content	What the student wants to learn.	1	1
Student role vis à vis curriculum	Curriculum is subservient to the student. Form follows function.	0,5	1

Teachers' role	Curators of learning entrepreneurship by doing entrepreneurship.	0,5	1
Learning materials	Supplementary tools.	1	1
Students' ability	Given little attention.	1	1
Students' emotions	Central to how students learn.	0	1
Knowledge progress	Active experimentational activities emphasizing collaboration and bringing disciplines together.	1	1
Assessment	Assessment is not treated as a yardstick for learning in entrepreneurship.	0,5	1
Facts and information about entrepreneurship	Less important than students' own experiences.	1	1
Interdisciplinarity	Essential feature.	0,5	1
Collaboration	Generously encouraged.	0,5	1
Structure of curriculum	Changes regularly. Flexible.	1	1

Thus, the total Euclidean distance deviation of ICB06 to Type II entrepreneurship education $D_{II,ICB06}$ is summarized below:

$$D_{II,ICB06} = -(8 + 6\sqrt{0,5})$$

Summary

Taken together, I will operationalize my independent variable "Investment in Anti-realist Entrepreneurship Human Capital" as the full completion of the ICB06 course iteration. As an investment activity, it has an estimated distance from Type II entrepreneurship education of $D_{II,ICB06}$.

Summary

In sum, I operationalize the independent variables of the thesis as outlined below:

Investment in Realist Entrepreneurship Human Capital: Full completion of PDV06. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as PDV06.

Investment in Anti-realist Entrepreneurship Human Capital: Full completion of ICB06. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as ICB06.

Control Variables: Ingoing Human Capital and Other Variables

In this thesis, I study the relationship between investment in entrepreneurship human capital and entrepreneurship outcomes. Therefore, I include as my control variables other human capital that individuals have acquired prior to the investment in focus in this thesis. I include known levels of human capital from formal and informal investments, specifically in the form of managerial experience, entrepreneurial experience, and business studies. Moreover, age and sex are both known to influence entrepreneurship outcomes (Davidsson & Honig, 2003; Van Auken, Fry, & Stephens, 2006; Boissin & Emin, 2007; Kickul, Wilson, Marlino, & Barbosa, 2008).

Therefore, these are also included as control variables.[31] The operationalization and measurement of these control variables are outlined below:

Managerial Experience: If the student had managerial experience pre-investment in entrepreneurship-specific human capital. Managerial experience is understood as a permanent board position in a limited company. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Man_Exp.

Entrepreneurial Experience: If the individual had founded a firm pre-investment in entrepreneurship-specific human capital. Binary variable. Firm founding is treated as having had a controlling and accountable role in a sole trader, trading company, limited partnership, or limited company at the day of inception. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Ent_Exp.

Business Study Experience: If the student had a background as a business major student at the time of investment in entrepreneurship-related human capital. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Bus_Stu_Exp.

Age: Measured in years as the individual's age at the time of investment into entrepreneurship-specific human capital. Continuous variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Age.

Sex: Measured as male or female. Binary variable. In the subsequent statistical analysis, this operationalization is carried by the variable referred to as Sex.

[31] Unfortunately, due to registry design, I am unable to collect and include data for parents' entrepreneurship, which otherwise can be a determinant for entrepreneurship (Andersson & Hammarstedt, 2010, 2011; Lindquist, Sol, van Praag; 2015).

Methodological Approach

To be able to address the formulated hypotheses, I take my point of departure in a peculiar situation that led to PDV06 and ICB06 being offered to two cohorts of students but where two other groups were accidently unable to participate. This situation and its consequences are discussed below and subsequently exploited as two natural experiments.

As ICB06 was scheduled to run before PDV06, I will outline them in calendar order in this section.

ICB06

ICB06 was scheduled to run twice, the first iteration of ICB06 September 1–October 11, 2006 and the second iteration of ICB06 Jan 15–March 12, 2007. The two iterations were promoted to the student communities at the member institutions in tandem throughout calendar year 2006 and as the same course with the sole difference of being run on two different occasions 10 weeks apart. In other words, students at the members were offered to participate in identical offerings of ICB06 but could choose to start at different times. Registrations were managed locally at the respective members and selection done on a first come/first served basis. Every student that registered for the course was guaranteed a place.

The registration process for both iterations mirrored the same practice and procedures, and registration for the first iteration was open during spring term of 2006 (during the 2005/2006 spring iteration of the course), whereas the registration period for the second iteration was open during fall term of 2006 until November 20th (during the first 2006/2007 iteration of the course, closing prior to the reporting of grades for the first iteration). Both iterations of ICB06 shared the same faculty and same course contents/schedule/syllabus, followed the same registration process, and had the same pre-requisites (120 ECTS credits from at least one member). The first iteration of ICB06 commenced September 1, 2006 and completed in full (101 students). Grades were reported to students by November 22, 2006. The second iteration of the course, however, was cancelled on December 12, 2006—about four weeks prior to the planned start (January 15, 2007)—

following information that the faculty member was unable to offer the course as initially intended. All registered students (99 students) were informed; by December 22, 2006, they had all been deregistered from the academic systems at SSES and the respective member institutes.

The two ICB06 iterations and events relevant to the purpose at hand can be seen in the figure below:

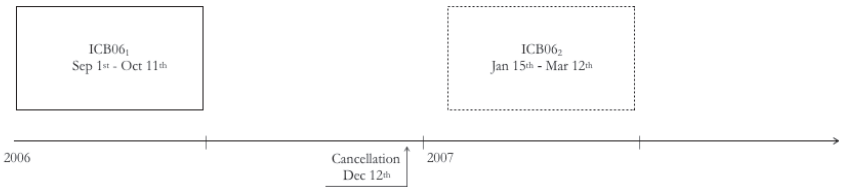

Figure 6: ICB06 timeline.

PDV06

PDV06 was scheduled to follow ICB06. However, as PDV06 had the same faculty as the ICB06 course, its second iteration was also cancelled.

PDV06 followed the same pattern as ICB06: the two iterations were promoted to the member institutions in tandem throughout calendar year 2006 and as the same course with the sole difference of being run on two different occasions 10 weeks apart. In other words, students at the members were offered to participate in identical offerings of PDV06, too, and similarly to ICB06, they could choose to start at different times. Both iterations of the course shared the same faculty and course contents/schedule/syllabus, followed the same registration process, and had the same pre-requisites (120 ECTS credits from at least one member). Participation in PDV06 was not contingent on participation in ICB06. Every student that registered for the course was guaranteed a place.

The registration process for both iterations of PDV06 mirrored the practice and procedures of ICB06, too: registration for the first iteration was open during spring term of 2006 (during the 2005/2006 spring iteration of the course), whereas the registration period for the second iteration was open

during fall term of 2006 until November 20th (during the first 2006/2007 iteration of the course, closing prior to the reporting of grades for the first iteration). On December 12, 2006 the second iteration was cancelled, about 12 weeks prior to the start of the next iteration. Registrations were managed in the same way as for ICB06, locally at the respective members and selection done on a first come/first served basis.

The first iteration of the course commenced November 5, 2006 and completed in full (48 students). Grades were reported to students by January 10, 2007. The second iteration of the course, however, was cancelled on December 12, 2006—about 12 weeks prior to the planned start (March 13, 2007)—following information that the faculty member was unable to offer the course as initially intended. All registered students (45 students) were informed; by December 22, 2006, they had all been deregistered from the academic systems at SSES and the respective member institutes.

The two PDV06 iterations and events relevant to the purpose at hand can be seen in the figure below:

Figure 7: PDV06 timeline.

The two PDV06 iterations combined with the two ICB06 iterations and events relevant to the purpose at hand can be seen in the figure below:

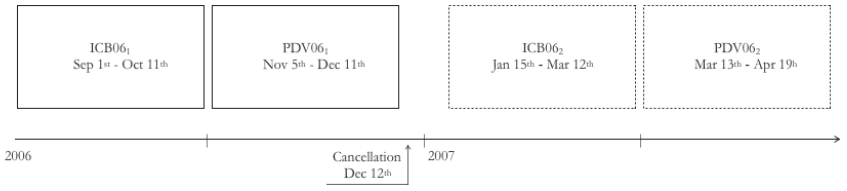

Figure 8: Joint timeline for ICB06 and PDV06.

Two Natural Experiments

The process determining whether registered students were provided the opportunity to participate in either of the two respective iterations of the two different courses during academic year 2006/2007 followed a non-deterministic pattern, and the event of cancellation was unforeseeable and unpredictable.

Allocation to either of the two groups of the respective courses followed independent and stochastic processes, whereby the unintentional design ensured that self-selected participating and self-selected non-participating students would be equivalently distributed on observed and unobserved characteristics.

The remainder of this chapter will exploit this peculiar event as two natural experiments and follow the two cohorts of 101 + 48 "treatment group" entrepreneurship students and the two cohorts of 99 + 45 "control group" entrepreneurship students, respectively. As a consequence of the experimental designs, it will be possible to infer causality. Because of the similarity of the courses, it will be possible to compare them.

Data Collection

The data for this study are unique. I make use of different databases and combine them all into one unique purpose-built database. The first database consists of all 101 + 99 students of the two respective ICB06 cohorts and all of the 48 + 45 students of the two respective PDV06 cohorts, including their

previous and subsequent participation in other entrepreneurship education activities at SSES. I retrieve this database from the academic records at SSES and connect this database to four different sources: Bolagsverket (Swedish Companies Registration Office), Skatteverket (Swedish Tax Agency), SCB (Statistics Sweden), and UC (Sweden's leading business and credit reference agency). The combination service is provided by the UC-subsidiary service AllaBolag. Taken together, the above contains the information necessary to track the subsequent entrepreneurship behavior, entrepreneurship performance and business performance for all cohorts. For ethical reasons, my data material remains anonymous. I can follow individual people and firms through the data; however, I cannot identify them. Additionally, my data are registry-based; hence, the data do not suffer from self-reported biases. I follow treated ICB06 individuals from 09-01-2006 to 02-01-2016 (3,440 days) and control from 01-15-2007 to 06-16-2016 (3,440 days). I follow treated PDV06 students from 11-07-2006 to 04-12-2016 (3,440 days) and control from 03-13-2007 to 08-12-2016 (3,440 days). For all groups I am able to collect pre-data from 1993 onward.

Population

The population database consists of all students that have gone through the academic programs at SSES July 1, 1998–July 1, 2013. These data are collected to be able to conduct robustness tests for the subsequent tests and regression analyses. In total, the data include 6,989 individuals, for which 361 concern participants in variations of the PDV course over the years 1999–2005 (inclusive), and 513 concern participants in variations of the ICB course over the same years. Data are available for entrepreneurship behavior as entry and entrepreneurship performance as entry speed but not for operationalizations of re-entry and business performance. Because these data concern robustness tests of treatments only, they are outlined as an appendix (Appendix 3).[32] The results, however, are continuously reported throughout the coming chapter as they are deemed relevant.

[32] The population robustness tests are not part of the body text because including it would increase the length of the chapter without adding a corresponding increase in information.

Sample

The sample database consists of all 48 + 45 students of the two respective PDV06 cohorts and all 101 + 99 students of the two respective ICB06 cohorts.

Managerial experience and firm founding for limited companies are left censored from 1993. The legal age for firm founding in Sweden is 18; as no one in our data is born pre-1975, it is unlikely that any firm founding is missing. Data are systematically missing for international students. As patterns of entrepreneurship and human capital vary extensively across countries, and as several nationalities are represented among the international students in these data, I will treat this as ignorable data and consequently perform a corresponding list-wise exclusion thereon. A similar approach was conducted by Wilson, Kickul, and Marlino (2007), where international students were omitted to increase the validity of the study.

ICB06 saw 44 international students in the treatment group (43%) and 37 international students in the control group (37%). PDV06 saw 12 international students in the treatment group (25%) and 26 in the control group (58%). The reason why the PDV06 iterations vary in terms of international students is ambiguous. Importantly, treating the randomly missing data in the samples as data not missing at random, and instead using full maximum likelihood (FML) to impute missing data, renders the same conclusions for the samples throughout.[33]

In the ICB06 control, three individuals participated in subsequent ideation courses. However, all those individuals were international students and were thus list-wise excluded. For the PDV06 control, no individuals participated in other subsequent planning courses. No students of ICB06 subsequently registered for or participated in a planning course and vice versa.

Taken together, after list-wise exclusions, the total sample consists of 156 individuals, with 93 treated individuals and 63 controls. The two ICB06 sub-

[33] FML produces estimates that are consistent, asymptotically efficient, and asymptotically normal (Allison, 2012).

samples consist of 57 treated and 44 controls, whereas the two PDV06 sub-samples consists of 36 treated and 19 controls.

PDV06: Descriptive Statistics and Missing Data

After correcting for ignorable missing data, a total of 55 individuals are represented in my PDV06 sub-sample, with 36 (65%) treated individuals and 19 (35%) in the control group. The average age of the groups at t_0 was 25,7 years; 80% of the participants were men, and 20% were women. Business students represented 22% of the entire sample. In total, 5% of the sample did have previous managerial experience, and 2% had entrepreneurial experience.

Next, I compare the means of each background variable in the PDV06 dataset to ascertain that the two iteration groups are, indeed, equally distributed on observed characteristics. I do this independently of their potential explanatory power for any of the above-identified relevant outcome variables. For all binary outcome variables, I perform Pearson's chi-squared test on the respective means. I conduct t-tests with equal assumed variances for continuous variables. The chosen p-value is 0,05, which is consistent with similar sample sizes in both entrepreneurship education and other domains and disciplines in terms of the probability of wrongly rejecting the null hypothesis if this is, in fact, true (Greenwald, 1975; Fanelli, 2012). A detailed summary of all tests and descriptive data follows.

Table 7 summarizes the descriptive background data for the two respective groups.

Table 7: PDV06 individual-level descriptive data: Background.

Variables	Treatment (n=36)	Control (n=19)	p
Age (average, years)	25,8	25,3	0,60
Female	6	5	0,12
Engineering student	13	9	0,77
Business student	8	4	0,92
Medicine student	2	1	0,23
Design student	1	0	0,46
Managerial experience	3	0	0,20
Entrepreneurship experience	1	0	0,46

I conclude that I can continue to treat the two groups as twins—not only conceptually but also based on the fact that nothing in the data points to the opposite.

Table 8 summarizes the descriptive data of the individual-level outcome variables for the two respective groups.

Table 8: PDV06 individual-level descriptive data: Outcomes.

Variables	Treatment (n=36)	Std. Dev	Min	Max	Control (n=19)	Std. Dev	Min	Max
Entry	14	0,49	0	1	6	0,48	0	1
Re-entry	1	0,27	0	1	3	0,40	0	1
Entry speed (average, days)	1,184	855	3	2,654	1,037	684	393	2,063
Survival	3	0,27	0	1	3	0,40	0	1
Extreme performance	0	0	0	0	1	0,23	0	1

Descriptive data for entrepreneurship entry and exit, specifically, can be found in Table 9.

Table 9: PDV06 individual-level descriptive data: Entry and exit.

Variables	Treatment (n=36)	Control (n=19)
Individuals that enter	14	6
Individuals that enter as teams	2	0
Individuals that re-enter	1	1
Individuals that exit	5	2

Descriptive data for firm-level output variables, specifically, can be found in Table 10.

Table 10: PDV06 firm-level descriptive data: Survival and performance.

Variables	Treatment (n=15)	Std. Dev	Min	Max	Control (n=7)	Std. Dev	Min	Max
Survival	11	0,46	0	1	5	0,49	0	1
Survival rate (average, days)	1,776	1,084	120	3,437	1,804	965	445	3,047
Extreme performance	0	0	0	0	1	0,23	0	1

Descriptive data for firm birth and firm death, specifically, can be found in Table 11.

Table 11: PDV06 firm-level descriptive data: Birth and death.

Variables	Treatment	Control
Firms founded	15	7
Firms that cease to exist	4	2
Firm survival (average, days)	1,776	1,804
Firms that issue an IPO	0	1

There is a total of 20 unique firm founders in the sample. In the treatment group 14 individuals enter (39%), whereas in the control group 6 individuals enter (32%). In the treatment group 2 individuals enter together. In the control group no one did.

The odds of individuals in the treated group entering are 98:140, while the odds of the control group doing so are 88:140. In other words, individuals within the treated cohort are 1,12 times more likely than the control group to enter into the entrepreneurship process. An individual in the treated group entered the quickest at 3 days; the last entry was also conducted by someone in the treatment group after 2,654 days. The entries by the control group seem to be concentrated within a shorter time span: 393–2,063 days. The average time to enter into the entrepreneurship process is shorter by 147 days for the control group (1,037 days) than for the treatment group (1,184 days). In the treatment group, 6 individuals (42%) exited a firm they had founded. In the control group, 3 individuals (60%) exited a firm they had founded. The average time to exit in the treatment group is 1,797 days, whereas in the control group it is 2,118 days.

Some enter into entrepreneurship more than once; in total, 15 unique firms are founded in the treatment group (by 14 individuals) and 7 unique firms in the control group (by 6 individuals).

In total, 4 treatment firms have ceased to exist (27%), whereas in the control group 2 firms have ceased to exist (33%). The odds of a firm created in the treated group ceasing to exist are 8:54, while the odds of a firm in the control group doing so are 18:54. In other words, firms within the control cohort are 1,2 times more likely than the treatment group to cease to exist.

In total, firms founded by the treatment group survive for an average of 1,776 days. In the control group, firms survive for an average of 1,840 days. Firm survival is inclusive of those firms that cease to exist and those that are still alive at the end of the study.

In the control group there was a case of IPO for a firm founded, post-onset, while in the treatment there was no case of IPO.

I have set t_0 as the first day of the respective iteration for all subsequent tests. I follow each cohort for 3,440 days after the respective t_0 with a 128-day positive time lag for the control group.

ICB06: Descriptive Statistics and Missing Data

After correcting for ignorable missing data, a total of 101 individuals are represented in my ICB06 sub-sample, with 57 (56%) treated individuals and 44 (44%) in the control group. The average age of the groups at t_0 was 25,7 years; 73% of the participants were men and 27% were women. Business students represent 54% of the sample, almost 11% of the sample did have previous managerial experience, and a total of 15% had entrepreneurial experience. Medicine students were only represented in the treatment group (3% of the total and 9% of the group).

Next, I compare the means of each background variable in the ICB06 dataset to ascertain that the two course iteration groups are, indeed, equally distributed on observed characteristics. I do this independently of their potential explanatory power for any of the above-identified relevant outcome variables. For all binary outcome variables, I perform Pearson's chi-squared test on the respective means. I conduct t-tests with equal assumed variances for continuous variables. Again, the chosen p-value is 0,05, which is consistent with similar sample sizes in both entrepreneurship education and other domains and disciplines in terms of the probability of wrongly rejecting the null hypothesis if this is, in fact, true (Greenwald, 1975; Fanelli, 2012). A detailed summary of all tests and descriptive data follows below.

Table 12 summarizes the descriptive background data for the two respective groups.

Table 12: ICB06 individual-level descriptive data: Background.

Variables	Treatment (n=57)	Control (n=44)	p
Age (average, years)	25,7	25,8	0,92
Female	13	14	0,31
Engineering student	26	13	0,10
Business student	31	27	0,48
Managerial experience	9	2	0,07
Entrepreneurship experience	11	4	0,15

I conclude that I can continue to treat the two groups as twins: not only conceptually but also based on the fact that nothing in the data points to the opposite.

Table 13 summarizes the descriptive data of the individual-level outcome variables for the two respective cohorts.

Table 13: ICB06 individual-level descriptive data: Outcomes.

Variables	Treatment (n=57)	Std. Dev	Min	Max	Control (n=44)	Std. Dev	Min	Max
Entry	18	0,47	0	1	5	0,32	0	1
Re-entry	6	0,48	0	1	3	0,54	0	1
Entry speed (average, days)	1,646	891	162	3,440	1,369	598	648	1,992
IPO	0	0	0	0	0	0	0	0

Descriptive data for entrepreneurship entry and exit, specifically, can be found in Table 14.

Table 14: ICB06 individual-level descriptive data: Entry and exit.

Variables	Treatment (n=57)	Control (n=44)
Individuals that enter	18	5
Individuals that enter as teams	6	0
Individuals that re-enter	6	3
Individuals that exit	7	4

Descriptive data for firm-level output variables, specifically, can be found in Table 15.

Table 15: ICB06 firm-level descriptive data: Survival and performance.

Variables	Treatment (n=24)	Std. Dev	Min	Max	Control (n=8)	Std. Dev	Min	Max
Survival	21	0,33	0	1	4	0,53	0	1
Survival rate (average, days)	1,559	876	27	3,238	945	644	156	2,058
Extreme performance	0	0	0	0	0,05	0,23	0	1

Descriptive data for firm birth and firm death, specifically, can be found in Table 16.

Table 16: ICB06 firm-level descriptive data: Birth and death.

Variables	Treatment	Control
Firms founded	24	8
Firms that cease to exist	4	4
Firm survival (average, days)	1,559	945
Firms that issue an IPO	0	0

There is a total of 23 unique firm founders represented in the sample, starting firms over 3,440 days. In the treatment group a total of 18 individuals enter into entrepreneurship (32%), whereas in the control group a total of 5 individuals enter (11%). In the treatment group 6 individuals enter together with someone else from the cohort. In the control group no one did.

An individual in the treated group was the quickest to enter at 162 days and the last entry, also by someone in the treatment group, after 3,440 days. Entry in the control group seem to be concentrated within a shorter time span: 648–1,992 days. The average entry speed is shorter by 280 days for the control group (1,369 days) than for the treatment group (1,646 days).

The odds of individuals in the treated group entering are 18:39, while the odds of the control group doing so are 5:39. In other words, individuals

within the treated cohort are 3,13 times more likely than the control group to enter into entrepreneurship.[34]

Some firm founders founded more than one firm; in total, 24 unique firms are founded in the treatment group and 8 unique firms in the control group.

A total of 7 individuals (38%) exit in the treatment group. In the control group the respective number is 4 individuals (80%). The average time to exit in the treatment group is 799 days, whereas in the control group it is 931 days.

In total, 4 treatment firms have ceased to exist (17%). In the control group, also 4 firms have ceased to exist (50%). The odds of a firm created in the treated group ceasing to exist are 1:6, while the odds of a firm in the control group doing so are 3:6. In other words, firms within the control cohort are 3 times more likely than the treatment group to cease to exist.

In the treatment group, firms survive for an average of 1,559 days. In the control group, firms survive for an average of 945 days. Firm survival is inclusive of those firms that cease to exist and those that are still alive at the end of the study.

There were no cases of IPOs among firms founded in the ICB06 sub-sample. However, one treated participant joined another, not self-started, firm as CEO, which subsequently issued an IPO during the individual's tenure.

I have set t_0 as the first day of the respective iterations for all subsequent tests. I follow each cohort for 3,440 days after the respective t_0 with a 136-day positive time lag for the control group.

Summary

In summary, this thesis will exploit two different yet related natural experiments of higher entrepreneurship education. For this, the empirical context has been described and discussed. Specifically, I have collected

[34] This is substantially different from the effect size for PDV06 (1,12). Yet, given the sample sizes, inference of effect sizes should be drawn with some prudence (although there is good reason to think this "rule of thumb" is not necessarily applicable to this present test, which will be specifically discussed under "A Summary of the Empirical Results" below).

registry-based longitudinal data over ten years for 156 individuals across all composite outcomes of interest to the purpose at hand. Moreover, in order to be able to conduct robustness tests, population data have been collected for the entire population of courses of which the natural experiments make part.

Results

In this chapter, the empirical findings are analyzed, the hypotheses tested, and the results thereof presented. More specifically, I first test individual outcomes for the respective investments and then calculate the relative strength for realism and anti-realism entrepreneurship human capital in relation to the individual composite outcomes. A summary of the findings concludes the chapter.

Entrepreneurship Outcomes

Below I will test the three entrepreneurship outcomes of relevance to the thesis: entrepreneurship behavior (entry), followed by entrepreneurship performance (entry speed and re-entry), and concluding with business performance (survival, survival rate, and extreme performance). This will first be done for investments in realist entrepreneurship human capital, followed by investments in anti-realist entrepreneurship human capital. I will then address the relative strength for realism and anti-realism entrepreneurship human capital. The analytical strategy is outlined in detail each time a new technique is used.

Entrepreneurship Behavior: Entry

The purpose below is to test the relationship to entrepreneurship behavior as entry for investments in realist vis à vis anti-realist entrepreneurship human capital.

Entry and Investment in Realism Entrepreneurship Human Capital

This is an individual-level test. Investment into realist entrepreneurship human capital and entry are binary variables. All observations of entry are assumed independent, and the events considered are mutually exclusive and have a total probability of 1. More than 20% of the counts in a 2x2 observation matrix of entry are 5 or more. Therefore, Pearson's chi-squared test will be used as the technique to test the relationship (Larntz, 1978). Entry is followed per investment activity for 3,440 days after the respective investment start. It is then possible to evaluate how likely it is that any observed difference in entry between the courses over 10 years has arisen by chance.

The null hypothesis for the Pearson's chi-squared test is consistent with a particular theoretical distribution, that is to say, the frequency distribution of certain events observed in a sample. In other words, the null hypothesis in the context of this study is that the frequency distributions of the entries observed in my treatment and control groups are consistent with each other. The chosen p-value is 0,05, which is consistent with similar sample sizes in

both entrepreneurship education and other domains and disciplines in terms of the probability of wrongly rejecting the null hypothesis if this is, in fact, true (Greenwald, 1975; Fanelli, 2012).

Table 17: Pearson's chi-squared test.

Variables	Treatment (n=36)	Control (n=19)
Individuals that enter into entrepreneurship	14	6
Individuals that do not enter into entrepreneurship	22	13
		Pearson's chi2(1) = 0,287
		p = 0,592

Table 17 shows how observations of entry into entrepreneurship are distributed between the two groups. It is noted that the difference in observations is insignificant ($p > 0,05$). In other words, there is support for the null hypothesis of the test where the frequency distributions of the entries observed in the treatment and control groups are consistent with each other.

The research design allows self-selection to investment in realist entrepreneurship human capital to be studied as a moderator. Moreover, self-selected participating and self-selected non-participating students are concluded to be equivalently distributed on observed and unobserved characteristics. As the total number of observations of entry are few, it is not possible to conduct logistic regression for the control variables. This is because the maximum likelihood estimation of a logistic model suffers from small-sample bias. Therefore, penalized likelihood is chosen as the regression technique, which is a general approach that reduces small-sample bias in maximum likelihood estimation (King & Zheng, 2001; Pourahmadi, 2000). The results are outlined in Table 18 below.[35,36]

[35] As a robustness test, the same test was conducted for the population of PDV courses, with similar results as here (Appendix 3).

[36] As standard errors can be directly derived from the relationship between the coefficient and the z-value, and as separate population tests are conducted to specifically understand the accuracy of the sample mean to the population mean, standard errors are only reported individually as it is deemed to add additional information.

Table 18: Penalized likelihood logistic regression estimation.

	Coef.	z-Value
Treatment	0,14	0,23
Business study	1,27	1,61
Entrepreneurship experience	-2,11	-1,17
Managerial experience	-1,66	-1,05
Sex	2,05**	2,07
Age	0,00	0,04
Constant	-2,55	-1,13
N		55
Prob>X²		0,33
Wald X² (6)		6,86
* p < 0,10 ** p < 0,05 *** p < 0,01		

In summary, it is concluded that no support is found for either a direct or a positive relationship between investment in realist entrepreneurship human capital and entry.

Entry and Investment in Anti-realism Entrepreneurship Human Capital

The analytical strategy for this test follows that of the previous test.

Table 19: Pearson's chi-squared test.

Variables	Treatment (n=57)	Control (n=44)
Individuals that enter into entrepreneurship	18	5
Individuals that do not enter into entrepreneurship	39	39
		Pearson's chi2(1) = 5,770
		p = 0,016

Table 19 shows how observations of entry into entrepreneurship are distributed between the two groups. It is noted that the difference in observations is significant ($p < 0,05$). In other words, there is no support for the null hypothesis of the test where the frequency distributions of the entries observed in the treatment and control groups are consistent with each other.

The results of the penalized likelihood logistic regression are outlined in Table 20 below.[37]

Table 20: Penalized likelihood logistic regression estimation.

	Coef.	**z-Value**
Treatment	1,12*	1,96
Business study	0,55	1,02
Entrepreneurship experience	1,22	1,92
Managerial experience	0,89	1,64
Sex	1,66	1,87
Age	-0,11	-1,13
Constant	-1,23	-0,48
N		101
Prob>X²		0,02
Wald X² (6)		14,53
* p < 0,10 ** p < 0,05 *** p < 0,01		

In summary, it is concluded that the relationship between investment in anti-realist entrepreneurship human capital and entry is positive and direct.

[37] As a robustness test, the same test was conducted for the population of ICB courses, with similar results as here (Appendix 3).

Entrepreneurship Performance: Entry Speed

The purpose below is to test the relationship to entrepreneurship performance as entry speed for investments in realist vis à vis anti-realist entrepreneurship human capital.

Entry Speed and Investment in Realism Entrepreneurship Human Capital

To test differences in entry speed, duration modeling will be used as the technique. The spell variable is continuous and describes periods to entry post-investment. Entry is measured in days. The event variable for entry is binary. Data are left-censored from 1998 and right-censored 3,440 days after the first day of the course. Staggered entry speed is managed by a 128-day positive time lag for the control group. For the subsequent analyses, the observations are sorted based on duration from smallest to largest per duration to determine the number of observations at risk: n_j, the number of events: d_j, and the number of censored observations: m_j.

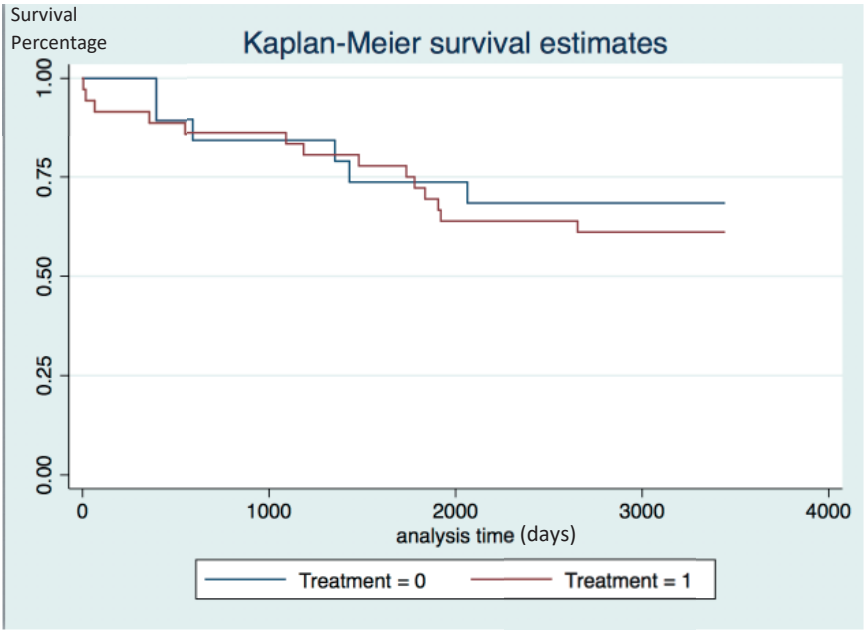

Figure 9: Nonparametric estimation, Kaplan-Meier survival curves for the two groups.

As depicted in the Kaplan-Meier survival curves for the two cohorts (Figure 9), the likelihood of not having entered decreased for the two groups as time goes on from t_0, with no dramatic graphically notable difference in survival rates between the treatment and control groups at t = 3,440. In other words, it does not seem as though those individuals who invested in realist entrepreneurship human capital have an increased likelihood to enter quicker than those who do not.

Table 21: Log-rank test for equality of survival functions.

Variables	Treatment (n=36)	Control (n=19)
Events observed	6	14
Events expected	7,07	12,93
		Chi2(1)=0,25
		p=0,616

As can be seen in Table 21, the log-rank test for equality between the survival functions confirms there to be no significant difference between the respective functions.

Assuming that the covariates are multiplicatively related to the hazard and noting that the hazard responds exponentially, it is assumed that each individual's change in age is likely to result in a proportional scaling of the hazard. Therefore, the semi-parametric model Cox proportional hazard function is opted for in lieu of a parametric model. The estimation can be found in Table 22.

Table 22: Cox proportional hazard function estimation.

	Haz. Ratio	z-Value
Treatment	1,17	0,33
Business study	2,43*	1,78
Entrepreneurship experience	0,00	0,00
Managerial experience	0,00	0,00
Sex	8,47**	2,04
Age	0,98	-0,25
N		55
Prob>X²		0,04
LR X² (6)		13,30
* p < 0,10 ** p < 0,05 *** p < 0,01		

As can be noted in Table 22 above, the treatment variable is not deemed significant.[38]

Taken together, neither a direct nor positive relationship is found to exist between investment in realist entrepreneurship human capital and entry speed.

Entry Speed and Investment in Anti-realism Entrepreneurship Human Capital

As in the previous test, duration modeling will be used as the technique to test differences in entry speed. Staggered entry is managed by a 136-day positive time lag for the control group.

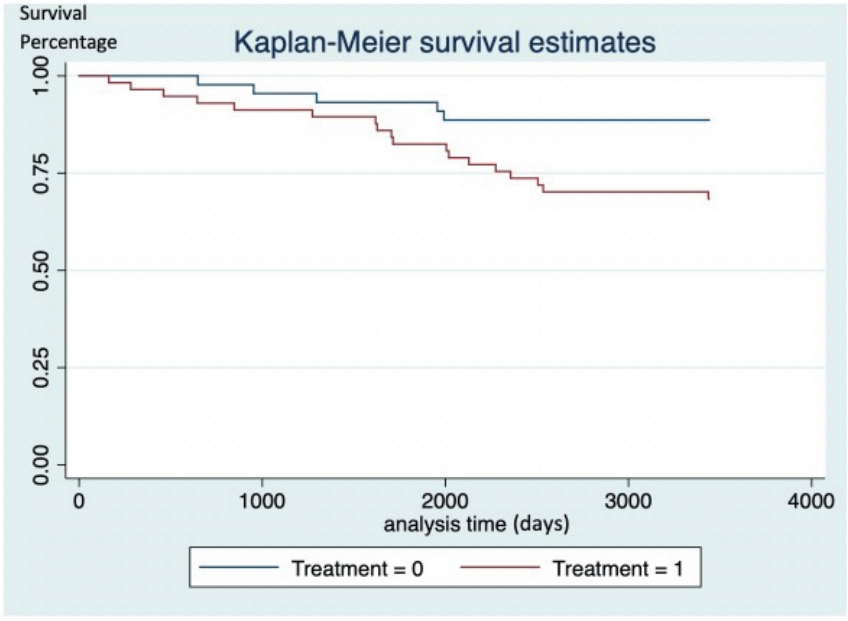

Figure 10: Nonparametric estimation, Kaplan-Meier survival curves for the two groups

[38] As added robustness tests, population tests (c.f. Appendix 3) and parametric models were estimated, with close to identical results as in the Cox proportional hazard model above.

As depicted in the Kaplan-Meier survival curves for the two cohorts (Figure 10), the likelihood of not having entered decreased for the two groups as time goes on from t_0. The Kaplan-Meier survival estimates for the respective cohorts follow the same decreasing form, with a graphically notable difference in survival rates between the treatment and control groups at t = 3,440. In other words, it seems as though those individuals who invested in anti-realist entrepreneurship human capital have an increased likelihood to enter quicker than those who do not.

Table 23: Log-rank test for equality of survival functions.

Variables	**Treatment (n=57)**	**Control (n=44)**
Events observed	18	5
Events expected	12,60	10,40
		Chi2(1)=5,13
		p=0,02

As can be seen in Table 23, the log-rank test for equality between the survival functions confirms the graphically identified difference as significant at the 5% level.

For the regression analysis of the direction of the semi-parametric model, the Cox proportional hazard function is again opted for in lieu of a parametric model.[39]

[39] As added robustness tests, population tests (c.f. Appendix 3) and parametric models were estimated, with close to identical results as in the Cox proportional hazard model above.

Table 24: Cox proportional hazard function estimation.

	Haz. Ratio	**z-Value**
Treatment	2,42*	1,71
Business study	1,67	1,15
Entrepreneurship experience	3,01**	2,15
Managerial experience	2,33**	1,91
Sex	6,30*	1,78
Age	0,87	-1,55
N		101
Prob>X²		0,00
LR X² (6)		22,19
* p < 0,10 ** p < 0,05 *** p < 0,01		

As can be noted in Table 24 above, treatment is deemed significant. Entrepreneurship experience, managerial experience, and sex function as direct effects, meaning those with such background are more likely to enter quicker post-investment into anti-realist entrepreneurship human capital than are those without. More specifically, those with entrepreneurship experience have a threefold higher hazard rate than those without, those with managerial experience have a twofold higher hazard rate than those without, and men have a six-fold higher hazard rate than women. No significant differences are found for those with or without a business major. Moreover, it is irrespective of age.

Entrepreneurship Performance: Re-entry

The purpose below is to test the relationship to entrepreneurship performance as re-entry for investments in realist vis à vis anti-realist entrepreneurship human capital.

Re-entry and Investment in Realism Entrepreneurship Human Capital

This is an individual-level test. Investment into realist entrepreneurship human capital and re-entry are both binary variables. Only those that enter can re-enter; thus, this test concerns a sub-set of the original sample. Observations of re-entry are assumed independent of each other, and the events are considered mutually exclusive, with a total probability of 1. The least count in a 2x2 observation matrix is less than 5. Therefore, Fisher's exact test is chosen as the technique to test the difference observed in the descriptive. It is then possible to evaluate how likely it is that any observed difference in re-entry between the respective realist human capital investment activities over 10 years has arisen by chance.

The null hypothesis for the Fisher's exact test is that the relative proportions of one variable are independent of the second variable; in other words, the proportions of one variable are the same for different values of the second variable. The null hypothesis of this study is that those that invest in realist entrepreneurship human capital and those that do not are equally as likely to re-enter into entrepreneurship. Contrary to non-exact tests, the p-value can be calculated exactly rather than relying on an approximation that becomes exact in the limit as the sample size grows to infinity. The results are as follows in Table 25.

Table 25: Fisher's exact test.

Variables	Treatment (n=14)	Control (n=6)
Individuals that re-enter into entrepreneurship	1	1
Individuals that do not re-enter into entrepreneurship	13	5
		Fisher's exact = 0,521

Table 25 shows how observations of re-entry and single entry are distributed between the two groups. The difference in observations is not found to be significant ($p > 0,05$). In other words, no support is found for the null

hypothesis of the test where those that invest in realist entrepreneurship human capital and those that do not would expose varying likelihoods to re-enter up to 10 years post-investment. Penalized likelihood logistic regression is not possible to conduct due to too few observations and collinearity.

Taken together, no relationship is found for investment into realist entrepreneurship human capital and re-entry.

Re-entry and Investment in Anti-realism Entrepreneurship Human Capital

The analytical strategy for this test follows that of the previous test. The results are depicted in Table 26.

Table 26: Fisher's exact test.

Variables	Treatment (n=18)	Control (n=5)
Individuals that re-enter into entrepreneurship	6	3
Individuals that do not re-enter into entrepreneurship	12	2
		Fisher's exact = 0,343

Table 26 shows how observations of re-entrants and single-entrants are distributed between the two cohorts. The difference in observations is not found to be significant. In other words, no support is found for the null hypothesis of the test where those that invest in anti-realist entrepreneurship human capital and those that do not would expose varying likelihoods to re-enter up to 10 years post-investment.

The results of the penalized likelihood logistic regression are outlined in Table 27 below.

Table 27: Penalized likelihood logistic regression estimation.

	Coef.	z-Value
Treatment	-0,75	-0,76
Business study	-0,51	-0,58
Entrepreneurship experience	0,51	0,66
Managerial experience	0,38	0,41
Sex	0,75	0,41
Age	-0,33	-1,04
Constant	7,79	0,96
N		23
Prob>X²		0,88
Wald X² (6)		2,39
* p < 0,10 ** p < 0,05 *** p < 0,01		

In sum, no relationship is found for investment into anti-realist entrepreneurship human capital and re-entry.

Business Performance: Survival

The purpose below is to test the relationship to business performance as survival for investments in realist vis à vis anti-realist entrepreneurship human capital.

Survival and Investment in Realism Entrepreneurship Human Capital

This is a firm-level test. Investment into realist entrepreneurship human capital and survival are both binary variables. Observations of survival are assumed independent of each other, and the events are considered mutually exclusive, with a total probability of 1. The least count in a 2x2 observation matrix is less than 5. Therefore, Fisher's exact test is chosen as the technique to test the difference observed in the descriptive data. It is then possible to evaluate how likely it is that any observed difference in survival between the

respective realist human capital investment activities over 10 years has arisen by chance.

The null hypothesis for the Fisher's exact test is that the relative proportions of one variable are independent of the second variable; in other words, the proportions at one variable are the same for different values of the second variable. The null hypothesis of this study is that firms founded by those that invest in realist entrepreneurship human capital and those that do not are equally as likely to survive. Contrary to non-exact tests, the p-value can be calculated exactly rather than relying on an approximation that becomes exact in the limit as the sample size grows to infinity. The results are as follows.

Table 28: Fisher's exact test.

Variables	Treatment (n=15)	Control (n=7)
Firms that survive	11	5
Firms that fail to survive	4	2
		Fisher's exact = 0,651

Table 28 shows how observations of survival and failure to survive are distributed between the two groups. The difference in observations is not found to be significant. In other words, no support is found for the null hypothesis of the test where those that invest in realist entrepreneurship human capital and those that do not would expose varying likelihoods to found firms that survive or fail to survive. Penalized likelihood logistic regression is not possible to conduct due to too few observations and collinearity.

Survival and Investment in Anti-realism Entrepreneurship Human Capital

The analytical strategy for this test follows that of the previous test. The results can be found in Table 29 below.

Table 29: Fisher's exact test.

Variables	Treatment (n=24)	Control (n=8)
Firms that survive	21	4
Firms that fail to survive	3	4
		Fisher's exact = 0,047

Table 29 shows how observations of survival and failure to survive are distributed between the two groups. The difference in observations is found to be significant ($p < 0,05$). In other words, the null hypothesis of the test where those that invest in anti-realist entrepreneurship human capital and those that do not would expose varying likelihoods to found firms that survive or fail to survive is not rejected. Penalized likelihood is chosen as the regression technique, for which the results are outlined below.

Table 30: Penalized likelihood logistic regression estimation.

	Coef.	z-Value
Treatment	1,60*	1,77
Business study	0,59	0,68
Entrepreneurship experience	-0,22	-0,20
Managerial experience	0,53	0,05
Age	0,08	0,38
Constant	-3,08	-0,54
N		32
Prob>X²		0,71
Wald X² (6)		3,75
* p < 0,10 ** p < 0,05 *** p < 0,01		

In summary, it is concluded that the relationship between investment in anti-realist entrepreneurship human capital and survival is positive and direct.

Business Performance: Survival Rate

The purpose below is to test the relationship to business performance as survival rate for investments in realist vis à vis anti-realist entrepreneurship human capital.

Survival Rate and Investment in Realism Entrepreneurship Human Capital

To test differences in survival rate, duration modeling will be used as the technique. The spell variable is continuous and describes periods of survival post-investment. Survival rate is measured in days. The event variable for survival is binary. Data are left-censored from 1998 and right-censored 3,440 days after the first day of the course. Staggered entry is managed by a 136-day positive time lag for the control group. For the subsequent analyses, the observations are sorted based on duration from smallest to largest per duration to determine the number of observations at risk: n_j, the number of events: d_j, and the number of censored observations: m_j.

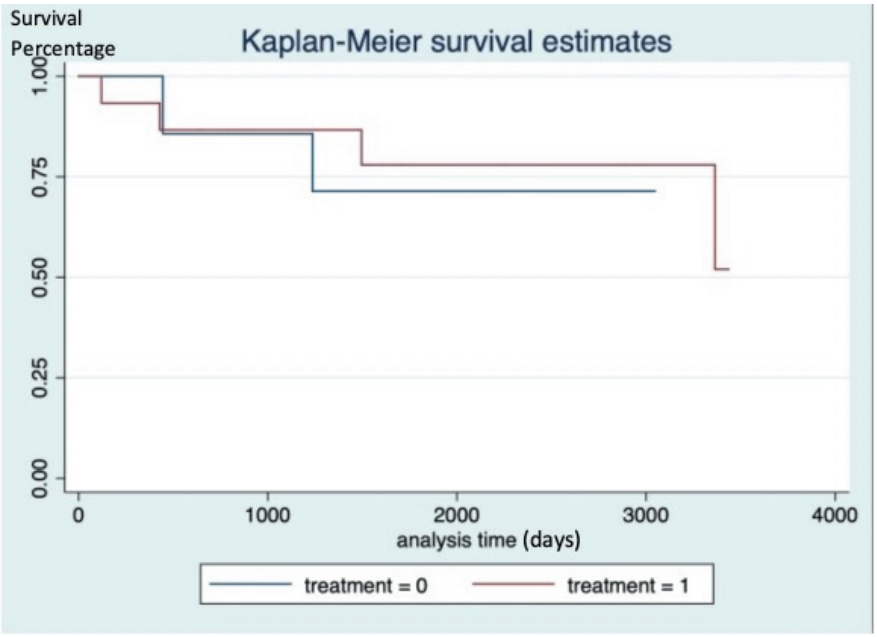

Figure 11: Nonparametric estimation, Kaplan-Meier survival curves for the two groups.

As depicted in the Kaplan-Meier survival curves for the two cohorts above (Figure 11), the likelihood of not having entered decreased for the two groups as time goes on from t_0. The Kaplan-Meier survival estimates for the respective cohorts follow the same decreasing form, with no dramatic graphically notable difference in survival rates between the treatment and control groups at t = 3,440. In other words, it does seem as though those firms founded by individuals who invested in realist entrepreneurship human capital have the same survival rate as those firms founded by someone who does not invest in realist entrepreneurship human capital.

The log-rank test for equality between the survival functions is outlined in Table 31 below.

Table 31: Log-rank test for equality of survival functions.

Variables	Treatment (n=15)	Control (n=7)
Events observed	4	2
Events expected	4,41	1,59
		Chi2(1)=0,16
		p=0,689

The log-rank test for equality between the survival functions in Table 31 confirms there to be no difference between the respective functions.

Assuming that the covariates are multiplicatively related to the hazard, and noting that the hazard responds exponentially, it is assumed that each individual's change in age is likely to result in a proportional scaling of the hazard. Therefore, the semi-parametric model Cox proportional hazard function is opted for in lieu of a parametric model. The results are found in Table 32.

Table 32: Cox proportional hazard function estimation.

	Haz. Ratio	z-Value
Treatment	0,72	-0,34
Business study	0,44	-0,67
Age	0,87	-0,62
N		22
Prob>X²		0,60
LR X² (6)		1,88
* p < 0,10 ** p < 0,05 *** p < 0,01		

As can be noted in Table 32 above, the treatment variable is not deemed significant.[40] Managerial experience, entrepreneurship experience, and sex are omitted due to multicollinearity.

[40] As added robustness tests, population tests (c.f. Appendix 3) and parametric models were estimated, with close to identical results as in the Cox proportional hazard model above.

Taken together, neither a direct nor positive relationship is found to exist between investment in realist entrepreneurship human capital and entry speed.

Survival Rate and Investment in Anti-realism Entrepreneurship Human Capital

The test technique is the same as that of the previous test, but staggered entry is managed by a 136-day positive time lag for the control group. As depicted in the Kaplan-Meier survival curves for the two cohorts below, the likelihood of survival decreased for the two groups as time goes on from t_0.

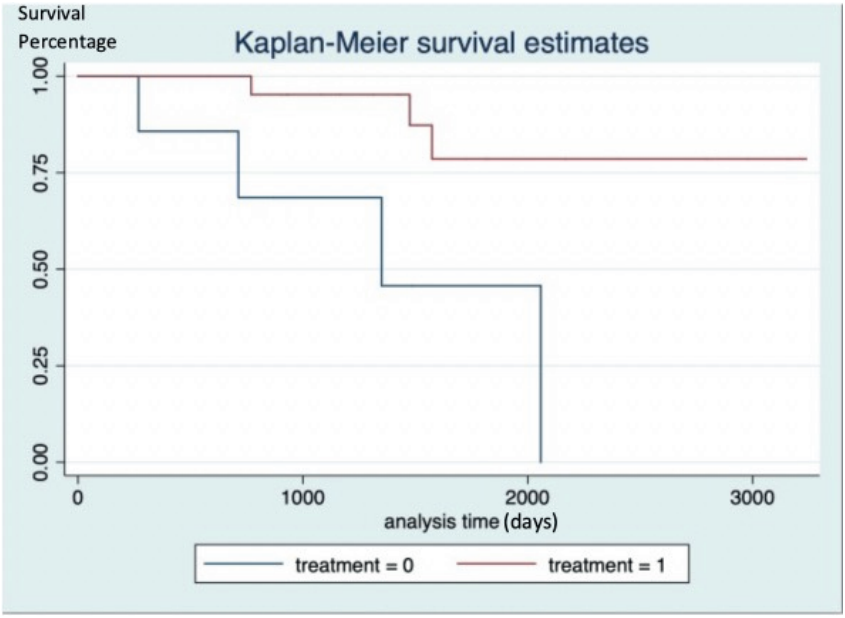

Figure 12: Nonparametric estimation, Kaplan-Meier survival curves for the two groups.

As can be seen in Figure 12 above, the Kaplan-Meier survival estimates for the respective cohorts follow the same decreasing form, with a graphically

notable difference in survival rates between the treatment and control groups at t = 3,440. In other words, firms founded by those individuals who invested in anti-realist entrepreneurship human capital seem to have an increased likelihood to survive longer than those who do not.

The log-rank test for equality between the survival functions is outlined in Table 33 below.

Table 33: Log-rank test for equality of survival functions.

Variables	**Treatment (n=24)**	**Control (n=8)**
Events observed	3	4
Events expected	5,85	1,15
		Chi2(1)=8,61
		p=0,003

The log-rank test for equality between the survival functions outlined in Table 33 confirms the graphically identified difference as significant at the 5% level.

Assuming that the covariates are multiplicatively related to the hazard, and noting that the hazard responds exponentially, it is assumed that each individual's change in age is likely to result in a proportional scaling of the hazard. Therefore, the semi-parametric model Cox proportional hazard function is opted for in lieu of a parametric model. The results can be seen in Table 34 below.

Table 34: Cox proportional hazard estimation.

	Haz. Ratio	z-Value
Treatment	0,03**	0,33
Business study	0,61	1,78
Entrepreneurship experience	1,23	0,00
Managerial experience	1,69	0,00
Sex	.	.
Age	0,55	0,17
N		32
Prob>X²		0,05
LR X² (6)		11,20
* p < 0,10 ** p < 0,05 *** p < 0,01		

As can be noted in Table 34 above, the treatment variable is deemed significant, with no direct effects identified among control variables.[41]

Taken together, a direct and positive relationship is found for investment in anti-realist entrepreneurship human capital and survival rate.

Business Performance: Extreme Performance

The purpose below is to test the relationship to business performance as extreme performance for investments in realist vis à vis anti-realist entrepreneurship human capital.

Extreme Performance and Investment in Realism Entrepreneurship Human Capital vis à vis Investment in Anti-realism Entrepreneurship Human Capital

In total, there is one instance of extreme performance in a firm founded in the 2+2 treatment and control samples. The instance occurred within the control group of the investment in realism entrepreneurship human capital.

[41] As a robustness test, parametric models were estimated, with close to identical results as in the Cox proportional hazard model.

In conclusion, and therefore, no support is found for the hypothesis that the relationship to extreme performance would be stronger between investment in realism entrepreneurship human capital than for investment in anti-realism entrepreneurship human capital.

Table 35: Extreme performance tabulation.

Variables	**Investment in Realism Entrepreneurship Human Capital**		**Investment in Anti-realism Entrepreneurship Human Capital**	
	Treatment (n=15)	Control (n=7)	Treatment (n=24)	Control (n=8)
Extreme Performance	0	1	0	0

Relative Strengths for Realism and Anti-realism Entrepreneurship Human Capital

To compute the relative strength for investments in realism and anti-realism entrepreneurship human capital, their absolute strength needs to be weighted to their typological distances $|D_{II,PDV06}|$ and $|D_{II,ICB06}|$. The relative ratio for the respective distances holds that $|D_{II,PDV06}| > |D_{II,ICB06}|$. However, direct and positive, albeit weak, relationships were noted for investment in anti-realist human capital and entrepreneurship behavior, entrepreneurship performance, and business performance, but in no instance was either a direct or a positive relationship found for investment in realism entrepreneurship human capital and entrepreneurship outcomes. Consequently, due to the lack of relationship of realism entrepreneurship human capital investments to entrepreneurship outcomes, no relative strength can be computed.

Summary

Below a summary of the findings and the respective tests are provided.

Table 36: Summary of findings and tests.

Outcome	HC_R	HC_{AR}	Test	Robustness tests	Ratio
Entrepreneurship Behavior					
Entry	0	+	Pearson's Chi-squared	Yes	AR>R
Entrepreneurship Performance					
Entry speed	0	+	Log-rank Cox Proportional Hazard	Yes	AR>R
Re-entry	0	0	Fisher Exact	n/a	AR=R
Business Performance					
Survival	0	+	Pearson's Chi-squared	n/a	AR>R
Survival Rate	0	+	Log-Rank Cox Proportional Hazard	Yes	AR>R
Extreme Performance	0	0	-	n/a	AR=R

Conclusions

In conclusion, the results of the hypotheses testing are outlined below:

> **H_{01a}:** There is no direct positive relationship between investment in realist Type II entrepreneurship human capital and entrepreneurship behavior. **FAIL TO REJECT**

H_{01b}: There is no direct positive relationship between investment in realist Type II entrepreneurship human capital and entrepreneurship performance. **FAIL TO REJECT**

H_{01c}: There is no direct positive relationship between investment in realist Type II entrepreneurship human capital and business performance. **FAIL TO REJECT**

H_{02a}: There is no direct positive relationship between investment in anti-realist Type II entrepreneurship human capital and entrepreneurship behavior. **REJECT**

H_{02b}: There is no direct positive relationship between investment in anti-realist Type II entrepreneurship human capital and entrepreneurship performance. **REJECT**

H_{02c}: There is no direct positive relationship between investment in anti-realist Type II entrepreneurship human capital and business performance. **REJECT**

H_{03a}: Investment in Type II realist entrepreneurship human capital is less related to entrepreneurship behavior than is investment in Type II anti-realist entrepreneurship human capital. **FAIL TO REJECT**

H_{03b}: Investment in Type II realist entrepreneurship human capital is less related to entrepreneurship performance than is investment in Type II anti-realist entrepreneurship human capital. **FAIL TO REJECT**

H_{03c}: Investment in Type II realist entrepreneurship human capital is less related to business performance than is investment in Type II anti-realist entrepreneurship human capital. **FAIL TO REJECT**

Discussion

In this chapter, the principal empirical and theoretical findings are summarized and discussed. First, I summarize and discuss the empirical findings, and specifically examine their relevance in the context of their power and accuracy. Next, I outline the principal theoretical findings in relation to the literatures on entrepreneurship, HCT and entrepreneurship education respectively. Additional insights of relevance to the purpose at hand that have been acquired throughout the study are brought up as deemed relevant. Finally, the generalizability of the results and implications for educators, policy makers as well as suggestions for future research are outlined.

Conclusions and Discussion

Epistemology is a central issue in the entrepreneurship and education debate, respectively. This thesis takes stock of this insight and marries it to the realization that the discussion is overlooked in the literature on entrepreneurship education outcomes. More specifically, it is suggested that the examination of varying epistemic ideas within entrepreneurship education is a promising avenue to explore the observation that sometimes entrepreneurship education "works," and sometimes not.

Against this background, this thesis has first dealt with developing a theoretical framework for explaining and predicting outcomes of entrepreneurship education. Throughout, it has been discussed what constitutes entrepreneurship education under varying philosophical realms and its implications for outcomes. Next, the relationships between varying types of entrepreneurship education as a function of philosophical vantage points, on one hand, and entrepreneurship outcomes, on the other, were empirically assessed.

For the empirical investigations, data were collected from two natural experiments of two entrepreneurship courses with different epistemic designs. In total, 292 individuals were represented in the treatment and control groups, of which the study was able to follow 156. Registry data were collected on background variables for all individuals up to 18 years prior and on outcome variables, especially concerned with entrepreneurship behavior, entrepreneurship performance, and business performance, annually between 2006 and 2016. As a consequence of the experimental design, it was possible to infer causality. Because of the similarity of the courses, it was possible to compare and contrast them. Analyses were primarily conducted as simple means comparisons, survival analysis, penalized likelihood regression, and Cox proportional hazard regression. The empirical analyses addressed somewhat different group characteristics, and suitable tests were chosen in relation to these settings. To conduct robustness tests, the sample size was extended considerably by considering the entire population of students that graduated from the program in question (July 1, 1998–July 1, 2013).

Below, the central results are summarized and discussed in relation to previous research. Additional insights of relevance to the purpose at hand

that have been acquired throughout the study are brought up as deemed relevant. Moreover, the generalizability of the results and implications for theory and practice are outlined as well as suggestions for future research.

A Summary of the Empirical Results

The prime issue addressed by the empirical analysis was to explore the relationship between entrepreneurship education and entrepreneurship outcomes under varying philosophical realms. In relation to why entrepreneurship education sometimes "works," and sometimes not, the analysis yielded primarily unexpected findings.

Entrepreneurship Education under Realism

In contrast to what was expected, this thesis finds no empirical arguments in favor of a direct positive relationship between realism entrepreneurship education and entrepreneurship outcomes. This concerns all composite outcomes studied: entrepreneurship behavior, entrepreneurship performance, and business performance. Moreover, to the greatest extent possible, it was assured that these findings were not subject to selection bias (methodological design and background checks) nor chance, for example, by being a "bad course" (population tests). Previous empirical investigations into the relationship between entrepreneurship education and entrepreneurship outcomes have yielded similar or close to similar results, albeit with no consideration for what is perceived to constitute entrepreneurship education. Provided the theoretical backdrop, this suggest that realism entrepreneurship education as operationalized in this thesis does not "work." Yet, as it is the deviation from the ideal type that is posited to predict variability in outcomes this does not suggest that *all* realism entrepreneurship education does not work. However, provided the philosophical vantage point of this thesis, this is both unexpected and problematic, specifically as it suggests that realism entrepreneurship is less congruent to entrepreneurship than predicted. This will be specifically discussed in detail under "Theoretical Contributions" below. Next, the impact of anti-realism entrepreneurship was assessed on the same variables.

Entrepreneurship Education under Anti-realism

In contrast to realism entrepreneurship education, there are several empirical arguments in favor of anti-realism entrepreneurship education to be positively and directly related to entrepreneurship outcomes. This concerns all composite outcomes studied but not all operationalizations. More specifically, the results were found for entrepreneurship behavior as entry into entrepreneurship, entrepreneurship performance as entry speed, and business performance as survival and survival rate. Thus, no relationship was found for re-entry and extreme performance. For entry speed, some additional information of relevance was noted: graphically it seems as if the entry speed difference is manifested around 1,800 days, i.e., approximately five years after the onset of the education.[42] In the same ways as for realism entrepreneurship education, it was to the greatest extent possible assured that the empirical findings were not subject to selection bias (methodological design and background checks) and/or chance (population tests). Some previous empirical investigations into the relationship between entrepreneurship education and entrepreneurship outcomes have yielded similar or close to similar results, albeit with no consideration for what is perceived to constitute entrepreneurship education. This suggests that anti-realism entrepreneurship education as understood in this thesis is an instance of entrepreneurship education that "works." As for realism, this finding is both unexpected and problematic.

The Relative Strength of Varying Philosophical Realms

Because realism entrepreneurship education was unrelated to all studied entrepreneurship outcomes, it was not possible to calculate a relative magnitude of strength for the relationship between realism and anti-realism entrepreneurship education and outcomes.[43] This is unexpected; while theory

[42] Entrepreneurship and managerial experience as well as sex were found to moderate this relationship (stronger with the respective backgrounds/experiences) for the sample, although not corroborated by the population robustness tests.

[43] In doing so, anti-realism entrepreneurship education would be *infinitely* more related to entrepreneurship outcomes than realism entrepreneurship education.

does support both realism and anti-realism entrepreneurship education to be related to outcomes in a direct and positive manner, the philosophical vantage point of this thesis, however, expects realism entrepreneurship education *ceteris paribus* to be *more* related to outcomes than entrepreneurship education from the perspective of anti-realism.[44] For example, some of the realism literature in favor of anti-realism entrepreneurship education to be related to entry argues that effectuation logic (albeit unintentionally) trains individuals in discovering opportunities where others see risk. This argument, however, is indifferent with regard to anti-realism entrepreneurship education *also* being related to business performance. This is why it is important to study entrepreneurship behavior, entrepreneurship performance, and business performance as composite outcomes. Otherwise, the links between, for example, discovery/risk and exploitation/success remain unclear. Arguably, discovering opportunities where other see risk should, if anything, mean that those opportunities are riskier and should consequently not exhibit increased performance at the group level. The empirical analysis did indeed, however, find anti-realism entrepreneurship education to do so.[45]

Moreover, while anti-realism entrepreneurship education was related to all composite outcomes, realism entrepreneurship education was not related to any of them.

Empirical Power and Accuracy

The overall methodological design, the process of data collection, and the robustness test of treatment quality[46] warrant overall high quality in regard to the rigor of the results. In total, however, while 292 individuals were represented in the treatment and control groups, the study was able to follow only 156. Moreover, those individuals were unevenly distributed over two

[44] This is especially remarkable as the purpose of realism entrepreneurship education is to "produce more and better entrepreneurs," while the purpose of such anti-realism education is more directed toward "support the inner growth of the entrepreneur."

[45] The effect of by chance *not* being able to participate remains unclear and unaccounted for.

[46] The treatment quality test concluded that the observed variation in the dependent variables between epistemic designs was unlikely to occur by chance and/or to be atypical for the respective treatment procedure.

sub-samples of realism (36 treated and 19 controls) and two sub-samples of anti-realism (57 treated and 44 controls). Therefore, the relationship between rigor vis à vis absolute and relative sample sizes merits further discussion, for which two important observations stand out.

First, while data were systematically missing for international students, treating these data in the samples as not missing at random, and instead using maximum likelihood to impute missing data, renders the same conclusions for the samples throughout. This implies that i) the missing data across the dependent variables are unrelated to other independent variables as well as the dependent variables themselves and that ii) the results would remain if the sub-sample sizes were extended to their original sizes, albeit with stronger power across all tests. Taken together, this suggests that the de facto precision of the estimates is more accurate than for other tests of equal sample sizes.[47]

Second, the main study follows only one singular treatment of each respective Type II epistemic instance. However, extending the sample sizes to the *entire populations* of treated individuals from all previous iterations of the respective courses (a total of 214 + 342 individuals after list-wise correction for international students) still rendered similar or close to similar results.[48,49] This implies that the probability of wrongly rejecting the null hypothesis if this is, in fact, true is smaller than the risk determined by the chosen p-value of 0,05. Thus, it is plausible that the power of the results is stronger than estimated.

Taken together, while sample size can be an approximator for concerns regarding estimate precision and statistical power, it is likely that the precision herein is more accurate and the power stronger than what meets the eye by considering the absolute and relative sample sizes alone. Yet, in recognition of the actual sub-sample sizes and prudence in overstating effects, the central empirical contributions of this thesis are considered to be the findings that i) the perceived status of knowledge plays a decisive role for entrepreneurship education impact and that ii) all else equal, aspects of anti-realism

[47] In other studies in the domain of entrepreneurship education, international students have been omitted in order to increase the validity of the results (Wilson et al., 2007).

[48] Unfortunately, population data were not available for re-entry and business performance.

[49] To the best of my knowledge, the control groups themselves constitute the entire population of control groups per epistemic instance.

entrepreneurship are necessary for entrepreneurship congruence to materialize. Henceforth, and therefore, those are regarded as "strong" empirical conclusions. Other empirical findings discussed above, such as actual effect sizes and relative magnitudes of composite outcomes and specific operationalizations, are regarded as weaker empirical conclusions that to a lesser extent underpin the discussion on theoretical contributions.

Summary of Empirical Findings

In summary, the empirical findings are promising as they suggest that the perceived status of knowledge plays a decisive role for entrepreneurship education impact, and that epistemic fit is an important influencer. In itself, this is expected as both the education literature and entrepreneurship literature argue for it in their respective domains. Nevertheless, this thesis finds both strong and weak empirical arguments in direct contrast to the theoretical predictions made as to *why* this interaction would happen: particularly the provision of creative activities. This is surprising, and the implications are discussed below.

Theoretical Contributions

This research aims to contribute to three bodies of literature: entrepreneurship theory, HCT, and the literature on entrepreneurship education. In relation to all three bodies of literature, this thesis underscores the importance of the behavioral aspects of entrepreneurship and the promising but marginalized role of philosophy in knowledge advancements.

Implications for Entrepreneurship Theory

This thesis shares the view of entrepreneurship as the process by which new economic activity emerges. Moreover, it is recognized that the nexus of individuals and opportunities forms the basis of this process. Therefore, the implications of this thesis for entrepreneurship will be discussed in relation to entrepreneurship as a process of emergence, the role of individuals therein, and the traits of opportunities. Specifically, due to the epistemic

consequences following the theoretically derived conditions that favor the creation of new unobservables in the entrepreneurship process (e.g., new means-end relationships that previously did not exist), specific attention will be devoted to the intersection of realism entrepreneurship and creation activities.

The Problematic Role of Creation Activities Under Realism

This thesis finds empirical arguments in direct contrast to the theoretical predictions made as to *why* perceptions of knowledge matter to the entrepreneurship process. More specifically, the findings suggest that anti-realism entrepreneurship is more congruent to the entrepreneurship process than realism entrepreneurship is. However, as previously demonstrated, realism and anti-realism indeed overlap in considerations of what may constitute entrepreneurship. From the perspective of epistemology, the crucial bond between realism and anti-realism that may explain overlaps beyond mere "happy coincidences" are activities of creation. Creation activities refer to individual-level activities that strive to form new or modify existing unobservables. In the context of entrepreneurship education those unobservables are commonly knowledge, opportunities or the entrepreneurship process itself. Under anti-realism, activities of creation are recognized as central to entrepreneurship. The realism literature accepts them but at most as holding peripheral importance to the entrepreneurship process. However, the empirical findings not only conclude anti-realism as more congruent to the entrepreneurship process across all composite outcomes, they also do not find evidence for *any* systematic relationship between realism entrepreneurship and entrepreneurship outcomes. Consequently, by studying the epistemic overlaps that may explain this conundrum, a conclusion materializes: creation activities necessarily play more than a peripheral role in the bringing about of entrepreneurship outcomes through the entrepreneurship process; more specifically, the theoretical backdrop and empirical findings of this thesis suggest activities of creation as *vital* for the process to unfold at all. How can this be?

From the perspective of contemporary realism literature, this is problematic. First, mainstream realism entrepreneurship literature is underpinned by an epistemology that is "conservative" in its view on

creation. This conservatism is reflected in the taken-for-granted understanding i) that opportunities form without the participation of individuals, ii) that it is possible to make valid claims about them, iii) that knowledge about opportunities is unrestricted by individual's observational powers, and iv) that what we know about them is a description of an underlying reality. For example, while scholarship about strong-premise opportunities allows for some forms of creation at the margin of the entrepreneurship process, both weak- and strong-premise opportunities refuse knowledge to be equal to individuals' attachment of meaning to raw data, and in general realism refutes that any form of subjective interpretation may play a role in the forming of an opportunity. Following the same logic, the contemporary realist literature contends that there is a finite number of opportunities. Consequently, allowing for creation activities to play a central role in such a process of entrepreneurship would disrupt the epistemological assumptions underpinning the view itself. Second, for realism to *at all* accept activities of creation is in itself, in fact, an important contradiction that "hides in plain sight" of the literature but that has received surprisingly little attention. Consequently, contemporary realism literature has still to come to terms with the implications of accepting activities of creation altogether. For example, is there a finite number of opportunities, or can individuals participate in the forming of new ones? Accepting activities of creation under realism as it is understood in contemporary literature makes the answer to that question complicated. In fact, allowing for individuals to form or modify unobservables—even if only at the margin—suggest the latter alternative. Nevertheless, the literature has come to accept this complexity and today resides on this view. In any event, to then extend that permission and allow creation to play a *central* role in the entrepreneurship process in order to explain the empirical results of this thesis is incompatible with the contemporary realism entrepreneurship literature in general as well as its metaphysical view on knowledge specifically.

In sum, the implications of the empirical findings for entrepreneurship theory are complex as they are incompatible with mainstream understandings of the entrepreneurship process in contemporary realism scholarship. Specifically, activities of creation are seemingly central to the entrepreneurship process, which is something that realism entrepreneurship

refutes. Therefore, alternative ways to interpret the findings will be discussed below.

Alternative Ways to Interpret the Findings

The literature that in retrospect laid the ground work for contemporary realism views of entrepreneurship largely regarded entrepreneurship as a process of creation; for example, Gartner (1988) discussed the "creation of new organizations" and Low and MacMillan (1988) the "creation of new enterprise," respectively. Over time, and especially following the introduction of the nexus view, however, entrepreneurship has increasingly been recognized as a process of *coming about* or *emergence* (c.f., e.g., Wiklund et al., 2011; Davidsson, 2015). By transitioning from a process of creation toward a largely self-governing process of emergence, the literature has made scholarly advancements, and, for example, been able to clarify the core tasks of individuals to acts of discovery and exploitation as well as limit individuals' direction of agency toward opportunities that are present as undiscovered entities of reality (either as weak- or strong-premise opportunities). Still, those advancements struggle with a set of core problems pertaining primarily to its conceptualization of opportunities, for example: i) how is entrepreneurial failure for a given opportunity explained beyond the individual's inability to assess lucrativeness, or ii) why is it that the properties of opportunities are recognized by some but not others? The most sophisticated challenge that scholars still have to overcome, however, relates to construct clarity in general and how scholars should operationalize opportunities ante successfully exploited by an individual specifically (c.f. e.g. Shane, 2000).

In response to those and other challenges, several avenues have been suggested as alternatives for entrepreneurship scholarship to move beyond an emergence-centric understanding of the entrepreneurship process and thus be able to more generously allow for activities of creation. So far, those attempts still have some way to go to gain broader scholarly traction, and, to the best of my knowledge, and more importantly, only in rare instances have they from the perspective of philosophy of science successfully combined

realism with a generous permission for activities of creation.[50] Therefore, to successfully explain the empirical conclusions of this thesis from the perspective of realism, it is necessary to deepen our understanding on the epistemological assumptions of the contemporary realism literature in entrepreneurship while also broadening the horizon of what constitutes reality.

Entrepreneurship from the Perspective of Critical Realism

So far, this thesis has treated reality as flat and unidimensional, with no boundary between, for example, the actual and the not-yet realized future. Relaxing this implicit assumption would, however, make it possible to sense-make the surprising and problematic results of this thesis from another form of realism. More specifically, there is an alternate variation of realism that considers reality in a hierarchy of unique and separated domains: *critical* realism. Critical realism has so far received but sparse scholarly interest in the field of entrepreneurship (Ramoglou & Tsang, 2016) and is still to enter mainstream opportunity centric literature. It has, however, assumed a more discussed and debated position in other social sciences, such as information systems science. Critical realism was introduced in the philosophy of science debate in the late 70s (Bhaskar, 1978), arguing that everything is not necessarily what we perceive it to be. This is the *critical* aspect of the approach. The approach, however, still remains committed to the realism doctrine and still argues an objective reality to exist. Contrary to unidimensional ontologies, the objective reality as regarded within critical realism is argued to exist at a deeper level than other parts of reality. This deep level of reality consists of observables, unobservables, and the laws that govern their relationships. Those entities are independent of the cognition of individuals, but they govern individuals' impressions of reality. Thus, the impression of an object—observable as unobservable—may be different than the object itself. Contemporary realism in entrepreneurship "trusts" sensory data and argues that individuals cannot attain knowledge about something that they

[50] An example of this is reflected in the works of Alvarez, Young, and Barney (2010), who indeed aim to combine realism with permission for creative agency. However, Alvarez et al. treat reality synonymously with materiality, which realism does not.

cannot experience. Conversely, critical realism argues that senses are incomplete and that they may misdirect individuals from the objective reality of entities. Therefore, critical realism conditions knowledge on the experience of individuals, groups, or cultures. Against this background, critical realism concludes that scholars are indeed able to map the mechanisms that govern reality and explain causal relationships but that those insights are rarely useful to *coram eo* predict or generalize relationships. This is an important restriction of critical realism for entrepreneurship theorizing: in only rare cases does it allow for *prospective* scholarly work (Davidsson, 2017; Wood, 2017).

Under critical realism, the formation of unobservables is considered to be a process that step-by-step transitions through the different domains of reality. The domains include those of the real, the actual, and the empirical. The process starts in the domain of the real, where fixed and objective structures and mechanisms exist. These structures and mechanisms are governed by systems of causal relationships that in turn require individuals to be translated into actual events in the domain of the actual. More specifically, critical realism contends that individuals' modes of cognition—imagination, belief, and knowledge—and mental constructs are what brings unobservables from a setting that may generate them, but does not necessarily have to, into one that does: the domain of the actual. Opportunities that subsequently become experienced by individuals and observed have entered the domain of the empirical. It is in this domain that scholars are reduced to empirically studying them.

Rather than being discovered or created, opportunities under this view are actualized. Critical realism can thus be considered to transform the role of the individual from someone who identifies, evaluates, and exploits opportunities to someone who *actualizes*, *enriches,* and *experiences* them. Individuals thus actualize opportunities from the actual and enrich them in the domain of the real. From the perspective of critical realism, this is why activities of creation are vital for the entrepreneurship process to unfold, altogether. Moreover, from the perspective of critical realism, Ramoglou and Tsang (2016) describe opportunities as "…more like the (unobservable) intrinsic power of a seed's propensity to germinate into a flower—versus the flower itself" (Ramoglou & Tsang, 2016, p. 416).

Henceforth, such opportunities will be referred to as "propensity opportunities" (because they are objectively possible, rather than objectively existing). As the domain of the empirical is the only domain that scholars may study the actualization and enrichment process respectively of propensity opportunities by default lies beyond possible systematic knowledge accumulation of propensity opportunities. This produces important limitations for prospective use of opportunity-based entrepreneurship theories committed to the critical realism realm. The implications of this merit future scholarly attention, especially for scholars to be able to position propensity opportunities inside a framework to both explain and *predict* the relationship between entrepreneurship education and its outcomes.

The critical realist approach still maintains that opportunities exist independently of cognition but that the modes thereof are required for individuals to actualize them.[51] This is why properties of opportunities are "discovered" by some but not others. The premise of critical realism is thus that a large but finite number of opportunities exist (in the domain of the real) but that not all possible structures and mechanisms are actualized (into the actual). The imagination, belief, and knowledge that individuals employ to actualize the opportunity into the actual, however, makes the number of opportunities that can be experienced in the domain of the empirical infinite. This is why and how critical realism remains committed to realism but considers activities of creation necessary for the individual to advance the entrepreneurship process. Consequently, what contemporary realism understands as activities of creation are granted a central position in the entrepreneurship process under critical realism. To the purpose at hand, this is promising. Importantly, this does not necessarily negate the existence of weak- and strong-premise opportunities in the domain of the actual: they may be variations of propensity opportunities as a function of individuals' cognition.

[51] The variation of these modes of cognition, moreover, explains *why* properties of opportunities remain unattended to by some but not others.

Summary of Implications for Entrepreneurship Theory

This thesis implies that entrepreneurship is a process of creation rather than one of sole self-governed emergence. This is problematic for contemporary realism literature. Critical realism, however, is a promising avenue to explain the empirical findings of this thesis while also overcoming inherent challenges to the contemporary opportunity literature. This metaphysical approach to entrepreneurship appreciates the core role of the individual in the entrepreneurship process to *actualize*, *enrich,* and *experience* opportunities. This also explains why activities of creation are important to entrepreneurship education: they allow students to experience actualization of opportunities from the actual and enrichment of them in the domain of the real.

Implications for Human Capital Theory (HCT)

Scholarly efforts designed to understand the transfer of knowledge into entrepreneurship outcomes requires considerable methodological rigor. In the entrepreneurship education literature, HCT has proven a promising avenue to conduct such undertakings. Moreover, HCT is a knowledge-centric theory. It regards knowledge as transferable and conceptualizes it as an unobservable with traits. Against this background, the implications of this thesis for HCT will be specifically discussed in light of the developed HCT-based typology for which three implications stand out.

First, it was suggested that the likelihood by which a given human capital investment produces outcomes is predictable. Specifically, it was theoretically derived that this likelihood varied as a function of the traits of both the investment activity and the human capital stock. The traits of the investment activity were captured by the epistemic fit criterion, wherein epistemic fit becomes a proxy for how well the philosophical vantage points toward an HC-specificity and its medium, respectively, of a given investment activity synchronize. As theory does not discriminate the epistemic fit criterion to entrepreneurship as a specificity nor to education as a medium for transferability, general HCT benefits from this insight as epistemic fit is an important influencer of the specific human capital investment effectiveness

of a given investment activity. Importantly, while it was possible to operationalize epistemic fit, it remains a proposed dimension of human capital effectiveness that was not tested in itself.

Second, in the HCT literature, stocks of human capital are widely accepted to come in many forms, of which the dominating view is general vis à vis specific. Yet, while the notion of specific human capital is of vintage in the HCT literature, there is still much scholarly advancement to be made. This thesis contributes to the HCT literature by demonstrating how the entity of specific can vary as a function of the congruence of the stock to the entity. The notion of entrepreneurship congruity is an important contribution to HCT because it is an example that demonstrates the benefit of extending taken-for-granted views of what constitutes a given specificity. The notion of industry conditions is an important contribution because it demonstrates how human capital stock may vary between being general and specific depending on what is valuable to the entity of specificity at a certain point in time (Sherer, 2011). In the context of entrepreneurship, those are novel concepts that diversify ways of understanding what entrepreneurship-specific human capital de facto is.

Third, a connection between realism human capital and anti-realism human capital was empirically established. Although the empirical results of the latter tests were unexpected, varying ideas of realism-committed epistemologies allowed theorizing on the underlying reasons (c.f. below). It should be mentioned that conceptualizing knowledge through HCT from the vantage point of anti-realism should be done with caution as HCT directs the same ontological status to unobservables as knowledge as it does to observables, whereas anti-realism denies this proposition.

Lastly, and of a more general note, while being a seemingly trivial concept, I have not, to the best of my capacity, been able to identify other human capital frameworks or models that explicitly predict the likelihood by which outcomes evolve, neither in the broader human capital literature nor the entrepreneurship outcome literature. This was unexpected as it is widely accepted that not all human capital investments lead to outcomes. Nonetheless, the degree to which human capital investment activities are "successful" in producing outcomes is a central concern to both scholars and practitioners.

Taken together, this thesis speaks in favor of a less monolithic view of human capital in general and in the context of entrepreneurship (where the stock is still emerging) specifically. Moreover, it is proposed that increased attention should be devoted to the view of knowledge in relation to what is expected to transfer in a given human capital investment activity.

Implications for the Entrepreneurship Education Literature

Taken together, the entrepreneurship education literature paints a picture of entrepreneurship education as something that sometimes works, and sometimes not, and of which we remain scarcely informed as to why that is. As noted in the preface, however, this is a body of literature that in general, and when concerning outcomes specifically, is primarily empirically focused. Unfortunately, many of those contributions are concluded to reside on weak methodological rigor. This is a concern. It is, for example, possible to link lower methodological quality to findings of overstated positive entrepreneurship education effects (Martin et al., 2013). Consequently, the entrepreneurship education literature has offered but sparse guidance on, and foundation for, investigating what underpins the seemingly straightforward relationship between entrepreneurship education and outcomes. Against this backdrop, this thesis has adopted an interdisciplinary approach. Below, the implications of this approach and the results are discussed.

Entrepreneurship Education and Entrepreneurship Outcomes

First, it is rare that the literature on entrepreneurship education defines the concept of entrepreneurship education. In instances that do define the concept, it is usually done solely from the perspective of either entrepreneurship or education, rarely from both perspectives, and usually as a function of its outcomes. This thesis, however, suggests entrepreneurship education to be recognized as the process designed to facilitate the acquisition or modification of knowledge about the process by which new economic activity emerges, and that the interaction of individuals and opportunities forms the basis of this latter process. This thesis thus provides a proposition of what entrepreneurship education is, which resides on broadly established literature from both the fields of entrepreneurship and

education. To the best of my knowledge, this definition provides properties to the concept of entrepreneurship education so that counterexamples can be reduced to other forms of education. In practice, this recognition makes it possible to decisively and systematically separate entrepreneurship education from what it is not—for example, business education for non-business students—which other definitions rarely do. Consequently, the theoretically derived recognition of what constitutes entrepreneurship education is a definition that future scholarly efforts on entrepreneurship education can benefit from, including beyond those specifically concerning outcomes.

Second, a central premise of this thesis is that understandings of what constitutes entrepreneurship education are invariably related to conceptions of reality and knowledge. Building on the above-derived definition and by recognizing that realism and anti-realism represent irreconcilable positions on unobservables—for example, opportunities—it was possible to provide a classification of entrepreneurship education (see Table 2). Provided the void of classifications in entrepreneurship education overall, this is as rare as it is important. Moreover, the classification is based on variations of what constitutes entrepreneurship education under varying philosophical realms and resides on modern understandings of what constitutes both entrepreneurship and education. Consequently, apart from being a classification itself, the dimensions and empirical relationships that were developed for the classification provide a grouping logic and characterizations that may be used for the development of additional or different classes of entrepreneurship education beyond this thesis. This allows increased comprehension and understanding for entrepreneurship education in general while also providing prospects to conduct a variety of empirical investigations.

Third, this thesis has also advanced the scholarship on entrepreneurship education outcomes. It was demonstrated that almost all outcome studies of entrepreneurship education disregard outcomes of higher Kirkpatrick levels. This thesis, however, has done just that. This has been conducted across a total of six operationalizations across three different composite outcomes: entrepreneurship behavior, entrepreneurship performance, and business performance. In the context of entrepreneurship education, I have not been

able to find any previous gathering of data for the issuance of an IPO (extreme business performance). Moreover, Martin et al. (2013) outline four considerations that researchers of entrepreneurship education outcomes should bear in mind to achieve the highest possible rigor.[52] To the best of my knowledge, this thesis has met all of these. Thus, the contributions herein should be meaningful and relevant to the field of entrepreneurship education in general and to the literature on outcomes of entrepreneurship education specifically. The thesis has also theoretically derived relationships between entrepreneurship education and outcomes previously not acknowledged. For example, a novel operationalization of entrepreneurship performance (studied as accumulated entrepreneurship behavior in relation to one or several entrepreneurial processes[53]) was developed and tested: entry speed. This operationalization regarded how soon an individual took on the role of becoming an entrepreneur. The empirical analyses, which gathered original data, deemed the relationship between participation in entrepreneurship education and entry speed as significant. Thus, the empirical evidence provides a rich plethora of evidence to substantiate and broaden aspects of the observation that "entrepreneurship education sometimes works, but sometimes not." Moreover, the results are presented in a way that they should complement future research in a systematic and transparent way and thus inform the scholarship on entrepreneurship education outcomes in a valid and accessible manner.

In sum, the approach adopted in this thesis allows an increased comprehension and understanding of entrepreneurship education in general while also providing prospects to conduct a variety of both theoretical and empirical investigations. Future scholarly efforts can specifically benefit from a novel definition of entrepreneurship education, a classification as a function of variabilities of perceptions of reality and knowledge, and both substantiated and broadened ways to address outcomes.

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[52] The four recommendations for scholars are i) to include pre- and post-EET [entrepreneurship education and training] interventions, ii) ideally at several points in time post-intervention; iii) to include treatment and control groups; iv) and that random assignment to treatment and control groups should be carried out.

[53] This is different from business performance, which relates to the performance of the *firm*, but similar to Kim et al. (2015), who study time through the entrepreneurial process.

The Importance of Epistemology in Entrepreneurship Education

The epistemological debate is silent yet implicitly vivid in the entrepreneurship and the education literature, respectively: an intersection of research fields that the entrepreneurship education literature inevitably resides on. Yet, this thesis has documented that epistemology is a largely overlooked aspect in the entrepreneurship education literature itself. In relation thereto, four implications stand out.

First, the findings herein should be promising as they suggest that the rich extant literature of epistemology can effectively support scholarly advancements on entrepreneurship education in general and on why and how outcomes from entrepreneurship education emerge specifically. This has been demonstrated in several ways. For example, the epistemology literature made possible such broad contributions as the development of a unique classification of entrepreneurship education as well as an understanding of why the empirical results in this thesis are not necessarily on a course of collision with the contemporary entrepreneurship literature.

Second, this research explains *why* epistemology is crucial to understand the likelihood of a given entrepreneurship education activity to "work," or not. This is because both education and entrepreneurship processes are influenced by individuals' views on reality and conceptions of knowledge. The intricate interrelations between these considerations were specifically captured in the purposely designed typology, which is further discussed in detail below.

Third, epistemology impacts the extent to which creation activities are allowed and how close to, or far from, the epicenter of both the process of learning and entrepreneurship it is placed. Throughout this thesis, there were no empirical results in favor of creation as something of only peripheral importance. Instead, creation is concluded as crucial in the learning process in order for individuals to successfully be able to attach meaning to the data being transferred, and equally as crucial in the entrepreneurship process as it allows for the objectively possible propensity opportunities to "germinate into flowers."

Fourth, epistemology also allows theorizing on entrepreneurship education activities that deny the central propositions of realism but still give rise to outcome effectiveness. Effectuation is one such example in which

experience in discovering/actualizing opportunities where others see risk is inadvertently provided. The permission of both ontologies for systematic opportunity discovery by the formation of new means-end relationships is another example. These are illustrations of why entrepreneurship education under anti-realism can be congruent to the entrepreneurship process in general, but also to specific aspects thereof, as regarded from the perspective of realism.

In summary, this thesis marshals illustrations on the overall rich promise of integrating epistemology into the entrepreneurship education literature. More specifically, epistemology has allowed a balance between parsimony and completeness in addressing such important issues as why entrepreneurship education sometimes works, but other times not, and what role creation is allowed to play under realism.

A Typology of Outcome Effectiveness: Implications and Refinements

In light of the shallow theoretical grounding of the entrepreneurship education outcome literature, the intricate relationship between epistemology and outcomes, and the broader promise of HCT in advancing scholarship on outcomes, an interdisciplinary framework was deemed necessary. In response to this, a typology of outcome effectiveness was developed. The typology described i) why epistemology directs the degree to which a given entrepreneurship education activity considers the entrepreneurship process and industry conditions, respectively, and ii.) how well the philosophical vantage points toward entrepreneurship and education, respectively, of a given entrepreneurship education activity synchronize (which indirectly acts as both input and constraint to each other). The reciprocal interdependence between these two epistemic influences therefore underlies the respective relationships to entrepreneurship outcomes. In relation to the entrepreneurship education literature, two implications and two suggested improvements stand out.

First, the epistemic fit criterion and entrepreneurship congruity are proposed constructs that are novel to the literature. More specifically, epistemic fit is a proxy for how well the philosophical vantage points toward entrepreneurship and education, respectively, of a given education activity

synchronize. Moreover, entrepreneurship congruity is a proxy for the degree to which a given entrepreneurship education activity considers the entrepreneurship process and industry conditions, respectively. Thus, entrepreneurship congruity is an extension of entrepreneurship relatedness. This is a more contemporary view, which acknowledges the many aspects of the entrepreneurship process and which specifically regards entrepreneurship beyond a reduction to owner-manager tasks. In retrospect, it is plausible that the typology is too generous when including industry conditions and that the parsimony of the typology consequently suffers. Still, industry conditions are important to the comprehensiveness of entrepreneurship congruity as they underscore the sensitivity of context to the entrepreneurship process, in this instance specifically in relation to the likelihood of outcomes evolving *over time*.

Second, while the hypothesized constructs of epistemic fit and entrepreneurship congruity themselves were not tested, it was possible to empirically operate them. More specifically, a modeling method to assess Euclidean distance deviation from the ideal types of the typology was derived. The attributes were derived from the developed classifications of entrepreneurship education and the weight of each individual attribute estimated. This is important as the proximity used to predict outcome effectiveness can be used and/or altered in other studies. Thus, the typology consists of a set of factors of which the conditions are discussed and contrasted to each other. This warrants that the domain of the theoretical framework is clearly distinct to entrepreneurship education and that developments thereof are of broader value to the entrepreneurship education literature specifically.

Third, for all ideal types, the reciprocal interdependence between the entrepreneurial congruity and epistemic fit of an entrepreneurship education activity was concluded to underlie the respective relationships to entrepreneurship outcomes. Thus, the crucial interaction is between entrepreneurship process relatedness and epistemic vantage point as both are input and constraint to each other. The complex relationships that those proposed constructs hold with each other are all novel and empirically operationalized. Consequently, the typology is able to provide propositions in a clearly distinct domain that future scholars can build new theory on. It

is broadly recognized in the entrepreneurship literature that empirical investigations require methodological rigor: this, however, underscores the necessity to also deepen the theoretical grounding of the literature. In my view, the sheer necessity to develop such complex relationships to understand *why* outcomes evolve demonstrates the largely understated convolution of the issue. Nonetheless, other ideal types may be developed to further complement the typology.

Fourth, this is a typology that remains committed to realism. This follows the realism vantage point of this thesis. This also dictates the theories used to develop it. Consequently, from the perspective of anti-realism, the typology is unlikely to garner much promise: the assumptions underlying the typology are incompatible with the anti-realism doctrine.

In sum, the proposed typology provides a theoretical framing for the relationship between entrepreneurship education and entrepreneurship outcomes that regards previously disregarded aspects of the relationship. This typology allows scholars to recognize the multidimensionality of the relationship while exploring the intricacies that underlie the observation that sometimes entrepreneurship education works, and sometimes not.

Summary of Implications for the Entrepreneurship Education Literature

Taken together, the entrepreneurship education literature benefits from this thesis as it demonstrates that varying views of knowledge explain *how* and *why* outcomes of entrepreneurship education do not emerge (completely) haphazardly. Hopefully, it also does so in such a way that more scholars will aim to further deepen the theoretical grounding of the entrepreneurship education literature while also finding it worthwhile.

Implications for Practitioners

Implications for Policy Makers

Thirty years in to the global story of entrepreneurship education, one can note that entrepreneurship education initiatives continue to grow in both numbers and form but that policy makers have little guidance in allocating

their support thereto. This is because knowledge and understanding of the relationship between entrepreneurship education and outcomes still remains in its nascence. Based on the findings in this thesis, one synopsis and five recommendations can be made.

First, as a synopsis, the findings of this research should be encouraging as the high methodological rigor herein warrants that entrepreneurship education can be worthwhile for policy. Higher entrepreneurship education can, indeed, lead to a plethora of desired outcomes: entrepreneurship behavior, entrepreneurship performance, and business performance. Moreover, it seems as if the emergence of those outcomes is not (completely) arbitrary. It requires, however, time for outcomes to emerge.

Second, entrepreneurship education should be recognized as a distinct type of education, different from, for example, business education for non-business students. That is not to say that all types of entrepreneurship education look the same. Instead, based on understandings of what constitutes both entrepreneurship and education, different forms of entrepreneurship education can be identified. Following this realization, this thesis has proposed two classes of entrepreneurship education (see Table 2). The attributes of those classes can be thought of as "check-lists" to distinguish what is entrepreneurship education, and what is not.

Third, different forms of entrepreneurship education can be linked to different outcomes. Put differently, there is no "one-size-fits-all" approach to entrepreneurship education. Instead, initiatives to support entrepreneurship education should be directed to a plethora of activities, which all together recognize the task of entrepreneurs as something beyond the owner-manager and which remain sensitive to the context in which it is carried out (e.g., industry conditions or the institutional environment).

Fourth, for some time still, the data upon which policy can be formed will remain fragmented. This is partly because much of the available evaluation efforts concern individual programs without much generalizability beyond that very program but also because of an overall low methodological rigor in the literature. There is some *evidence*, and it makes entrepreneurship education look to be a promising avenue for increasing entrepreneurship behavior, entrepreneurship performance, and business performance. However, much remains to be understood as to why entrepreneurship

education sometimes works, and sometimes not. Nonetheless, this thesis makes it clear: stakeholders' perception of knowledge plays a part in this process. Moreover, this thesis has provided the first (to the best of my knowledge) empirical evidence of entrepreneurship education outcomes at the higher education levels. Interestingly enough, the evidence corroborates research from other levels too: sometimes it works, but not always.

Fifth, policy can play an important role in increasing both the theoretical and empirical foundations of our understanding for entrepreneurship education outcomes. This is because policy can influence programs to consider future evaluation in their design. If programs are designed to be evaluated, then scholars will be able to more effectively and systematically evaluate programs whilst also gathering evidence. Nevertheless, specific attention needs to be directed to issues of ethics in relation to, for example, the organization of an experimental setup of enrolments.

Lastly, but not least, this thesis warrants that comprehension of what constitutes entrepreneurship education is not always straightforward. Moreover, many extant outcome evaluations of entrepreneurship education cannot be used to provide insights beyond the given program. These are two examples of why experts that are bilingual in entrepreneurship *and* education should be given central roles in the design of decision frameworks that govern the allocation and long-term evaluation of initiatives.

Taken together, entrepreneurship education can play a vital role in policy making, and policy making can play an important role in the development of entrepreneurship education. As a general guideline, the support of entrepreneurship education programs requires a combination of risk-taking and patience to see the outcomes emerge.

Implications for Educators

The findings in this thesis should be encouraging to educators: outcomes from higher entrepreneurship education do not emerge (completely) haphazardly. That said, this research is not framed as a contribution to pedagogy. Yet, based on the findings, five recommendations are made for educators.

First, this thesis suggests that it is beneficial for educators of entrepreneurship to have insights into the scholarly domain of entrepreneurship. This is because entrepreneurship congruence influences specifically what students learn. This may seem to be a trivial implication, yet it is rarely so in practice. This speaks to curricular designs of entrepreneurship that remain flexible to alter the contents based on new findings and advances in the scholarly domain of entrepreneurship. This, however, is not to say that understandings of what (should) constitute entrepreneurship in practice should be limited to practitioners of scholarly work.

Second, activities of entrepreneurship education should ensure that students are generously allowed to apply creativity in the entrepreneurship process. This is a seemingly straightforward conclusion but one that merits emphasizing. Over the past decade, entrepreneurship education has seen a rich influx of teaching tools that put creative agency at the forefront of education, for example, rapid prototyping and business model canvas.[54] In light of the findings, their popularity is encouraging. If, however, they are related to outcomes, and if so, why, still remains to be seen.

Third, in this research a business planning course was deconstructed as an instance of realism-entrepreneurship education. This, however, does not imply that all courses of business planning are so (c.f., e.g., Honig, 2004). Consequently, the findings of this thesis do not necessarily suggest that business planning is a teaching tool not worth exploring. This should be promising to entrepreneurship educators as business planning remains the most popular way of teaching entrepreneurship. Nonetheless, this thesis corroborates both anecdotal evidence and contemporary research that point to caution in using "traditional" business planning in entrepreneurship classrooms.

Fourth, entrepreneurship education is a process designed to facilitate the acquisition or modification of knowledge about entrepreneurship. Unfortunately, albeit making things so much more exciting, we still know relatively little about entrepreneurship. Consequently, *what* knowledge educators should focus on is not clear. The theoretically derived propositions

[54] Another commonly used method that this thesis lends validity to is lean start-up. In essence, lean is a realism-committed methodology that allows entrepreneurs to systematically use the scientific method whilst concentrating the efforts of students on creative exercise.

in this research, however, suggest that rather than supporting individuals in designing a self-governed process, educators should concentrate on students' understanding of the relationships that govern the structures and mechanisms of the entrepreneurship process. Teaching and training activities of process configuration, such as design thinking and ideation processes, are examples of such initiatives.

Lastly, what it means to educate individuals in entrepreneurship varies extensively between classrooms. This thesis, however, underscores the importance of explicit epistemological considerations on behalf of the educator. Epistemological considerations themselves, however, are complex. Thus, this research suggests that entrepreneurship educators benefit from formal teacher training. Consequently, entrepreneurship education is an activity that requires a certain degree of expertise beyond entrepreneurship experience. That is not to say that experience of the entrepreneurship process on behalf of the educator is unimportant, but the findings of this research do not suggest that it is necessary to successfully transfer or modify knowledge about entrepreneurship.

Taken together, entrepreneurship education is an expertise in its own right and a complex undertaking that requires more than entrepreneurship experience can give. The findings of this thesis specifically suggest that educators of entrepreneurship should focus on the creative agency of individuals while simultaneously ensuring that a deeper understanding on the mechanics of the entrepreneurship process is provided.

Limitations

In the context of limitations, research relevance is a practice of parsimony as simplifications de facto need to be made, while in tandem the simplifications cannot be too generous such that the research is left misrepresenting reality. Against this background, six specific limitations should be highlighted.

First, while the data were collected as registry data, the registry design defined what data were accessible. As previously mentioned, it was not possible, due to the registry design, to account for role models, such as parents' entrepreneurship, as ingoing human capital. This is unfortunate as parental entrepreneurship is an important predictor of entrepreneurship

behavior (Andersson & Hammarstedt, 2010, 2011; Lindquist et al., 2015). For the population studied, it was not possible to collect business performance measures for robustness tests. These are clearly limitations of the present study, and it is likely that an even more representative model of reality would have emerged had it been accessible.

Second, following the choice of data collection, data were systematically missing for international students. The technical implications in general, and in the light of alternative full information maximum likelihood estimation specifically, have been discussed previously. Yet, this is a limitation that, had these data been accessible, also could increase the total explained variance of the research.

Third, in terms of the research design, the data were collected from higher education in Sweden alone. Because of the entrepreneurship activity having taken place in Sweden, generalization beyond higher education in other innovation-driven economies should be done with caution. Such geographical considerations of high rigor outcome studies of entrepreneurship education are not rare (c.f., e.g., Campos et al., 2017) but still limit the external validity.

Fourth, it follows from the research design that a time-lag exists in the sample, which, in turn, limits the internal validity. This lag has been accounted for by both technical adjustments and by attempting to identify other potential implications thereof (of which none were found but many ruled out). Importantly, there is no known pollution of dual or multiple participation of the subjects between the respective sub-samples. Yet, this remains a limitation, which may limit the internal validity of the research.

Fifth, it was observed that impact studies of entrepreneurship education primarily focus on lower Kirkpatrick levels in general and entrepreneurial intentions specifically. Following this, and a discussion about the obscure promise of this line of inquiry, it was decided to instead study dependent variables as behavior and performance at the individual and firm levels. Although outside the scope and purpose of this research, it is still possible that the introduction of dependent variables of lower levels would render a clearer modeling of reality.

Taken together, these are the central limitations following the chosen approach. Yet, the theories and models developed are reasoned to be simplified but relevant for what they are intended to explain and predict.

Future Research

Entrepreneurship education in general and in relation to outcomes specifically is a maturing field of study. Consequently, while this thesis is able to advance knowledge on the relationship, much remains. The possibilities of further research have emerged and received some attention throughout this thesis. The most important avenues for future research following this work are outlined below. It is my sincere hope that these avenues are deemed encouraging for future research and that any exploration of them will result in confirmation, refinement, or dispute of my own research. Five general directions for future research stand out.

First, critical realism was suggested as a way to understand the otherwise contradictory findings of this research. However, the implications for what constitutes both entrepreneurship education and outcomes under critical realism remain. Specifically, what does an entrepreneurship education focused on training individuals in "actualizing, enriching, and experiencing" opportunities in fact entail? This is especially intriguing as actualization and enrichment lies beyond possible empirical exploration. Such an academic effort would add a third decisive class of entrepreneurship education whilst also making it possible to relate critical realism entrepreneurship education to specific outcomes. This would broaden our understanding for entrepreneurship, entrepreneurship education, and entrepreneurship outcomes altogether.

Second, activities of creation in relation to entrepreneurship education merit further research. Activities of creation have been concluded as the one possible overlap between realism and anti-realism that can explain the empirical findings of this thesis. Consequently, understanding what those activities are (and what they are not), how they are governed, and their relationships to outcomes is promising to advance the entrepreneurship education literature. It is likely that the extant literature on creativity and innovation can contribute specifically thereto.

Third, the proposed typology warrants much testing and refinement. Future research should especially test the ingoing first-level constructs, their relationships and relative importance. This would advance the parsimony of the typology while also increasing comprehension for outcomes of entrepreneurship education. Specifically, testing the relative outcomes of all four quadrants should empirically assert the validity of the theoretical derivation that underpinned their development. In general, the entrepreneurship education literature has underscored the methodological rigor needed to understand impact. The thesis corroborates this. However, a typology is a complex theory that regards intricate interrelations of constructs while also accounting for the predictability of a given empirical phenomenon. The necessity to develop such a complex framework to understand impact shows that efforts directed toward entrepreneurship education outcomes also require theoretical rigor. Further refinement of this typology, or other novel development of interdisciplinary approaches to elevate the outcome literature is welcomed.

Fourth, from the perspective of critical realism, the primary qualities of knowledge are stable, but the secondary-level qualities of human capital are dependent upon the ontological vantage points taken (while the first-level qualities of human capital remain, the second do not). This thesis thus indicates that effective transfer of entrepreneurship-related human capital benefits from investment activities designed to allow for stable primary qualities of knowledge, but where the secondary qualities come in according to the "investor's" cognition. Put differently, it is plausible that epistemic fit is a more multidimensional construct than suggested so far. More specifically, it is likely that epistemic fit also needs to consider the epistemological orientation of the participants.

Lastly, I offer a specific recommendation for broader entrepreneurship scholarship. The posited entrepreneurship congruence of critical realism suggests that it is a promising avenue to address construct clarity of opportunities. Such an undertaking should specifically consider the several layers of traits that critical realism ascribes to unobservables and how they transition across layers of reality. It is plausible that such work will clarify opportunities as a structural mechanism that plays the same cause-effect role

for individuals' agency and new economic activity as the market mechanism does for the inescapable meeting of supply and demand.

Taken together, entrepreneurship education and outcomes remain an important and worthwhile endeavor for researchers. Future research pertaining thereto will do well to wander into the territories of epistemology while in tandem focusing on methodological rigor.

References

Literature

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2),179–211.

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, *84*(5), 888.

Aldrich, H. (1999). *Organizations evolving*, London: Sage.

Allison, P. (2012). *Handling missing data by maximum likelihood*. Keynote presentation at the SAS Global Forum, April 23, 2012, Orlando, Florida.

Alvarez, S. A., & Barney, J. (2007). *A creation theory of entrepreneurial opportunity formation*. Working paper. Retrieved from http://www. uky. edu/Ag/AgEcon/seminars/alvarez-may07-txt. pdf.

Alvarez, S. A., & Barney, J. B. (2013). Epistemology, opportunities, and entrepreneurship: Comments on Venkataraman et al. (2012) and Shane (2012). *Academy of Management Review*, *38*(1), 154–156.

Alvarez, S. A., Barney, J. B. (2010). Entrepreneurship and epistemology: The philosophical underpinnings of the study of entrepreneurial opportunities. *Academy of Management Annals, 4*(1), 557–583.

Alvarez, S. A., Barney, J. B., & Young, S. L. (2010). Debates in entrepreneurship: Opportunity formation and implications for the field of entrepreneurship. In *Handbook of entrepreneurship research* (pp. 23–45). Springer, New York, NY.

Amaral, A. M., Baptista, R., & Lima, F. (2011). Serial entrepreneurship: Impact of human capital on time to re-entry. *Small Business Economics*, *37*(1), 1–21.

Andersson, L., & Hammarstedt, M. (2010). Intergenerational transmissions in immigrant self-employment: Evidence from three generations. *Small Firm Economics, 34,* 261–276.

Andersson, L., & Hammarstedt, M. (2011). Transmission of self-employment across immigrant generations: The importance of ethnic background and gender. *Review of Economics of the Household, 34,* 261–276

Ardichvili, A., Cardozo, R., & Ray, S. (2003). A theory of entrepreneurial opportunity identification and development. *Journal of Business Venturing*, *18*(1), 105–123.

Astebro, T. B., & Hoos, F. (2016). The effects of a training program to encourage social entrepreneurship. *HEC Paris Research Paper No. SPE-2016-1128*.

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

Bailey, K. D. (1994). *Typology and taxonomies. An introduction to classification techniques.* Thousand Oaks: Sage.

Baker, T., Miner, A. S., & Eesley, D. T. (2003). Improvising firms: Bricolage, account giving and improvisational competencies in the founding process. *Research Policy*, *32*(2), 255–276.

Baker, T., & Nelson, R. E. (2005). Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative Science Quarterly*, *50*(3), 329–366.

Barton, A. H. (1955). The concept of property-space in social research. In Paul F. Lazarsfeld & Morris Rosenberg (Eds.), *The language of social research* (pp. 40–53). New York: Free Press.

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education.* Chicago: University of Chicago Press.

Becker, G. S. (1993). *Human capital: Theoretical and empirical analysis, with special reference to education*. Chicago: University of Chicago Press.

Becker, G. S. (2013). *The economic approach to human behavior*. Chicago: University of Chicago Press.

Ben-Peretz, M., Brown, S., & Moon, B. (2004). *Routledge international companion to education*. London: Routledge.

Berger, P. L., & Luckmann, T. (1991). *The social construction of reality: A treatise in the sociology of knowledge* (No. 10). London: Penguin UK.

Bhaskar, R. (2013). *A realist theory of science*. London: Routledge.

Bhaskar, R. (2014). *The possibility of naturalism: A philosophical critique of the contemporary human sciences*. London: Routledge.

Biesta, G. J., & William, N. C. B. E. (2003). *Pragmatism and educational research (philosophy, theory, and educational research series)*. USA: Rowman & Littlefield Publishers, Inc.

Blair, M. M. (2011). An economic perspective on the notion of "human capital." In *The Oxford handbook of human capital* (pp. 49–71). Oxford, UK: Oxford University Press

Blaug, M. (1976). The empirical status of human capital theory: A slightly jaundiced survey. *Journal of Economic Literature*, *14*(3), 827–855

Boissin, J. P., & Emin, S. (2007). *Les étudiants et l'entrepreuneuriat: l'effet des formations* (No. halshs-00325869).

Brown, N. C. (2017). *Studies in philosophical realism in art, design and education* Switzerland: Springer International Publishing.

Brüderl, J., Preisendörfer, P., & Ziegler, R. (1992). Survival chances of newly founded business organizations. *American Sociological Review*, 227–242.

Byrne, J., Fayolle, A., & Toutain, O. (2014). 15. Entrepreneurship education: What we know and what we need to know. In *Handbook of research on small business and entrepreneurship* (pp. 261–288). USA: Edward Elgar Publishing Ltd.

Campbell, D. T. (1974). Evolutionary epistemology. In P. A. Schilpp (Ed.), *The philosophy of Karl Popper* (pp. 413–463). Lasalle: Open Court.

Campos, F., Frese, M., Goldstein, M., Iacovone, L., Johnson, H. C., McKenzie, D., & Mensmann, M. (2017). Teaching personal initiative beats traditional training in boosting small business in West Africa. *Science*, *357*(6357), 1287–1290.

Carter, S. M., & Little, M. (2007). Justifying knowledge, justifying method, taking action: Epistemologies, methodologies, and methods in qualitative research. *Qualitative Health Research*, *17*(10), 1316–1328.

Cassar, G. (2006). Entrepreneur opportunity cost and intended venture growth. *Journal of Business Venturing*, *21*, 610–632.

Casson, M. (1982). *The entrepreneur: An economic theory*. Oxford: Martin Robinson.

Chandler, G. N., & Jansen, E. (1992). The founder's self-assessed competence and venture performance. *Journal of Business Venturing, 7*, 223–236.

Chrisman, J. J., & McMullan, W. E. (2004). Outsider assistance as a knowledge resource for new venture survival. *Journal of Small Business Management*, *42*(3), 229–244.

Clifford, N. B., & Obaro R. C. (2017). Human capital development on employee performance (A case study of Ignatius Ajuru University of Education and University of Port-Harcourt Choba, River State), (1–10). *Proceedings of the Second American Academic Research Conference on Global Business, Economics, Finance and Social Sciences* (AAR17New York Conference).

Cohen, L. M. (1999). *Philosophical perspectives in education*. Retrieved from https://oregonstate.edu/instruct/ed416/PP3.html.

Colombo, G. M., & Grilli, L. (2005). Founders' human capital and the growth of new technology-based firms: A competence-based view. *Research Policy*, *34*(6), 795–816.

Cooper, A. C., Gimeno-Gascon, F. J., & Woo, C. Y. (1994). Initial human and financial capital as predictors of new venture performance. *Journal of Business Venturing*, *9*(5), 371–395.

Cornelissen, J. P., & Clarke, J. S. (2010). Imagining and rationalizing opportunities: Inductive reasoning and the creation and justification of new ventures. *Academy of Management Review*, *35*(4), 539–555.

Cushner, K. (1992). *Human diversity in education: An integrative approach*. Hightstown, NJ: McGraw-Hill.

Davidsson, P. (2017). Entrepreneurial opportunities as propensities: Do Ramoglou & Tsang move the field forward?. *Journal of Business Venturing Insights*, *7*, 82–85.

Davidsson, P. (2003). The domain of entrepreneurship research: Some suggestions. In *Cognitive approaches to entrepreneurship research* (pp. 315–372). Emerald Group Publishing Limited.

Davidsson, P. (2015). Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization. *Journal of Business Venturing, 30*(5), 674–695.

Davidsson, P., & Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing, 18*(3), 301–331.

De Long, D. W., & Fahey, L. (2000). Diagnosing cultural barriers to knowledge management. *Academy of Management Perspectives*, *14*(4), 113–127.

de Regt, H. C. (1995). *Representing the world by scientific theories: The case for scientific realism* (Doctoral dissertation). Tilburg: Tilburg University Press.

Dewey, J. (1889). *Applied psychology. An introduction to the principles and practice of education*. US: Palala Press (reprinted: 2015).

Dewey, J. (1916a). *Democracy and education. An introduction to the philosophy of education*. US: MacMillan.

Dewey, J. (1916b). The pragmatism of Peirce. *The Journal of Philosophy, Psychology and Scientific Methods*, *13*(26), 709–715.

Dickson, P., Solomon, G., & Weaver, K. (2008). Entrepreneurial selection and success: Does education matter? *Journal of Small Business and Enterprise Development*, *15*(2), 239–258.

Dimov, D. (2011). Grappling with the unbearable elusiveness of entrepreneurial opportunities. *Entrepreneurship Theory and Practice*, *35*(1), 57–81.

Drucker, P. (1985). *Innovation and entrepreneurship*. New York: Harper and Row.

Dummett, M. (1963). *Realism*. Boston: Houghton-Mifflin.

Dummett, M. (1978). *Truth and other enigmas*. Harvard University Press.

Dummett, M. (1992). *The logical basis of metaphysics*. London: Duckworth.

Eckhardt, J. T., & Shane, S. A. (2003). Opportunities and entrepreneurship. *Journal of Management*, *29*(3), 333–349.

Eckhardt, J. T., & Shane, S. (2010). An update to the individual-opportunity nexus. In *Handbook of entrepreneurship research* (pp. 47–76). New York, NY: Springer.

Eckhardt, J. T., & Shane, S. A. (2013). Response to the commentaries: The individual-opportunity (IO) nexus integrates objective and subjective aspects of entrepreneurship. *Academy of Management Review*, *38*(1), 160–163.

Elert, N., Andersson, F. W., & Wennberg, K. (2015). The impact of entrepreneurship education in high school on long-term entrepreneurial performance. *Journal of Economic Behavior & Organization*, *111*, 209–223.

Ellis, A. K., Cogan, J. J., & Howey, K. R. (1991). *Introduction to the foundations of education* (3rd ed.). New Jersey: Prentice Hall.

Evans, D. S., & Leighton, L. S. (1989). The determinants of changes in US self-employment, 1968–1987. *Small Business Economics*, *1*(2), 111–119.

Fairlie, R., Karlan, D., & Zinman, J. (2014). Behind the gate experiment: Evidence on effects of and rationales for subsidized entrepreneurship training. *American Economic Journal: Economic Policy*, *7*(2), 125–161.

Fanelli, D. (2012). Negative results are disappearing from most disciplines and countries. *Scientometrics*, *90*, 891–904.

Fayolle, A., & Gailly, B. (2008). From craft to science: Teaching models and learning processes in entrepreneurship education. *Journal of European Industrial Training*, *32*(7), 569–593.

Fayolle, A., & Liñán, F. (2014). The future of research on entrepreneurial intentions. *Journal of Business Research*, *67*(5), 663–666.

Fisher, G. (2012). Effectuation, causation, and bricolage: A behavioral comparison of emerging theories in entrepreneurship research. *Entrepreneurship Theory and Practice*, *36*(5), 1019–1051.

Franke, N., & Lüthje, C. (2004). Entrepreneurial intentions of business students—A benchmarking study. *International Journal of Innovation and Technology Management*, *1*(03), 269–288.

Friedrichs, J. (1983). Methoden empirischer Sozialforschung (11th ed.). Opladen: Westdeutscher Verlag. [1st edition, 1973].

Gartner, W. B. (1988). "Who is an entrepreneur?" is the wrong question. *American Small Business Journal*, *12*(4), 11–31.

Gimeno, J., Folta, T. B., Cooper, A. C., & Woo, C. Y. (1997). Survival of the fittest? Entrepreneurial human capital and the persistence of underperforming firms. *Administrative Science Quarterly*, *42*(4), 750–783.

Giroux, H. A., & McLaren, P. (1989). Schooling, cultural politics, and the struggle for democracy. *Critical Pedagogy, the State, and Cultural Struggle*, 12–97.

Gordon, M. (2009). Toward a pragmatic discourse of constructivism: Reflections on lessons from practice. *Educational Studies*, *45*, 39–58.

Gorman, G., Hanlon, D., & King, W. (1997). Some research perspectives on entrepreneurship education, enterprise education and education for small business management: a ten-year literature review. *International Small Business Journal*, *15*(3), 56–77.

Greenwald, A. G. (1975). Consequences of prejudice against the null hypothesis. *Psychological Bulletin, 82*, 1–20.

Gutek, G. L. (2013). *Philosophical, ideological, and theoretical perspectives on education*. Pearson Higher Ed.

Haack, S., & Lane, R. E. (2006). *Pragmatism, old & new: selected writings* (pp. 18–67), Prometheus Books.

Hahn, D., Minola, T., Van Gils, A., & Huybrechts, J. (2017). Entrepreneurial education and learning at universities: Exploring multilevel contingencies. *Entrepreneurship & Regional Development*, *29*(9–10), 945–974.

Haupert, B. (1991). Vom narrativen interview zur biographischen typenbildung. In Detlef Garz & Klaus Kraimer (Eds.), *Qualitativ-empirische sozialforschung. Konzepte, Methoden, Analysen* (pp. 213–254). Opladen: Westdeutscher Verlag.

Henry, C., Hill, F., & Leitch, C. (2005a). Entrepreneurship education and training: Can entrepreneurship be taught? Part I. *Education+ Training*, *47*(2), 98–111.

Henry, C., Hill, F., & Leitch, C. (2005b). Entrepreneurship education and training: Can entrepreneurship be taught? Part II. *Education+ Training*, *47*(3), 158–169.

Higgins, J. P. T. (2011). GSe. *Cochrane handbook for systematic reviews of interventions version*, *5*(0).

Honig, B. (2004). Entrepreneurship education: Toward a model of contingency-based business planning. *Academy of Management Learning & Education, 3*(3), 258–273.

Hunt, S. D. (1991). *Modern marketing theory: Critical issues in the philosophy of marketing science*. South-Western Pub.

James, W. (1907). *Pragmatism: A new name for some old philosophy, old ways of thinking: Popular lectures on philosophy*. Longmans, Green.

Jones, M. V., Coviello, N., & Tang, Y. K. (2011). International entrepreneurship research (1989–2009): A domain ontology and thematic analysis. *Journal of Business Venturing*, *26*(4), 632–659.

Kailer, N. (2005). Evaluation of entrepreneurship education at universities. *Ibw-Mitteilungen*, *3*, 1–11.

Katz, J., & Gartner, W.B. (1988). Properties of emerging organizations. *Academy of Management Review, 13*(3), 429–441.

Katz, J. A. (2003). The chronology and intellectual trajectory of American entrepreneurship education 1876–1999. *Journal of Business Venturing, 18*, 283–300.

Kickul, J., Wilson, F., Marlino, D., & Barbosa, S. D. (2008). Are misalignments of perceptions and self-efficacy causing gender gaps in entrepreneurial intentions among our nation's teens? *Journal of Small Business and Enterprise Development*, *15*(2), 321–335.

Kim, P. H., Wennberg, K., & Toft-Kehler, R. (2015). You've got talent: Breaking the 'barriers to learning' from early entrepreneurial experience (summary). *Frontiers of Entrepreneurship Research*, *35*(3), 12.

King, G., & Zeng, L. (2001). Logistic regression in rare events data. *Political Analysis*, *9*(2), 137–163.

Kirkpatrick, D. L. (2007). *Implementing the four levels: A practical guide for effective evaluation of training programs*. Oakland, CA: Berrett-Koehler.

Kirzner, I. (1973). *Competition and entrepreneurship*. Chicago, IL, US: University of Chicago Press.

Kirzner, I. (1985). *Discovery and the capitalist process*. Chicago, IL, US: Univeristy of Chicago Press.

Kirzner, I. (1997). Entrepreneurial discovery and the competitive market process: An Austiran approach. *The Journal of Economic Literature*, *35*, 60–85.

Kozlinska, I. (2016). Evaluation of the outcomes of entrepreneurship education revisited: Evidence from Estonia and Latvia (Doctoral dissertation). *Publications of the University of Turku, sub-series E Oeconomica, Juvenes Print, Turku, Finland.*

Kreuger, N., & Carsrud, A. (1993). Entrepreneurial intentions: Applying the theory of planned behavior. *Entrepreneurship and Regional Development*, *5*(4), 315–330.

Kuratko, D. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, *29*(5), 577–597.

Larntz, K. (1978). Small-sample comparisons of exact levels for chi-squared goodness-of-fit statistics. *Journal of the American Statistical Association*, *73*(362), 253–263.

Lazarsfeld, P. F. (1937). Some remarks on the typological procedures in social research. *Zeitschrift für Sozialforschung*, *6*, 119–139.

Lazarsfeld, P. F., & Barton, A. H. (1951). Qualitative measurement in the social sciences. Classification, typologies, and indices. In D. Lerner & H. D. Lasswell (Eds.), *The policy sciences* (pp. 155–192). Stanford University Press.

Leplin, J. (1984). *Scientific realism*. University of California Press.

Levi-Strauss, C. (1966). *The savage mind*. Chicago: University of Chicago Press.

Lewin, P. (2011). A capital-based approach to the firm: Reflections on the nature and scope of the concept of capital and its extension to ingangibles. In *The Oxford handbook of human capital* (pp. 145–165). Oxford, UK: Oxford University Press.

Lewis, D. (1974). Causation. *The Journal of Philosophy*, *70*(17), 556–567.

Liñán, F., & Fayolle, A. (2015). A systematic literature review on entrepreneurial intentions: Citation, thematic analyses, and research agenda. *International Entrepreneurship and Management Journal*, *11*(4), 907–933.

Lindquist, M. J., Sol, J., & Van Praag, M. (2015). Why do entrepreneurial parents have entrepreneurial children? *Journal of Labor Economics*, *33*(2), 269–296.

Low, M. B., & MacMillan, I. C. (1988). Entrepreneurship: Past research and future challenges. *Journal of Management*, *14*(2), 139–161.

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

McCann, J. E., & Buckner, M. (2004). Strategically integrating knowledge management initiatives. *Journal of Knowledge Management*, *8*(1), 47–63.

McKelvey, B. (1997). Quasi-natural organization science. *Organization Science*, *8*(4), 352–380.

McKelvey, B. (1999). Toward a campbellian realist organization science. In J. Baum & B. McKelvey (Eds.), V*ariations in organization science: In honor of Donald T. Campbell* (pp. 383–411). Thousand Oaks, CA: Sage.

McMullan, W. E. L., & Wayne A. (1987). Entrepreneurship education in the nineties. *Journal of Business Venturing*, *2*(3), 261–275.

McMullen, J. S., & Dimov, D. (2013). Time and the entrepreneurial journey: The problems and promise of studying entrepreneurship as a process. *Journal of Management Studies, 50*(8), 1481–1512.

McMullin, E. (1984). A case for scientific realism. In J. Leplin (Ed.), *Scientific realism* (pp. 8−40). Berkeley, CA: University of California Press.

Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of Political Economy, 66*, 281–302.

Mincer, J. (1974). *Schooling, experience, and earnings*. New York: National Bureau of Economic Research.

Mintzberg, H., & Waters, W. J. (1982). Tracking strategy in an entrepreneurial firm. *Academy of Management Journal, 25*, 465–499.

Nahapiet, J. (2011). A social perspective: Exploring the links between human capital and social capital. In The Oxford handbook of human capital (pp. 71–96). Oxford, UK: Oxford University Press

Neergaard, H., Tanggaard, L., Krueger, N., & Robinson, S. (2012). Pedagogical interventions in entrepreneurship from behaviorism to existential learning. *Proceedings*. Dublin, Ireland: Institute for Small Business and Entrepreneurship.

Nelson, R. R., & Winter, S. G. (1982). The Schumpeterian tradeoff revisited. *The American Economic Review, 72*(1), 114–132.

Nonaka, I., Toyama, R., & Peltokorpi, V. (2011). The distributed and dynamic dimensions of human capital. In *The Oxford handbook of human capital* (pp. 459–477). Oxford, UK: Oxford University Press

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

Ornstein, A. C., & Levine, D. U. (2003). *Foundations of education* (8th ed.). Boston: Houghton-Mifflin.

Ozmon, H. A., & Craver, S. M. (2003). *Philosophical foundations of education* (7th ed.). New Jersey: Merrill Prentice Hall.

Perry, W. G. (1970). *Forms of intellectual and ethical development in the college years: A scheme*. New York: Holt, Rinehart and Winston.

Peterman, N. E., & Kennedy, J. (2003). Enterprise education: Influencing students' perceptions of entrepreneurship. *Entrepreneurship Theory and Practice*, *28*(2), 129–144.

Pierce, C. (1878). How to make our ideas clear. *Popular Science Monthly*, *12*, 286–302.

Peirce, C. (1898). The logic of mathematics in relation to education. *Educational Review, 15*, 209–216.

Pierce, C. (1902). *The simplest mathematics, collected papers of Charles Sanders Peirce*. Harvard University Press, 227–323.

Pigou, A. C. (1928). *A study in public finance*. London: Macmillan.

Pittaway, L., & Cope, J. (2007). Entrepreneurship education: A systematic review of the evidence. *International Small Business Journal*, *25*(5), 479– 510.

Podsakoff, P. M., MacKenzie, S. B., Bachrach, D. G., & Podsakoff, N. P. (2005). The influence of management journals in the 1980s and 1990s. *Strategic Management Journal*, *26*(5), 473–488.

Pourahmadi, M. (2000). Maximum likelihood estimation of generalised linear models for multivariate normal covariance matrix. *Biometrika*, *87*(2), 425–435.

Ramoglou, S., & Tsang, E. W. (2016). A realist perspective of entrepreneurship: Opportunities as propensities. *Academy of Management Review*, *41*(3), 410–434.

Ramoglou, S., & Tsang, E. W. (2017). In defense of common sense in entrepreneurship theory: Beyond philosophical extremities and linguistic abuses. *Academy of Management Review*, *42*(4), 736–744.

Rideout, E. C., & Gray, D. O. (2013). Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of university-based entre- preneurship education. *Journal of Small Business Management*, *51*(3), 329–351.

Rosenberg, A. (2011). *Philosophy of science*. London, UK: Routledge

Sarason, Y., Dean, T., & Dillard, J. F. (2006). Entrepreneurship as the nexus of individual and opportunity: A structuration view. *Journal of Business Venturing*, *21*(3), 286–305.

Sarason, Y., Dillard, J. F., & Dean, T. (2010). How can we know the dancer from the dance? Reply to "Entrepreneurship as the structuration of individual and opportunity: A response using a critical realist perspective" (Mole & Mole, 2008). *Journal of Business Venturing*, *25*(2), 238–243.

Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, *26*(2), 243–288.

Sarasvathy, S., Dew, N., Velamuri, R., & Venkataraman, S. (2003). Three views of entrepreneurial opportunity. In: Z. J. Acs & D. B. Audretsch (Eds.), *Handbook of entrepreneurship research* (pp. 141–160). Kluwer, Dordrecht, NL.

Sarasvathy, S. D., Dew, N., & Velamuri, S. R. (2002). A testable typology of entrepreneurial opportunity: Extensions of Shane and Venkataraman (2000). *Academy of Management Review (2002).*

Schultz, T. (1961). Investment in human capital. *The American Economic Review*, *51*(1), 1–17.

Schumpeter, J. A., (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.

Scott, M., & Rosa, P. (1996). Has firm level analysis reached its limits? Time for a rethink. *International Small Business Journal*, *14*(4), 81–89.

Shackle, G. L. S. (1979). *Imagination and the nature of choice*. Edinburgh University Press: Edinburgh, U.K.

Shane, S. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Cheltenham, UK: Edward Elgar.

Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review, 25*(1), 217–226.

Sherer, P. D. (2011). Looking into the future: Bringing organizations deeper into human capital theory. In *The Oxford handbook of human capital* (pp. 563–588). Oxford, UK: Oxford University Press

Smith, A. (1776). *An inquiry into the nature and causes of the wealth of nations*. London: Methuen & Co, Ltd.

Sodeur, W. (1974). *Empirische verfahren zur klassifikation*. Stuttgart: Teubner.

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

Sweetland, S. (1996). Human capital theory: Foundations of a field of inquiry. *Review of Educational Research*, *66*(3), 341–359.

Tan, C. (2006). Philosophical perspectives on education. In C. Tan, B. Wong, J. S. M. Chua & T. Kang (Eds.), *Critical perspectives on education: An introduction* (pp. 21–40). Singapore: Prentice Hall.

Uljens, M. (2006). Democracy and normative education. Invited comments to Nel Noddings plenary lecture, "*Education and democracy in the 21st century*." *NERA Conference*, 9–12,3.

Unger, J. M., Rauch, A., Frese, M., & Rosenbusch, N. (2011). Human capital and entrepreneurial success: A meta-analytical review. *Journal of Business Venturing*, *26*(3), 341–358.

Van Auken, H., Fry, F. L., & Stephens, P. (2006). The influence of role models on entrepreneurial intentions. *Journal of Developmental Entrepreneurship*, *11*(02), 156–167.

Van der Sluis, J., Van Praag, M., & Vijverberg, W. (2008). Education and entrepreneurship selection and performance: A review of the empirical literature. *Journal of Economic Surveys*, *22*(5), 795–841.

Van Praag, M., van Witteloostuijn, A., & van der Sluis, J. (2013). The higher returns to formal education for entrepreneurs versus employees. *Small Business Economics*, *40*(2), 375–396.

Venkataraman, S. (1997). The distinctive domain of entrepreneurship research. *Advances in Entrepreneurship, Firm Emergence and Growth*, *3*(1), 119–138.

Vesper, K. (1971). Venture initiation courses in U.S. business schools. *The Academy of Management Journal*, *14*(4), 525–528.

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

Wennberg, K., Wiklund, J., DeTienne, D. R., & Cardon, M. S. (2010). Reconceptualizing entrepreneurial exit: Divergent exit routes and their drivers. *Journal of Business Venturing*, *25*(4), 361–375.

Westhead, P., & Wright, M. (1998). Novice, portfolio, and serial founders: Are they different?. *Journal of Business Venturing*, *13*(3), 173–204.

Wiklund, J., Davidsson, P., Audretsch, D. B., & Karlsson, C. (2011). The future of entrepreneurship research. *Entrepreneurship Theory and Practice, 35*(1), 1–9.

Wood, M. S. (2017). Misgivings about dismantling the opportunity construct. *Journal of Business Venturing Insights*, *7*, 21–25.

Wood, M. S., & McKinley, W. (2010). The production of entrepreneurial opportunity: A constructivist perspective. *Strategic Entrepreneurship Journal*, *4*(1), 66–84.

Young, M. (2014). Curriculum theory: What it is and why it is important. Cadernos de Pesquisa [online]. *44*(151), 190–202.

Zarutskie, R. (2010), The role of top management team human capital in venture capital markets: Evidence from first-time funds. *Journal of Business Venturing*, *25*(1), 155–172.

Literature Review

Anne Støren, L., & Harry Matlay, P. (2014). Entrepreneurship in higher education. *Education + Training*, *56*(8/9), 795–813.

Arlotto, J., Jourdan, P., Sahut, J. M., & Teulon, F. (2012). Les programmes de formation à l'entre-preneuriat sont-ils réellement utiles? Le cas des concours pédagogiques de creation d'entreprise. *Management Avenir*, (5), 291–309.

Athayde, R. (2009). Measuring enterprise potential in young people. *Entrepreneurship Theory and Practice*, *33*(2), 481–500.

Athayde, R., & Matlay, H. (2012). The impact of enterprise education on attitudes to enterprise in young people: an evaluation study. *Education + Training*, *54*(8/9), 709–726.

Azam Roomi, M., & Harrison, P. (2010). Behind the veil: Women-only entrepreneurship training in Pakistan. *International Journal of Gender and Entrepreneurship*, *2*(2), 150–172.

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

Bledsoe, M. T., & Oatsvall, R. J. (2010). Entrepreneurship – Women's business. *The International Business & Economics Research Journal*, *9*(13), 47–55.

Blenker, P., Harry Matlay, P., Trolle Elmholdt, S., Hedeboe Frederiksen, S., Korsgaard, S., & Wagner, K. (2014). Methods in entrepreneurship education research: A review and integrative framework. *Education + Training*, *56*(8/9), 697–715.

Boissin, J. P., Branchet, B., Delanoë, S., & Velo, V. (2011). Gender's perspective of role model influence on entrepreneurial behavioral beliefs. *International Journal of Business, 16*(2), 182.

Brink, T., & Madsen, S. O. (2015). Entrepreneurial learning requires action on the meaning generated. *International Journal of Entrepreneurial Behavior & Research*, *21*(5), 650–672.

Budden, M. C., Baraya, A. R., Budden, C. B., & Valero, J. (2013). Assessing leadership and entrepreneurial capabilities in A latin american youth program. *International Journal of Management & Information Systems* [Online], *17*(4), 201.

Byabashaija, W., & Katono, I. (2011). The impact of college entrepreneurial education on entrepreneurial attitudes and intention to start a business in Uganda. *Journal of Developmental Entrepreneurship*, *16*(01), 127–144.

Chrisman, J. J., McMullan, W. E., Kirk Ring, J., & Holt, D. T. (2012). Counseling assistance, entrepreneurship education, and new venture performance. *Journal of Entrepreneurship and Public Policy*, *1*(1), 63–83.

Clement, T., LeMire, S., & Silvernagel, C. (2015). The bias in favor of venture capital finance in u.s. entrepreneurial education: At the expense of trade credit. *Journal of Education for Business*, *90*(5), 233–240.

Dabic, M., Daim, T., Bayraktaroglu, E., Novak, I., & Basic, M. (2012). Exploring gender differences in attitudes of university students towards entrepreneurship. *International Journal of Gender and Entrepreneurship*, *4*(3), 316–336.

Dodd, S. D., & Hynes, B. C. (2012). The impact of regional entrepreneurial contexts upon enterprise education. *Entrepreneurship & Regional Development*, *24*(9–10), 741–766.

Draycott, M. C., Matlay, H., Rae, D., & Vause, K. (2011). The assessment of enterprise education in the secondary education sector. *Education + Training*, *53*(8/9), 673–691.

Dutta, D. K., Li, J., & Merenda, M. (2010). Fostering entrepreneurship: Impact of specialization and diversity in education. *International Entrepreneurship and Management Journal*, *7*(2), 163–179.

Elenurm, T., & Alas, R. (2008). Applying cross-cultural student teams for supporting international networking of Estonian enterprises. *Baltic Journal of Management*, *3*(2), 145–158.

Elert, N., Andersson, F. W., & Wennberg, K. (2015). The impact of entrepreneurship education in high school on long-term entrepreneurial performance. *Journal of Economic Behavior & Organization*, *111*, 209–223.

Faherty, A. (2015). Developing enterprise skills through peer-assessed pitch presentations. *Education + Training*, *57*(3), 290–305.

Farashah, D. A., & Matlay, H. P. (2013). The process of impact of entrepreneurship education and training on entrepreneurship perception and intention. *Education + Training*, *55*(8/9), 868–885.

Fayolle, A. (2013). Personal views on the future of entrepreneurship education. *Entrepreneurship & Regional Development*, *25*(7–8), 692–701.

Fayolle, A., & Castagnos, J. (2006). Impact des formations à l'entrepreneuriat : Vers de nouvelles méthodes d'évaluation. *Management International*, *10*(4), 43–55.

Fayolle, A., Gailly, B., & Lassas-Clerc, N. (2006). Assessing the impact of entrepreneurship education programmes: A new methodology. *Journal of European Industrial Training*, *30*(9), 701–720.

Galloway, L., Anderson, M., Brown, W., & Wilson, L. (2005). Enterprise skills for the economy. *Education+ Training*, *47*(1), 7–17.

Garavan, T. N., & O' Cinneide, B. (1994). Entrepreneurship education and training programmes: A review and evaluation – part 1. *Journal of European Industrial Training*, *18*(8), 3–12.

Gielnik, M. M., Frese, M., Kahara-Kawuki, A., Wasswa Katono, I., Kyejjusa, S., Ngoma, M., & Dlugosch, T. J. (2015). Action and action-regulation in entrepreneurship: Evaluating a student training for promoting entrepreneurship. *Academy of Management Learning & Education*, *14*(1), 69–94.

Giunta, C. (2012). iPad and Web 2,0 pedagogic innovations in marketing: Utilization of entrepreneurial skills. *Journal of Marketing Development and Competitiveness*, *6*(5), 107–114.

Gordon, I., Hamilton, E., & Jack, S. (2012). A study of a university-led entrepreneurship education programme for small business owner/managers. *Entrepreneurship & Regional Development*, *24*(9–10), 767–805.

Grimm, M., & Paffhausen, A. L. (2015). Do interventions targeted at micro-entrepreneurs and small and medium-sized firms create jobs? A systematic review of the evidence for low and middle income countries. *Labour Economics*, *32*, 67–85.

Guerrero, M., Cunningham, J. A., & Urbano, D. (2015). Economic impact of entrepreneurial universities' activities: An exploratory study of the United Kingdom. *Research Policy*, *44*(3), 748–764.

Harmeling, S. S., & Matlay, H. (2011). Re-storying an entrepreneurial identity: Education, experience and self-narrative. *Education + Training*, *53*(8/9), 741–749.

Harmeling, S. S., & Sarasvathy, S. D. (2013). When contingency is a resource: Educating entrepreneurs in the Balkans, the Bronx, and beyond. *Entrepreneurship Theory and Practice*, *37*(4), 713–744.

Harte, V., Harte, V., & Stewart, J. (2012). Develop.evaluate.embed.sustain: Enterprise education for keeps. *Education + Training*, *54*(4), 330–339.

Harte, V., Matlay, H., & Stewart, J. (2010). Undertaking HRD research in higher education. *Education + Training*, *52*(8/9), 679–693.

Hattab, H. W. (2014). Impact of entrepreneurship education on entrepreneurial intentions of university students in Egypt. *The Journal of Entrepreneurship*, *23*(1), 1–18.

Heinonen, J., Matlay, H., Hytti, U., & Stenholm, P. (2011). The role of creativity in opportunity search and business idea creation. *Education + Training*, *53*(8/9), 659–672.

Hietanen, L. (2015). Entrepreneurial learning environments: Supporting or hindering diverse learners? *Education + Training*, *57*(5), 512–531.

Higgins, D., & Elliott, C. (2011). Learning to make sense: What works in entrepreneurial education? *Journal of European Industrial Training*, *35*(4), 345–367.

Hoogendoorn, S., Oosterbeek, H., & van Praag, M. (2013). The impact of gender diversity on the performance of business teams: Evidence from a field experiment. *Management Science*, *59*(7), 1514–1528.

Huber, L. R., Sloof, R., & Van Praag, M. (2014). The effect of early entrepreneurship education: Evidence from a field experiment. *European Economic Review*, *72*, 76–97.

Hussain, J. G., Matlay, H., Scott, J. M., & Matlay, H. (2010). The impact of entrepreneurship education on succession in ethnic minority family firms. *Education + Training*, *52*(8/9), 643–659.

Hytti, U., Matlay, H., Stenholm, P., Heinonen, J., & Seikkula-Leino, J. (2010). Perceived learning outcomes in entrepreneurship education. *Education + Training*, *52*(8/9), 587–606.

Iacobucci, D., Matlay, H., & Micozzi, A. (2012). Entrepreneurship education in Italian universities: Trend, situation and opportunities. *Education + Training*, *54*(8/9), 673–696.

Idogho, P. O., & Augustine, B. A. E. (2011). Entrepreneurship education and small-scale business management skill development among students of Auchi Polytechnic Auchi, Edo State, Nigeria. *International Journal of Business and Management*, *6*(3), 284.

Ilayaraja, S. (2015). Indian educational system and its impact in "entrepreneurship as a career." *International Journal of Entrepreneurship*, *19*, 29–39.

Ipate, D. M., & Parvu, I. (2014). Entrepreneurial education as a success factor for the Romanian SMEs. *Economics, Management and Financial Markets*, *9*(4), 247.

Joensuu, S., Harry Matlay, P., Viljamaa, A., Varamäki, E., & Tornikoski, E. (2013). Development of entrepreneurial intention in higher education and the effect of gender—A latent growth curve analysis. *Education + Training*, *55*(8/9), 781–803.

Johansen, V. (2013). Entrepreneurship education and start-up activity: A gender perspective. *International Journal of Gender and Entrepreneurship*, *5*(2), 216–231.

Jones, A., Matlay, H., & Jones, P. (2011). "Making an impact": A profile of a business planning competition in a university. *Education + Training*, *53*(8/9), 704–721.

Jones, P., Harry Matlay, P., & Colwill, A. (2013). Entrepreneurship education: An evaluation of the Young Enterprise Wales initiative. *Education + Training*, *55*(8/9), 911–925.

Jones, P., Harry Matlay, P., & Jones, A. (2014). Attitudes of Sports Development and Sports Management undergraduate students towards entrepreneurship. *Education + Training*, *56*(8/9), 716–732.

Jones, P., Nabi, G., Jones, A., Packham, G., & Miller, C. (2008). Student attitudes towards enterprise education in Poland: A positive impact. *Education + Training*, *50*(7), 597–614.

Jones, P., Nabi, G., Miller, C., Jones, A., Packham, G., Pickernell, D., & Zbierowski, P. (2011). Attitudes and motivations of Polish students towards entrepreneurial activity. *Education + Training*, *53*(5), 416–432.

Jones, S., & Silke Tegtmeier, P. J. M. D. (2015). "You would expect the successful person to be the man." *International Journal of Gender and Entrepreneurship*, *7*(3), 303–320.

Karlan, D., & Valdivia, M. (2011). Teaching entrepreneurship: Impact of business training on microfinance clients and institutions. *Review of Economics and Statistics*, *93*(2), 510–527.

Kassean, H., Vanevenhoven, J., Liguori, E., & Winkel, D. E. (2015). Entrepreneurship education: A need for reflection, real-world experience and action. *International Journal of Entrepreneurial Behavior & Research*, *21*(5), 690–708.

Kasturiratne, D., Harte, V., Lean, J., & Phippen, A. (2012). International enterprise education in Sri Lanka: A blended approach. *Education + Training*, *54*(4), 306–318.

Kickul, J., Griffiths, M., & Bacq, S. (2010). The boundary-less classroom: Extending social innovation and impact learning to the field. *Journal of Small Business and Enterprise Development*, *17*(4), 652–663.

Klinger, B., & Schündeln, M. (2011). Can entrepreneurial activity be taught? Quasi-experimental evidence from Central America. *World Development*, *39*(9), 1592–1610.

Korsgaard, S., Berglund, H., Thrane, C., & Blenker, P. (2016). A tale of two Kirzners: Time, uncertainty, and the "nature" of opportunities. *Entrepreneurship Theory and Practice*, *40*(4), 867–889.

Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, *29*(5), 577–597.

Lamine, W., Mian, S., & Fayolle, A. (2014). How do social skills enable nascent entrepreneurs to enact perseverance strategies in the face of challenges? A comparative case study of success and failure. *International Journal of Entrepreneurial Behavior & Research*, *20*(6), 517–541.

Laviolette, E. M., Radu Lefebvre, M., & Brunel, O. (2012). The impact of story bound entrepreneurial role models on self-efficacy and entrepreneurial intention. *International Journal of Entrepreneurial Behavior & Research*, *18*(6), 720–742.

Lee, S. M., Chang, D., & Lim, S. (2005). Impact of entrepreneurship education: A comparative study of the U.S. and korea. *International Entrepreneurship and Management Journal*, *1*(1), 27–43.

Levenburg, N. M., & Schwarz, T. V. (2008). Entrepreneurial orientation among the youth of India. *The Journal of Entrepreneurship*, *17*(1), 15–35.

Levie, J., & Autio, E. (2008). A theoretical grounding and test of the GEM model. *Small Business Economics*, *31*(3), 235–263.

Lewis, K. (2005). The best of intentions: Future plans of Young Enterprise Scheme participants. *Education+ Training*, *47*(7), 470–483.

Li, H., Zhang, Y., Li, Y., Zhou, L. A., & Zhang, W. (2012). Returnees versus locals: Who performs better in China's technology entrepreneurship? *Strategic Entrepreneurship Journal*, *6*(3), 257–272.

Lorz, M., Mueller, S., & Volery, T. (2013). Entrepreneurship education: A Systematic review of the methods in impact studies. *Journal of Enterprising Culture*, *21*(02), 123–151.

Lourenço, F., & Jayawarna, D. (2011). Enterprise education: The effect of creativity on training outcomes. *International Journal of Entrepreneurial Behavior & Research*, *17*(3), 224–244.

Macura, R., Konda, I., & Koncar, M. (2015). The entrepreneurial desirability within students' intentions: Bosnia and Herzegovina case study. *Актуальні проблеми економіки*, (6), 293–304.

Maia, C., & Claro, J. (2012). The role of a Proof of Concept Center in a university ecosystem: An exploratory study. *The Journal of Technology Transfer*, *38*(5), 641–650.

Man, T. W. Y., & Farquharson, M. (2015). Psychological ownership in team-based entrepreneurship education activities. *International Journal of Entrepreneurial Behavior & Research*, *21*(4), 600–621.

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

Marvel, M. R. (2013). Human capital and search-based discovery: A study of high-tech entrepreneurship. *Entrepreneurship Theory and Practice*, *37*(2), 403–419.

Matlay, H. (2006). Researching entrepreneurship and education: Part 2: What is entrepreneurship education and does it matter?. *Education+ Training*, *48*(8/9), 704–718.

Matlay, H., & Carey, C. (2007). Entrepreneurship education in the UK: A longitudinal perspective. *Journal of Small Business and Enterprise Development*, *14*(2), 252–263.

Matlay, H., & Matlay, H. (2006). Researching entrepreneurship and education. *Education + Training*, *48*(8/9), 704–718.

Matlay, H., & Ramsey, E. (2011). The influence of stakeholders on developing enterprising graduates in UK HEIs. *International Journal of Entrepreneurial Behavior & Research*, *17*(2), 166–182.

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

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

Millman, C., Li, Z., Matlay, H., & Wong, W. C. (2010). Entrepreneurship education and students' internet entrepreneurship intentions. *Journal of Small Business and Enterprise Development*, *17*(4), 569–590.

Mitchelmore, S., & Rowley, J. (2013). Entrepreneurial competencies of women entrepreneurs pursuing business growth. *Journal of Small Business and Enterprise Development*, *20*(1), 125–142.

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

Ndedi, A. A., & Ahmed, A. (2013). Challenges and perspectives facing the development of entrepreneurship education and training in South Africa. *World Journal of Entrepreneurship, Management and Sustainable Development*, *9*(2/3), 126–132.

Nizam Zainuddin, M., Senior, C., & Rozaini Mohd Rejab, M. (2010). Assessing "ME generation's" entrepreneurship degree programmes in Malaysia. *Education + Training*, *52*(6/7), 508–527.

O'Connor, A., & Ramos, J. M. (2006). Empowering entrepreneurship through foresight and innovation: Developing a theoretical framework for empowerment in enterprise programs. *Journal of Developmental Entrepreneurship*, *11*(03), 207–231.

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

Packham, G., Matlay, H., Jones, P., Miller, C., Pickernell, D., & Thomas, B. (2010). Attitudes towards entrepreneurship education: A comparative analysis. *Education + Training*, *52*(8/9), 568–586.

Petridou, E., & Sarri, K. (2011). Developing "potential entrepreneurs" in higher education institutes. *Journal of Enterprising Culture*, *19*(01), 79–99.

Pickernell, D., Ramsey, E., Packham, G., Jones, P., Miller, C., & Thomas, B. (2011). Graduate entrepreneurs are different: they access more resources? *International Journal of Entrepreneurial Behavior & Research*, *17*(2), 183–202.

Piperopoulos, P., & Matlay, H. (2012). Could higher education programmes, culture and structure stifle the entrepreneurial intentions of students? *Journal of Small Business and Enterprise Development*, *19*(3), 461–483.

Pittaway, L., & Cope, J. (2016). Entrepreneurship education. *International Small Business Journal: Researching Entrepreneurship*, *25*(5), 479–510.

Pittaway, L., & Hannon, P. (2008). Institutional strategies for developing enterprise education. *Journal of Small Business and Enterprise Development*, *15*(1), 202–226.

Pittaway, L., Rodriguez-Falcon, E., Aiyegbayo, O., & King, A. (2011). The role of entrepreneurship clubs and societies in entrepreneurial learning. *International Small Business Journal*, *29*(1), 37.

Prajapati, K., & Biswas, S. N. (2011). Effect of entrepreneur network and entrepreneur self-efficacy on subjective performance. *The Journal of Entrepreneurship*, *20*(2), 227–247.

Pruett, M. (2012). Entrepreneurship education: Workshops and entrepreneurial intentions. *Journal of Education for Business*, *87*(2), 94–101.

Radu, M., & Loué, C. (2008). Motivational impact of role models as moderated by "ideal" vs. "ought self-guides" identifications. *Journal of Enterprising Culture*, *16*(04), 441–465.

Rae, D., Matlay, H., Martin, L., Antcliff, V., & Hannon, P. (2012). Enterprise and entrepreneurship in English higher education: 2010 and beyond. *Journal of Small Business and Enterprise Development*, *19*(3), 380–401.

Raposo, M. L. B., Matos Ferreira, J. J., Finisterra do Paço, A. M., & Gouveia Rodrigues, R. J. A. (2008). Propensity to firm creation: Empirical research using structural equations. *International Entrepreneurship and Management Journal*, *4*(4), 485–504.

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

Romerio, M. (2007). Conferences in Slocakia and Czechia (2007). *Intelektine Ekonomika*, *2*(2), 71–72.

Samantha Kumara, P. A. P. (2012). Undergraduates' intention Towards entrepreneurship: Empirical evidence from Sri Lanka. *Journal of Enterprising Culture*, *20*(01), 105–118.

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

Sánchez, J. C. (2010). University training for entrepreneurial competencies: Its impact on intention of venture creation. *International Entrepreneurship and Management Journal*, *7*(2), 239–254.

Schwarz, E. J., Wdowiak, M. A., Almer-Jarz, D. A., & Breitenecker, R. J. (2009). The effects of attitudes and perceived environment conditions on students' entrepreneurial intent. *Education + Training*, *51*(4), 272–291.

Şeşen, H., & Pruett, M. (2014). The impact of education, economy and culture on entrepreneurial motives, barriers and intentions: A comparative study of the United States and Turkey. *The Journal of Entrepreneurship*, *23*(2), 231–261.

Smith, I. H., & Woodworth, W. P. (2012). Developing social entrepreneurs and social innovators: A social identity and self-efficacy approach. *Academy of Management Learning & Education, 11*(3), 390–407.

Smith, K., Harry Matlay, P., Williams, D., Yasin, N., & Pitchford, I. (2014). Enterprise skills and training needs of postgraduate research students. *Education + Training*, *56*(8/9), 745–763.

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

Subroto, W. T. (2013). Entrepreneurship development course to foster character merchandise in support economic growth. *Asian Economic and Financial Review*, *3*(6), 762.

Tessema Gerba, D. (2012). Impact of entrepreneurship education on entrepreneurial intentions of business and engineering students in Ethiopia. *African Journal of Economic and Management Studies*, *3*(2), 258–277.

Urbano, D., & Guerrero, M. (2013). Entrepreneurial universities. *Economic Development Quarterly*, *27*(1), 40–55.

Varamäki, E., Joensuu, S., Tornikoski, E., & Viljamaa, A. (2015). The development of entrepreneurial potential among higher education students. *Journal of Small Business and Enterprise Development*, *22*(3), 563–589.

von Graevenitz, G., Harhoff, D., & Weber, R. (2010). The effects of entrepreneurship education. *Journal of Economic Behavior & Organization*, *76*(1), 90–112.

Wai Mui Yu, C., & Wing Yan Man, T. (2007). The sustainability of enterprise education: A case study in Hong Kong. *Education + Training*, *49*(2), 138–152.

Walter, S. G., & Dohse, D. (2012). Why mode and regional context matter for entrepreneurship education. *Entrepreneurship & Regional Development*, *24*(9–10), 807–835.

Walter, S. G., Parboteeah, K. P., & Walter, A. (2013). University departments and self-employment intentions of business students: A cross-level analysis. *Entrepreneurship Theory and Practice*, *37*(2), 175–200.

Wang, Y., & Verzat, C. (2011). Generalist or specific studies for engineering entrepreneurs? *Journal of Small Business and Enterprise Development*, *18*(2), 366–383.

White, R. J., Hertz, G. T., & Koutroumanis, D. A. (2012). Entrepreneurship literacy: The language of the new venture. *The Journal of Applied Business and Economics*, *13*(5), 35–45.

Williams, D., Harry Matlay, P., Smith, K., Yasin, N., & Pitchford, I. (2013). Evaluating the state of enterprise training for postgraduate researchers in the UK. *Education + Training*, *55*(8/9), 849–867.

Wilson, F., Kickul, J., & Marlino, D. (2007). Gender, entrepreneurial self–efficacy, and entrepreneurial career intentions: Implications for entrepreneurship education. *Entrepreneurship Theory and Practice*, *31*(3), 387–406.

Wing Yan Man, T., Matlay, H., & Wai Mui Yu, C. (2007). Social interaction and adolescent's learning in enterprise education. *Education + Training*, *49*(8/9), 620–633.

Yu, C. W. M., & Man, T. W. Y. (2009). Social interaction and the formation of entrepreneurial characteristics. *Journal of Workplace Learning*, *21*(8), 595–613.

Zdolšek, T., & Širec, K. (2014). Impact of entrepreneurship education on entrepreneurial intentions of students: A review of empirical research. *Our Economy, Journal of Contemporary Issues in Economics and Business*, *60*(3–4), 55–64.

Zhang, Y., Duysters, G. & Cloodt, M. (2013). The role of entrepreneurship education as a predictor of university students' entrepreneurial intention. *International Entrepreneurship and Management Journal*, *10*(3), 623-641.

Appendix

Appendix 1: Theory of Planned Behavior

General Outline of TPB

The Theory of Planned Behavior (TPB) is a development of the Theory of Reasoned Action (cf. Ajzen & Fishbein, 1977). TPB holds that, if an individual possesses a positive attitude toward certain behavior and/or if the social context is such that it supports the behavior, then the individual's inclination to exercise that behavior will increase (Ajzen, 1991). On the individual level, the theory has three core assumptions concerning behavioral, normative, and control beliefs. These are as follows.

Behavioral beliefs: According to the TPB, individuals create an understanding about objects by associating them with characteristics, events, or other objects that, in turn, give them certain attributes. When it concerns attitudes toward behaviors, individuals link them to outcomes. The belief may also link the behavior to other attributes: for example, the cost of performing a certain behavior that, in turn, would again be evaluated by the individual. If the individual already possesses an inherent positive or negative evaluation of the result or attributes, then s/he will have a corresponding attitude toward the behavior. As a result, the individual will positively evaluate certain behaviors and negatively evaluate others. This creates an attitude toward a certain behavior that indirectly affects the individual's behavior by directly moderating its underlying motivations. Furthermore, there are direct interaction effects between these attitudes, subjective norms, and perceived behavioral control (see below).

Normative beliefs: A normative belief is the probability that a reference person or group that is important for the individual will evaluate a certain type of behavior either positively or negatively. Normative beliefs result in social norms surrounding the individual's potential behavior, which moderates its underlying motivations. Therefore, there are direct interaction effects between these attitudes and perceived behavior control.

Control beliefs: TPB further states that, apart from a positive evaluation of the individual and his or her social context, a certain type of behavior can be predicted by the availability of control over necessary resources and opportunities. The access to this control is affected, in large part, by previous experiences concerned with the actual behavior, as well as access to information about previous results of the behavior as performed by others (e.g., friends, family, or colleagues). The control beliefs create a perceived level of control of the behavior by directly moderating the underlying motivations that, in turn, moderate the behavior. As mentioned above, there are interaction effects between the perceived level of control and subjective norms and attitudes toward the behavior.

In sum, TPB states that an attitude, and/or subjective norm, and/or perceived control of a potential behavior will positively correlate with the probability of an individual displaying the given behavior, for example, the creation of a new venture or entry into self-employment. Furthermore, perceived greater strength of control of the situation directly affects whether or not the behavior happens, without directly affecting the underpinning intentions. Finally, it should be noted that an intention could trigger behavior if, and only if, the individual has an option to control it.

TPB in the Context of Entrepreneurship and Education

Studies on intentions have a long tradition in the domain of entrepreneurship education. Within entrepreneurship, TPB helped make it possible for scholars to close previously existing research gaps and engage in relevant streams of research (Krueger & Carsrud, 1993). Indeed, this made TPB the dominant theory of entrepreneurial intentions (Liñán & Fayolle, 2015). The literature review in this thesis (cf. Appendix 2) confirms that this is the case also for entrepreneurship education.

Studies on the influence of education and training on attitudes have yielded conflicting findings. Positive links to an interest in entrepreneurship, attitudes toward entrepreneurship, and the perception of the feasibility of starting a business have been found: examples include the following international cases: post-secondary education in Northern Ireland (Hegarty, 2006), university students in England (Souitaris et al., 2007) and Germany

(Walter & Dohse, 2009), and secondary school pupils enrolled in an entrepreneurship program in Australia (Peterman & Kennedy, 2003). However, other studies have noted a decrease in intentions after entrepreneurship education programs: for example, in a Dutch school (Oosterbeek et al., 2010) and a German university (von Graevenitz, Harhoff & Weber, 2010).

Among scholarly contributions in the field of entrepreneurship, the topic of education is the third most dominant theme of research on entrepreneurial intentions, and more than 16% of all contributions on entrepreneurial intentions relate to education (Liñán & Fayolle, 2015). This shows that social psychology and theories on entrepreneurial intentions offer an important contribution to understanding entrepreneurship education. All things considered, integration of intentions into the entrepreneurship literature has led to an increased methodological rigor and robustness of theory regarding entrepreneurship (Liñán & Fayolle, 2015), as well as entrepreneurship education (Bae et al., 2014; Oosterbeek et al., 2010; Souitaris et al., 2007; Pittaway & Cope, 2007; Franke & Luthje, 2004). Yet, as discussed in this thesis, the theory remains problematic in the present context.

Summary

In sum, TPB is widely occurring in the literature on entrepreneurship, especially that on entrepreneurial entry. Specifically, TPB posits that attitudes toward behavior, subjective norms, and perceived behavioral control together shape an individual's behavioral intentions and behaviors. Thus, TPB is a theory of social psychology that connects beliefs and behavior but that disregards crucial aspects of dominant entrepreneurship theory (the "non-actor") as well as causal links of the entrepreneurial process (agency).

Appendix 2: Systematic Literature Review

Protocol

The purpose of this systematic literature review is to understand to what extent the Theory of Planned Behavior (TPB) is used as the go-to framework for studies considering the relationship between entrepreneurship and entrepreneurship education. Moreover, the review aims to understand to what extent the literature on this relationship refers to "the missing link", i.e., Kirkpatrick Level 3 (c.f., Chapter 1). Following the Cochrane approach (Higgins & Green, 2011), a detailed protocol for a systematic literature review of entrepreneurship education and entrepreneurship outcomes can be found in Table A1. The full literature list is available under "References: Literature Review."

Table A1: Protocol for systematic literature review on the relationship between entrepreneurship education and entrepreneurship outcomes.

Stage	**Description**
Stage 1	The ABI Inform/ProQuest database was searched for articles i) using the root terms ("enterprise" or "entrep*") and ("edu*" or "train*") and ("outcome" or "effect" or "impact"), ii) published from 1984 to 2016. The same search was conducted in Scopus, Web of Science (Social Science Citation Index) and ScienceDirect.
Stage 2	The sample was cleaned by removing all book reviews, interviews, and editorial notes.
Stage 3	The sample was further cleaned by reviewing all abstracts. All papers that were deemed not to contribute to the issue at hand were thus removed. A total of 138 prospective contributions were now part of the sample.
Stage 4	A database of the 138 papers' abstracts was recorded. The database specifically included the title, author, year of publication, and journal.

Stage 5	All papers were now read in their entirety.
Stage 6	For the purpose of this thesis, I limited the review to articles contributing solely to the relationship between entrepreneurship education and entrepreneurship outcomes. A total of 71 papers addressing this were identified. The other 67 articles were removed.
Stage 7	An additional column was added to the database: "theoretical framing." Based on theoretical framing, the articles were grouped into either of three categories: i) Theoretical Framing via TPB, or TPB in combination with other (marked with *), ii) Theoretical Framing outside TPB (marked with **), iii) No or Non-distinguishable Theoretical Framing (marked with ***). This result can be found in Table A2.

Literature reviews of entrepreneurship education have focused extensively on either high-impact journals (Byrne, Fayolle & Toutain, 2014) or lower-ranked journals (Gorman, Hanlon & King, 1997; Garavan & O'Cinneide, 1994; Henry, Hill & Leicht 2005a; Henry, Hill & Leicht 2005b; Pittaway & Cope, 2007). However, literature on entrepreneurship education has been published in several disciplines and especially in lower-impact journals (Byrne, Fayolle & Toutain, 2014). Therefore, I am discriminating neither between the impact factors of journals nor between the journals according to the discipline they represent. To this end, I include all journals represented in available databases. Journal articles alone have been included in this review, since they are considered as validated knowledge (Podsakoff, MacKenzie, Bachrach & Podsakoff, 2005); these are the base inclusion criteria in this review. Conversely, compared to journal articles, books, chapters, and conference proceedings enjoy less consistency in the peer review process, and thus they have been excluded (Jones & Jones, 2011). Similarly, I have excluded interviews, book reviews, and editorial notes.

The ABI Inform/ProQuest database was initially searched for articles published from 1984 (as far back as possible) to 2016, which contained the keywords "enterprise," "entrep*," "edu*," "train*," "outcome," "effect," or "impact," as is common in similar research in the field (Cornelius et al., 2006). Extant literature lacks a commonly agreed definition of

entrepreneurship education: the inclusion of enterprise ("enterpr*") and training ("train*") were intended to meet taxonomic and classificatory concerns. Similarly, outcome ("outcome"), impact ("impact"), and effect ("effect") are included. Additionally, the same search was run in other highly used databases: Scopus, Web of Science (Social Science Citation Index, and ScienceDirect. Compiling all results and controlling for possible duplicates identified a total of 138 papers.

All 138 abstracts were read to ensure that the paper indeed contributed to the present theme. When there was doubt, the entire paper was read. In the case of papers concerning enterprise or training, the entire paper was read to ascertain whether it was appropriate and relevant for the present purpose. Unsurprisingly, given the broad initial inclusion criteria, this process found 66 articles that focused on a different topic; therefore, these were eliminated. The remaining papers were then added to the database and read in their entirety; the analysis below includes those remaining 71 papers.

Finally, while this is in part intended to function as a review of conceptual contributions relating to the relationship between entrepreneurship education and entrepreneurship outcomes, I found very few such efforts in the literature. On the contrary, the vast majority of contributions are empirical papers. Once the database was established, for the purpose of this thesis, I therefore classified the papers according to the theoretical framework they used. Specific empirical findings are not discussed in the literature review but are throughout the thesis.

Table A2: Findings of Systematic Literature Review.

	Theoretical Framework	Kirkpatrick Level
Gielnik et al. (2015)	**	Learning
Rauch, Hulsnik (2015)	*	Learning
Gerba (2012)	*	Learning
Macura et al. (2015)	*	Learning
Urbano, Guerrero (2013)	***	Behavior, Results
Ipate, Paîvu (2014)	***	Learning
Galloway et al. (2005)	***	Learning
Lewis (2005)	***	Reaction, Learning
Man, Yu (2007)	***	Learning
Jones et al. (2008)	***	Learning
Schwarz et al. (2009)	**	Learning
Zainuddin, Rejab (2009)	***	Learning, Behavior
Packham et al. (2009)	***	Learning
Hytti et al. (2009)	*	Behavior
Hussain et al. (2009)	*	Behavior
Jones et al. (2011)	*	Learning
Jones (2011)	***	Reaction
Harmeling (2011)	***	Reaction
Athayde (2012)	***	Learning
Hietanen (2015)	*	Learning
Farashah (2013)	*	Learning

Jones, Colwill (2013)	***	Reaction
Smith et al. (2014)	***	Learning
Støren (2014)	***	Learning
Faherty (2015)	***	Reaction, Learning
Gordon et al. (2012)	*	Learning
Walter, Dohse (2012)	*	Learning
Oosterbeek et al. (2010)	***	Learning
Huber et al. (2014)	***	Learning
Lee et al. (2005)	**	Learning
Raposo et al. (2008)	***	Learning
Dutta et al. (2011)	**	Behavior
Sánchez (2011)	**	Learning
Zhang et al. (2014)	*	Learning
Boissin et al. (2011)	*	Learning
Idogho, Augustine (2011)	***	Learning
Matlay (2011)	***	Learning
Pickernell et al. (2011)	*	Behavior
Lourenco, Jayawarna (2011)	*	Learning
Laviolette et al. (2012)	*	Learning
Brink, Madsen (2015)	*	Results
Kassean et al. (2015)	**	Learning
Roomi, Harrison (2010)	***	Behavior, Results

Johansen (2012)	***	Behavior
Budden et al. (2015)	***	Reaction
Pittaway et al. (2013)	*	Learning, Behavior
Souitaris et al. (2007)	*	Learning
Martin et al. (2013)	**	Learning
O'Connor, Ramos (2006)	*	Learning
Byabashajja, Katono (2011)	*	Learning
Graevenitz et al. (2010)	*	Learning
Elert et al. (2015)	***	Behavior
Pruett (2012)	***	Learning, Behavior, Results
Petridou, Sarri (2011)	***	Learning
Kumara (2012)	*	Learning
Chrisman et al. (2012)	**	Behavior
Matlay (2008)	***	Learning, Behavior
Millman (2010)	***	Learning
Wang, Verzat (2011)	***	Learning, Behavior
Piperopoulos (2012)	***	Learning
Varamaki et al. (2015)	***	Learning
Yu, Man (2009)	***	Learning
Grimm, Paffhausen (2015)	***	Results
Guerrero et al. (2015)	***	Results
Arlotto et al. (2012)	***	Learning
Levie, Autio (2008)	***	Results

Hattab (2014)	***	Learning
Karlan, Valdivia (2011)	***	Behavior
Klinger, Schündeln (2011)	***	Behavior
Athayde (2009)	n/a	Learning
Walter et al. (2011)	n/a	Learning
*: intention-based framing **: other framing ***: no explicit theoretical framing n/a: not available or inconclusive		

Comments on the Findings

The findings of this systematic literature review are specifically used to inform the discussion on the theoretical framing of the thesis. Through the analysis it is possible to note that there are few conceptual papers on the relationship between entrepreneurship education and entrepreneurship outcomes.

It has previously been noted that entrepreneurship education largely lacks a framework in theoretically grounded studies (Henry, Hill & Leicht, 2005a; Kailer, 2005), and this indeed seem to be a persistent challenge: 45% of the identified studies in this review did not provide a theoretical framework at all. Of those that did, more than half were grounded in the Theory of Planned Behavior (TPB). This confirms anecdotal evidence that there is a dearth of literature conceptualizing outcomes of entrepreneurship education as actual entrepreneurial behavior among graduates, rather than predictors thereof.

Moreover, a total of 21% of papers seemingly did conceptualize outcomes as actual behavior, understood primarily as firm creation, rather than intentions or attitudes to behavior. Given the anecdotal evidence, this was a surprisingly high percentage (in total 15 studies). However, upon further scrutiny of those articles, I discovered a plethora of different views on what constitutes entrepreneurship education: e.g., extracurricular entrepreneurship activities being conceptualized as education. On the other

hand, none of the studies concerned the relationship between entrepreneurial behavior and entrepreneurship education as understood in this thesis.

Firm performance or growth was rarely studied (less than 10% of papers) at all. In these papers, conceptualizations of performance and growth were used interchangeably, and in all instances operationalized as self-reported perceptions of present or past beliefs about future growth.

Summary

In summary, previous research on the impact of entrepreneurship education has rarely addressed higher Kirkpatrick levels. Moreover, almost every second study that met the inclusion criterion did not provide a theoretical framework at all. Of those that did, more than half were grounded in the Theory of Planned Behavior (TPB).

Appendix 3: Robustness Tests

Background

The population database consists of all students who have gone through the academic programs at the Stockholm School of Entrepreneurship (SSES) during July 1, 1998–July 1, 2013. These data are collected in order to be able to conduct robustness tests for the subsequent tests and regression analyses. The database includes participation in 25 different courses and their various iterations. In total, 6,989 individuals are represented in the database, of whom 361 participated in all seven variations of the Planning – Developing a Venture (PDV) course over the years 1999–2005 (i.e., up to the last iteration before the studied natural experiments were conducted), and 513 took part in an equal number of variations of the Ideation – Creating a Business Idea (ICB) course over the same period. Data are available for entrepreneurship behavior as entry and for entrepreneurship performance as entry speed, but not for operationalizations of re-entry and business performance.

Descriptive Statistics and Missing Data

As noted above, the database consists of 6,989 individuals. Data are systematically missing for international students. For the sub-samples this is treated as ignorable data, since a multitude of different nationalities are represented, and patterns of firm founding and entrepreneurship activity vary extensively between nations. Consequently, list-wise exclusion is performed for all international students (in total 3,014 individuals).[55]

Managerial experience and founding of limited companies is left censored from 1993 onward. The legal age for founding a firm in Sweden is 18; a total of 539 individuals were born before 1975. Altogether, the data represent 249,619 data points, of which 2,063 are missing for both

[55] As a robustness test, inputting data with full information maximum likelihood (thus producing estimates that are consistent, asymptotically efficient, and asymptotically normal) produces the same conclusions for the later tests (Allison, 2012).

Entrepreneurial Experience and *Managerial Experience*. As this represents less than one-thousandth of the data for each variable, these data are treated as missing at random and are thus assumed to follow the distribution of the total population (Allison, 2012).

The subsequent tests are intended to function as robustness tests for $PDV06_1$ and $ICB06_1$. Therefore, list-wise exclusion is performed for all other courses except PDV and ICB, and all iterations of the respective courses following the natural experiments studied in this thesis. In total, seven annual course iterations of both PDV and ICB from 1999 to 2005 (inclusive) remain.[56]

Following the operations above, there are two sub-populations; the PDV sub-population consisting of 214 individuals (henceforth referred to as PDV_P), and the ICB sub-population consisting of 342 individuals (henceforth referred to as ICB_P).

Robustness tests are conducted for dependent variables, and for regression models of significant findings in the natural experiments. As data are not available for re-entry and business performance, tests are limited to entry and entry speed.

Descriptive Data and Robustness Tests for $PDV06_1$

After correcting for ignorable missing data, a total of 214 individuals are represented in the PDV_P population sample. The average age at t_0 was 25.4 years; 89% of the participants were men and 11% were women. Business students represented 25% of the entire sample. In total, 8% of the sample did have previous managerial experience, and 12% had entrepreneurial experience.

Below, the means of each background variable in the PDV_P are compared to the $PDV06_1$ dataset. This is done independently of their potential explanatory power for any of the outcome variables. For all binary outcome variables, Pearson chi square test is performed on the respective

[56] Between 1999 and 2004, the respective courses underwent name changes: "Creating a Business Plan" ("Planning – Developing a Venture") and "Creating a Business Opportunity" ("Ideation – Creating a Business Idea").

means. t-tests are conducted with equal assumed variances for continuous variables.

The chosen p-value is 0,05, which is consistent with the sub-sample tests, similar sample sizes in both entrepreneurship education and other domains and disciplines in terms of the probability of wrongly rejecting the null hypothesis if this is, in fact, true (Greenwald, 1975; Fanelli, 2012)

Table A3a: PDV individual level descriptive data: Background.

Variables	**PDV_P (n=214)**	**$PDV06_1$ (n=36)**	**P**
Age (average, years)	25,4	25,8	0,33
Female	24	6	0,46
Engineering student	74	13	0,85
Business student	54	8	0,69
Medicine student	15	2	0,74
Design student	7	1	0,87
Managerial experience	17	3	0,93
Entrepreneurship experience	26	1	0,09

As Table A3a shows, there are no systematic differences among the background variables between the studied sub-sample and the population. For all known background variables, it is thus concluded that $PDV06_1$ is a robust representation of the PDV population.

The table below shows descriptive data and tests for the available outcome variables.

Table A3b: PDV individual level descriptive data: Outcomes.

Variables	**PDV_P (n=214)**	**Max**	**Min**	**Std. Dev.**
Entry (%)	35%	54%	12%	12
Entry speed (average, days)	1,140	4,377	47	978

As may be seen, an average of 35% of graduates enter into entrepreneurship from the seven course iterations. The maximum for one single course was 54% and the minimum 12%. The first entry in the population happened 47 days post-onset, and the latest occurred approximately 11 years later (4,377 days).

Table A3c records details of the robustness tests for the relevant dependent variables.

Table A3c: PDV individual level tests: Outcomes.

Variables	**PDV_P (n=214)**	**$PDV06_1$ (n=36)**	**P**
Entry (%)	35%	38%	0,43
Entry speed (average, days)	1,140	1,184	0,49

As may be seen, there are no known significant differences in the dependent variables between the studied sub-sample and the population. For the available outcome variables, it is thus concluded that $PDV06_1$ is a robust representation of the PDV population.

Table A3d shows the logistic regression estimation for the robustness test of entry for the sub-sample compared with the entire population of PDV courses.

Table A3d: Logistic regression estimation for PDV_P.

	Coef.	**z-Value**
Business study	-0,25	-0,61
Entrepreneurship experience	0,42	0,93
Managerial experience	-2,45*	-2,43
Sex	1,01	1,52
Age	-0,13*	-2,58
Constant	1,98	1,3
N		214
Prob>X²		0,0002
Pseudo R2		0,088
* p < 0,10 ** p < 0,05 *** p < 0,01		

The estimated regression model corroborates the conclusions following the estimated model for the $PDV06_1$ sub-sample.

Assuming that the covariates are multiplicatively related to the hazard and noting that the hazard responds exponentially, it assumed that each individual's change in age is likely to result in a proportional scaling of the hazard. Therefore, the semi-parametric model, Cox Proportional Hazard Function, is opted for in lieu of a parametric model to conduct robustness tests of the survival function for entry speed for the population.

Table A3e: Cox proportional hazard estimation for PDV_P.

	Haz. Ratio	z-Value
Business study	1,44	1,30
Entrepreneurship experience	1,54	1,30
Managerial experience	3,25	1,15
Sex	1,06	0,11
Age	1,07	1,62
N		55
Prob>X²		0,33
LR X² (6)		5,75
* p < 0,10 ** p < 0,05 *** p < 0,01		

As may be seen from the table, the estimated Cox Proportional Hazard model for the population corroborates the conclusions of the sub-sample test.

Taken together, the robustness tests above conclude that the sample studied in the natural experiment constitute a robust representation of the PDV population. Therefore, the robustness tests lend added reliability to the conclusions following the natural experiment in general, and for entry and entry speed specifically.

Descriptive Data and Robustness Tests for $ICB06_1$

After correcting for ignorable missing data, a total of 342 individuals are represented in the ICB_P population sample. The average age at t_0 was 25.5 years; 27% of the participants were women. Business students represented the largest sub-sample: 59% of the entire sample. A total of 12% of the sample did have previous managerial experience, and 20% had entrepreneurial experience.

Next, the means of each background variable in the ICB_P are compared to the $ICB06_1$ dataset. The same analytical strategy is employed here as for the tests above.

Table A3f: ICB individual level descriptive data: Background.

Variables	ICB_P (n=342)	$ICB06_1$ (n=57)	P
Age (average, years)	25,5	25,7	0,31
Female	95	13	0,43
Engineering student	122	26	0,15
Business student	203	31	0,48
Medicine student	25	0	0,02
Design student	2	0	0,28
Managerial experience	43	9	0,31
Entrepreneurship experience	71	11	0,80

The data show a significant difference ($p<0.05$) for medical students. For all other studied background variables, there are no differences between the studied sub-sample and the population. Thus, for all but one known background variable, it is concluded that $ICB06_1$ is a robust representation of the ICB-population.

The next section presents descriptive data and tests for the available outcome variables.

Table A3g: PDV individual level descriptive data: Outcomes.

Variables	ICB_P (n=342)	Max	Min	Std. Dev.
Entry (%)	26%	41%	11%	9
Entry speed (average, days)	1,609	4,811	12	1,255

As may be seen, an average of 26% of graduates entered into entrepreneurship from the seven course iterations. The maximum for one single course was 41% and the minimum 11%. The first entry in the population happened 12 days post-onset, and the latest approximately 13 years later (4,811 days).

The robustness tests for the available outcome variables are presented in Table A3h.

Table A3h: ICB individual level tests: Outcomes.

Variables	**PDV_P (n=342)**	**$PDV06_1$ (n=57)**	**P**
Entry	0,26	0,32	0,38
Entry speed (average, days)	1,609	1,646	0,45

As the table shows, there are no systematic differences in the dependent variables between the studied sub-sample and the population. For the available outcome variables, it is thus concluded that $ICB06_1$ is a robust representation of the ICB population.

The next section presents the logistic regression estimation for robustness tests of entry for the sub-sample compared with the entire population of ICB courses.

Table A3i: Logistic regression estimation for ICB_P.

	Coef.	**z-Value**
Business study	0,25	1,01
Entrepreneurship experience	-0,20	-0,72
Managerial experience	0,21	0,85
Sex	0,20	0,70
Age	-0,13	-0,39
Constant	-1,04	-1,15
N		342
Prob>X^2		0,67
Pseudo R2		0,008
* p < 0,10 ** p < 0,05 *** p < 0,01		

The estimated regression model corroborates the conclusions derived from he estimated model for the sub-sample.

Table A3h presents the Cox Proportional Hazard estimation to conduct robustness tests of the survival function for speed of entry for the ICB population.

Table A3j: Cox proportional hazard estimation for PDV_P.

	Haz. Ratio	**z-Value**
Business study	0,52	-2,56
Entrepreneurship experience	1,90	2,47
Managerial experience	1,32	1,21
Sex	0,65	-1,63
Age	1,03	1,23
N		89
Prob>X^2		0,008
LR X^2 (5)		15,58
* p < 0,10 ** p < 0,05 *** p < 0,01		

The estimated Cox Proportional Hazard model for the ICB population yields somewhat different results than for the $ICB06_1$ iteration. Specifically, there are no direct effects noted for entrepreneurship experience, managerial experience, or sex. This observation suggests that, for the population, actual changes in these independent variables do not correlate with changes in entry speed, which will need to be accounted for in the broader interpretation of the results.

Taken together, the robustness tests confirm that $ICB06_1$ is a robust representation of the ICB population. That said, the tests suggest that the direct effects for entry speed should be treated with caution, as they do not occur for the population itself. In other words, the robustness tests lend added reliability to the conclusions derived from the natural experiment for ICB in general, and for entry specifically.

Conclusions

The robustness tests for PDV suggest that the $PDV06_1$ course iteration, which in this thesis represents realism treatment, is a reliable representation of the PDV population in general, and for entrepreneurship entry and entry speed specifically. Equivalent tests for ICB suggest that the $ICB06_1$ is also a reliable representation of the ICB population in general, and for entry specifically. At the population level, the direct effects noted in the estimation model suggest that the independent variables do not cause changes in entry speed.

Those are important conclusions, as they corroborate a systematic effect of the respective treatments. Moreover, the robustness tests suggest that effects noted in the natural experiments are in fact treatment effects. The direct effects of anti-realism entry speed noted in the natural experiments, however, were not corroborated through the robustness tests.

Importantly, while data for re-entry and business performance were excluded, there is nothing in the sub-samples or robustness tests that contradicts specific conclusions for those outcomes. Consequently, the sub-samples are concluded to be robust representations of the population to which they belong, the treatment effect is deemed systematic, and the inference from the results in the natural experiments should be considered with added reliability.

Appendix 4: Course Syllabi

PDV06

Stockholm School of Entrepreneurship

A partnership between KI, KTH, SSE and Konstfack

Planning a Venture, fall of 2006

Schedule

Time	Subject	Location	Lecturer
6/11, 12:00	Deadline Individual Assignment 1 - written: NOT COMPUSLORY1 Idea to develop, team & Coach to assist	e-mail	[redacted]
7/11 17:15 – 20:00	Introduction to Planning, Guest lecture and Springboards	D2	[redacted]
9/11 17:15 – 20:00 12:00	First Pitch to Coaches and Course Deadline Team Assignment 1 – written: submit names of team members, and name team leader Deadline Team Assignment 2 - oral: Bring coach and give 4 min presentation.	D2	[redacted]
14/11 17:15 – 20:00 12:00	Market and competitor analysis Deadline Individual assignment 2: Written 2-page reflection on two chosen articles, two pages total	D2	[redacted]
21/11 17:15 – 20:00	a) Knowing your audience b) Pitching and presentation	D2	[redacted]
22/11, 12:00	Deadline Team Assignment 3 - written: Draft of business plan, team structure, etc, …	D2	[redacted]
23/11 17:15 – 20:00	Half-way workshop: Deadline Team Assignment 4 - oral: 7-minute presentation	D2	[redacted]
28/11 17:15 – 20:00	a) Team Building and Networking b) Funding the business – knowing the capital need and how to get it	D2	[redacted]

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4/12 12:00	Deadline Team Assignment 5 – written: submit final Business Plan; max 8 pages	D2	[redacted]
5/12 17:15 – 19:00 12:00 17:15 – 19:00 12:00	Business Plan Presentations Deadline Team Assignment 6 – written: ppt-presentation/10min Deadline Team Assignment 7 – oral: final 10 min presentation – Compulsory Attendance Deadline Individual Assignment 3 - written: Grade yourself and your team members.	D2	[redacted]
18/12 17:15 – 20:00	Final Venture Cup and Business Plan Award presentations and Grading Party	SSES	[redacted]

All lectures are scheduled to start at 17.15 and will end no later than 20.00. The lectures are not compulsory, but it is recommended to attend in order to be able to get a passing grade. Each lecture will have a 15 minute break every 45 minutes.

Room locations
There will be two lecture rooms throughout the course:

For room D2 (KTH)

1. From t-centralen take the subway, red line towards "Mörby centrum", station: Tekniska Högskolan.

2. Take left after ascending the stairs in the trains direction.

3. Well out on "Drottning Kristinas väg" you will after 100 m see "Lindstedtsvägen" turning right. Follow it and you will have two flagpoles on your left hand side. These are situated just outside of the main building ("huvudbyggnad" on the map found at the below link). Pass between the flagpoles and go through the portal. On your right hand side on the court yard you will find the entrance at Lindstedtsvägen 17. Go in and go straight forward and then take a left inside the corridor. There you are.

Course Description

The main objective of Planning – Developing a Venture is to lead the participating students through a business development process, involving everything from the development of the idea to the final business plan. The underlying objectives are:

- Development of ideas
- Building a team
- Sorting of ideas
- Creation of a business plan for new ventures or established businesses
- Evaluation of the business plan to decide whether a business can be established, taking into account marketing, economic and organisational issues

Course Content

Students shall form teams by five to develop their ideas into business plans. Ideas and plans will be discussed at seminars attended by co-students and a 'coach'. Each team should find their own course. The objective of the seminars is to provide students with a forum to discuss their ideas with other students who study different disciplines and who bring to the seminar a variety of skills and business ideas. Toward the end of the seminar series the main objective changes to producing a business plan and to discussing the possibility of successfully launching the different business ideas.

As the commercialisation of an idea into a business is highly dependent on the will power, persistence and competence of the people involved, the team must be highly motivated and have a real belief in their project as well as the competence to develop the idea into a business.

The ideas developed within the framework of the course should be innovative in the sense that they are based on technical innovations, new scientific results, or new creative methods for organising resources or marketing products and services.

The two best business plans presented during the course will have the opportunity to participate in the competitions "European Business Plan of the Year" organised by London Business School and INSEAD and "Venture Challenge" organised by San Diego State University. Both events are frequented by Venture Capital businesses that are interested in supporting promising young entrepreneurs. Previous participants at this event from the SSES are today managing successful enterprises.

Students will also have the opportunity to participate in Venture Cup East, a business plan competition organised jointly by McKinsey & Company and many regional colleges and universities.

Assignments

Assignments will be based on presentations, the ongoing Business Plans being developed and discussions of selected reading material. The reading material will complement the workshops and the presentations.

PLEASE OBSERVE!

1. All assignments must be handed in on time! 12:00 means, that 12:05 is too late!
2. All assignments – group and individual – must be sent in electronically to planning.2006@gmail.com or to the e-mail address communicated at the first lecture, 7/11.
3. Failure to deliver all required assignments will result in an uncompleted course and will require extra assignments. If this occurs it is your responsibility to contact the course director, Bertil Guve, in order to get a new assignment appointed to you.
4. The deadline of the first individual assignment (written) is the day BEFORE the first lecture, i.e. the 6 nov, 12:00. Please observe it is not compulsory.
5. The respective deadlines of the assignments are presented in the course schedule and in the list of assignments here below.

List of assignments

6/11 – Deadline, 12:00: Individual assignment 1 - written

Assignment

This first individual assignment is NOT compulsory. The assignment is to submit the following:

a) a suggestion of a business idea to develop during the course
b) name team members (if there are any at this early stage)
c) name a coach to assist during the course.

Although this assignment is NOT compulsory, please observe that it is necessary for you to complete it if you have an idea that you wish to develop into a business plan during the course. Out of the submitted ideas the course directors [redacted] and [redacted] will choose the business ideas to be developed during the course. The chosen projects will be communicated at the lecture the 7/11. On the lecture of the 7/11 the teams of each project should be formed.

9/11 – Deadline, 12:00, Team assignment 1 - written

Assignment

Submit names and e-mails of team members, and team leader.

9/11 – Deadline, 17-20 Team assignment 2 - oral

Assignment
Each team should bring its coach to the lecture and prepare a 4 min presentation of the business project.

14/11 – Deadline, 12:00: Individual assignment 2 - written

Assignment
You should submit a written, 2-page reflection commenting and comparing two articles of the course readings chosen by you. In the reflection you should a) explain why or why not, the articles you have chosen would influence your business plan b) comment on what you can conclude combining the two articles. Please observe that this task is individual.

22/11 – Deadline, 12:00: Team assignment 3 - written

Assignment
Each team should hand in the following:

a) Present business plan draft, stating your findings so far and plans for the near future. This should include an outline of the final business plan, explaining what it is you plan to expand on.
b) Team description: who is who in the team and who is responsible for what?
c) Gantt-chart

23/11 – Deadline, 17-20: Team assignment 4 - oral

Assignment
Each team should prepare a 7-minute presentation of the present Business Plan and plans for the future. Please note and forgive that not all teams will be able to give the oral presentation. The teams to present will be selected during the lecture.

5/12 – Deadline, 12:00: Individual assignment 3 - written

Assignment
Grade yourself and your team members. Motivate the grades you give in three dimensions of your choosing; such as creativity, competence, effort, efficiency, loyalty, creator of positive thinking, or other… Please observe that the way in which you grade and motivate the grades will be evaluated. Giving top grades to all your team members is hence not necessarily ground for top grades for yourself.

5/12 – Deadline, 12:00: Team assignment 5 – written

Assignment
Each team should hand in a ppt-presentation of the business plan, corresponding to a 10-minute oral presentation of the final Business Plan.

5/12 – Deadline, 17-20: Team assignment 6 – oral

Assignment
Each team should be prepared to give a 10 minute presentation of the final Business Plan. Please note and forgive that not all teams will be able to give the oral presentation. The teams to present will be selected during the lecture.

Examination breakdown

The examination will be based on individual and Team performances as well as attendance. In order to pass the course you must attend at least 3 lectures and submit all required written assignments. The final grade will be based on

a) the level of the teams final business plan
b) the level of the individual assignments
c) the grading you receive from your team members
d) the evaluation of the way in which you give and motivate the grades you give yourself and your team members

Required readings

Required readings are expected to be read during the course. It is among these readings that you should choose for the individual assignment of writing a reflection. Further readings may be presented during the course. The readings will be posted at the course web site.

- Copeland, M.V. & Malik O.; (2006) How to build a bullet-proof start-up. Business 2.0, June 2006
- Osterwalder, Pigneur, Tucci, (2005) *Clarifying Business Models*, Communications of the Association of Information Systems
- Audia, Rider, (2005), *A Garage and an idea – what more does an entrepreneur need?,*
- Alvrez, Barney (2006), *Discovery and Creation – alternative theories of entrepreneurial action*, working paper series, Ohio University Press
- Zander, I., (2006); *Do you see what I mean? – an entrepreneurship perspective on the nature and boundaries of the firm*, reviewed for Journal of Management Studies
- Schwartz, P. *The Art of the Long-view – planning for the future in an uncertain world.* Currency Doubleday 1997 (ISBN: 0-385-26732-0)
- Goldenberg, J. Horowitz, R. Levav, A. and Mazursky, D. Article: *Finding your innovation sweet spot* HBR. March 2003.

Recommended readings

In addition to the required readings there is a list of recommended readings that further develop or complement the different assignments/lectures, bringing additional inspiration and value to the course content for those who would like to look deeper into the subject.

Books

- Bender, P.U. *Tala, Presentera, Kommunicera*. Egmont Richter AB 2001 - *Secrets of Power Presentations.* Eng.version: Stoddard Publishing Co. Limited, Canada. ISBN: 91 7711 789 0
- Kelly, T. Littman, J. *The art of Innovation*, Harper Collins, London, 2001 (available through http://www.adlibris.com/se/product.aspx?isbn=1593352182&s=1)
- Godin, S. (2005) *Purple Cow. Transform Your Business by Being Remarkable*.

Finally…

You should all by now have received a login and password to the SSES course web. Please visit that site and make sure you're familiar with the course web. It is a good habit, and will be expected from you to visit the course web at least once per day as all news regarding the course will be posted there. If you have any problems with this – please contact the course assistant planning.2006@gmail.com.

18/12 – Final Presentations and Grading Party

Listen up folks!

The three plans chosen on the evening of the 5th will present their plans to a tailored panel of experienced entrepreneurs in their fields. From these three projects the team representing SSES in this year's European Business Plan of the Year Competition and the Venture Challenge will be announced. Furthermore, the winners of the prestigious SSES Business Plan of the Year will be announced.

Come by, have a bite, drink a cold beer, a nice glass of wine or soda, get your grade and mingle!

ICB06

Stockholm School of Entrepreneurship

A partnership between KI, KTH, SSE and Konstfack

Ideation – Creating a business idea, 2007

An SSES Core Course

Karolinska Institutet

KTH

Handelshögskolan i Stockholm

Konstfack
University College of Arts, Crafts and Design

Stockholm School of Entrepreneurship
A partnership between KI, KTH, SSE and Konstfack

IDEATION — Creating Business Ideas

[redacted] & [redacted]

WELCOME!

Ideation is a course about ideas, entrepreneurship and creativity, and aims to give students practical knowledge about the process of creating and developing a business idea. The course stretches all the way from the pre-idea to the development of a business idea through to the identification of target markets, and finally to the issues surrounding the actual launching of the product/service. Using real-world examples and analysis emphasis is placed on the creative process surrounding the development of a sound business idea, the identification of a distinct market opportunities and the development of a strong business model.

Thinking up an interesting business idea is not the end of the process, in fact, it is just the beginning. This idea must be developed into a business concept and a true business opportunity through market and competitive analysis. This subject demands innovative and entrepreneurial work and requires creativity and problem solving skills.

The course will further encompass:

- Creativity
- Finding and/or creating business ideas
- Identifying the target market
- The business model
- Opportunity selection

During the course the students will be challenged to identify areas of need, to find and create business ideas, and to develop business concepts and opportunities.

COURSE PHILOSOPHY

The course wants to inspire the participants to see entrepreneurship as a worthwhile endeavor, and will focus on the personal development, drive and desire of the participants. Rather than presenting absolute truths, the course will encourage creative thinking and engagement, and will work from the assumption that students participating in the course do so out of an interest to develop themselves. Thus, the course will not focus unduly on compulsory aspects, and instead celebrates the participants active choice to take part.

EXAMINATION

The course will be examined primarily through a so-called portfolio-method. Rather than having one, larger final examination, the course has a series of assignments connected to the individual lectures. In order to get credits for the course, participants are to complete these assignments, and hand them in as a portfolio, i.e. the individual assignments are not handed in to the teacher, but instead kept, collected and handed in as a complete set at the end of the course.

Additionally, participants are expected to conduct readings, take an active role in the lectures and be prepared to present in front of the class when asked to do so.

SCHEDULE

1. Wednesday, Aug 30th, 17:15-20:00
   "Introduction to entrepreneurship", room D1
2. Wednesday, Sep 6th, 17:30-20:00
   "Idea development and the business idea", room E1
3. Thursday, Sep 7th, 17:15-19:00
   "Seeking and shaping business opportunities", room D1
4. Wednesday, Sep 13th, 17:30-20:00
   "Creativity", room E1
5. Thursday, Sep 14th, 17:15-19:00
   "Generating and developing business ideas", room F1
6. Wednesday, Sep 20th, 17:30-20:00
   "Evaluating and selecting ideas", room E1
7. Wednesday, Sep 27th, 17:15-20:00
   "Idea workshop", room E1
8. Wednesday, Oct 4th, 17:15-20:00
   "Planning for implementation", room E1
9. Thursday, Oct 5th, 17:15-19:00
   "Pitching your idea", room D1
10. Wednesday, Oct 11th, 17:15-20:00
    "Final workshop", room E1

PROGRAM FOR THE COURSE

(Note: All readings will be distributed during the course, and thus no set reading list exists.)

Lecture 1
Introduction to entrepreneurship

Aim and scope:

To introduce the field of entrepreneurship, its context and possibilities, to highlight the need for entrepreneurial ventures in society, and what it takes to become an entrepreneur. The lecture aims at presenting entrepreneurship as a complex and dynamic field, and lay the groundwork for developing an entrepreneurial mind. Moreover, the basic concepts and terminology of entrepreneurship and developing business ideas are presented. In addition, the scope, contents and the logic of the course is discussed.

Assignment 1: Readings & an additional assignment to be revealed during the lecture

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Lecture 2
Idea development and the business idea

Aim and scope:

To discuss the nature of the business idea. By presenting and analyzing a series of entrepreneurial ventures, central points regarding the business idea are highlighted, and this is then developed into a framework with which the participants can discuss and develop business ideas. The lecture further introduces the idea generation process, and highlights what is needed and what isn't in engaging personally with business ideas.

Assignment II: Readings & case analyses, cases to be distributed

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Lecture 3
Seeking and shaping opportunities

Aim and scope:

To present the basics of opportunity recognition in markets. The lecture discusses a series of macro-level trends that affects contemporary entrepreneurship and presents a series of models to grasp the context of business potential. In addition, the lecture presents and discusses a series of practical methods and techniques that can be used to identify and develop opportunities.

Assignment III: Readings & an assignment on the identification of opportunity spaces

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Lecture 4
Creativity

Aim and scope:

To present and discuss the need for creative thinking in entrepreneurship, and to present the creative process. The lecture discusses divergent versus convergent thinking, logic versus intuition and the need for contrarian thinking. Further, the lecture presents creativity techniques and the necessity of working with different frameworks. A particular focus is put on boundary techniques and how these can be used to create "breakaway" ideas.

Assignment IV: Readings & an assignment on idea generation

Lecture 5
Generating and developing new ideas

Aim and scope:

To present an in-depth discussion and analysis of the idea-development process, with a particular emphasis on systematic methods for harnessing and focusing creativity. In the lecture, a series of formal and informal methods for idea generation and development are presented and their use analyzed. Several frameworks to rethink the process of generating ideas are also discussed critically. After the lecture, the participants should be equipped with a "toolbox" with which to work out embryonic business ideas.

Assignment V: Readings & formal development of a selection of ideas from assignment IV

Lecture 6
Evaluating and selecting ideas

Aim and scope:

To introduce the screening and selecting of ideas, both intuitively and through formal methods. The lecture discusses the generation of feasible business ideas, business models and selection criteria for ideas. Several formal models for screening and decision-making are presented and analyzed. After the lecture, the participants should be able to engage in the critical analysis of business ideas, and be able to develop a feasibility analysis. Participants should also be able to formulate their ideas in the form of a business model rather than as "merely" an opportunity.

Assignment VI: Readings & development of an idea-presentation for the workshop

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Workshop 1
Idea workshop

Aim and scope:

The goal of the workshop is to let participants present their ideas for the class, argue for their views and receive feedback. The importance of this workshop is that it lets us get many perspectives on an idea, and also hone both communication skills for those selected to present and analytical skills for those in the audience. The aim is not to kill ideas, rather to work with them and develop them in a collaborative fashion, and to see how the notions presented in the preceding lectures can be used "live".

Lecture 7
Planning for implementation

Aim and scope:

To discuss the move from an idea to a business plan. The basic vocabulary of a business plan is introduced, along with a discussion of market analysis. The lecture further focuses on developing implementation strategies and analyzing potential blocks to implementation, presenting several models with which to predict the risks of a venture. In addition, the question of the business model is discussed in more depth.

Assignment VII: Readings & an assignment related to implementation analysis of the participants ideas.

Lecture 8
Pitching your idea

Aim and scope:

To teach the basics of pitching as a critical skill for the entrepreneur. The lecture discusses the pitch, standard models of presenting business ideas, rhetorical and analytical skills in relation to pitching, and the devising of a convincing pitch. Additionally, the session touches upon the basics of entrepreneurial marketing, the different audiences for a pitch and how to move forward with a developed business idea.

Assignment VIII: Readings & the development of a final idea-pitch.

Workshop 2
Final workshop

Aim and scope:

The final workshop will be a run-through of the idea-pitches, with critical commentary from the audience and invited guests. The aim is to simulate a pitch to interested parties, and discuss the

problems with pitching and taking ideas forward. All participants will be required to be prepared with a pitch, even though not all will be asked to do so.

Final assignments: Final assignments will be discussed at the workshop.

The program above is indicative. Changes, such as guest-lectures and changes according to the continuous development of the course, may occur.

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30-08-06

IDEATION 1

Assignment 1:

Find and fill out the documentation to start a company. In this day and age, it is simple to both find and fill out the necessary paperwork to register a company, but unless one has a reason to do so, one rarely explores this possiblity. Thus, your first assignment is to do so. You will find this assignment easy, but the very point of it is that once you've done it once (playing and virtually, but still), it'll be easier for you to do it for real when the time comes.

A hint: check http://bolagsverket.se

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06-09-06

IDEATION 2

Assignment 2:

There are three cases uploaded to the website together with this assignment. Write a short case-treatment on one of these (you can pick whichever one you like). Such a treatment should include a) lessons to be learnt from such a case, b) what you would do to develop the business described in the case, and c) what you can see could be potential future problems in the case. The treatment should be 2-3 pages.

Reading 1:

Read Guy Kawasaki's manifesto for "The Art of the Start" (attached on the website). Write a comment on this reading, no longer than one page, where you discuss his points and give your view on the text. Did you find something there to be of specific value?

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IDEATION

Assignment 3:

Your third assignment is simple. Write down ten opportunity spaces, ten different things you can see in the world around you that represent an opportunity. This can be a change you've noticed, a specific unfulfilled need, something that people seem to ignore or not pay enough attention to. The point is to write down ten of these, and preferably make them broad enough to enable one to think of several ways to utilize this opportunity.

An example: "Kids are getting fatter, and this seems to be linked to the fact that they play video games all the time. This might be an opportunity both for creating new kinds of games and creating ways to make kids play less."

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Assignment 4:

Of the ten opportunity spaces you wrote of in your last assignment, choose five and develop an idea to either solve the problem or utilize the opportunity. In other words, create and describe five ideas that could be developed into business ideas.

Reading 2:

Read the articles included in “Creativity-readings” (attached on the website). Write a comment on this reading, no longer than two pages, where you discuss his points and give your view on the text. Did you find something there to be of specific value?

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Assignment 5:

Of the five ideas you presented in the last assignment, pick two and submit these to two of the idea-development processes (workouts) discussed in the last lecture (e.g. take one idea and run it through the Osborn-list and through a rule-reversal exercise. The point of the assignment is to take two ideas and generate sets of variations (four sets in all). Show how you can take in idea and creatively generate other ideas from this. The variations don't have to be massive, the important thing is to explore the limits of one's idea.

(For those of you who did not attend, a "cheat-sheet" on SCAMPER (one of the techniques) can be found here: http://me.odysseyofthemind.org/SCAMPER%20your%20way%20to%20creative%20thinking.htm)

Reading 3:

Read the articles included in "Innovation-readings" (attached on the website). Write a comment on this reading, no longer than two pages, where you discuss his points and give your view on the text. Did you find something there to be of specific value?

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Assignment 5:

Assignment five is simple indeed. For next weeks session you are supposed to prepare a brief presentation of the business ideas you've worked with and are interested in. These presentations should be brief and to the point: what opportunity have you identified, what idea do you have about how this could be utilized, and what makes you think this could be turned into a business idea. A short presentation of this should run no more than 3-5 minutes,

The point of the exercise is to make you more comfortable talking about ideas in front of an audience, as well as having a stimulating discussion about several ideas in a group-setting. The point is not to rip ideas apart or prove that something cannot be done, rather to extend the notions we've talked about in class into practical discussions.

You are not required to present any idea you feel less than comfortable with, e.g. if you've seriously planned to realize this idea in the form of a start-up, and are afraid of giving away too much too soon. In such cases, I'd like for you to prepare an alternate idea, which basically can be anything.

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IDEATION

Assignment 7:

Assignment seven is, in one sense, the **big** one. For the Final Workshop, you should prepare a brief pitch, no longer than five minutes, accompanied by 3-4 slides. This pitch should clearly explain your idea, and why you think there is a business idea in it. You should be focused, to the point, and logical. You are free to design this pitch in the way you like, as pitches should be individual, unique and memorable.

Remember to collect both your slides and your notes for the portfolio (see separate document about the submission of the portfolio).

Reading 4:

Read the articles included in “Pitch-readings” (attached on the website). Write a comment on this reading, no longer than two pages, where you discuss his points and give your view on the text. Did you find something there to be of specific value?