



# Impact of Entrepreneurship Education in Denmark - 2014





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**Impact of Entrepreneurship Education in Denmark 2014:**

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## Main results of the Foundation's impact measurement

### General conclusions:

#### Entrepreneurship education:

- at one level leads to entrepreneurship education at later levels
- increases the desire among pupils and students to become an entrepreneur
- affects pupils' and students' entrepreneurial behaviour outside school and studies
- leads to higher incomes later in life – for self-employed as well as for employees
- increases pupils' and students' belief in their own entrepreneurial skills
- increases the likelihood of the individual becoming an entrepreneur
- increases the likelihood of the individual wanting to work with innovation in established companies
- increases the likelihood of the individual wanting to work as a manager in a private company.

### Primary school

- Pupils who take part in entrepreneurship education have higher ambitions for job and education than non-participants. Teaching *about* entrepreneurship has a positive effect on pupils' ambitions for the future.
- Entrepreneurship education has a positive effect on pupils' intentions and desire to start their own company.
- Pupils' entrepreneurial behaviour outside school increases: Significantly more pupils are managers and launchers of extra-curricular activities after they have received entrepreneurship education.
- Teaching *through* entrepreneurship has a positive effect on pupils' relations with school and education, i.e. the pupils enjoy going to school, get on well with their classmates and feel supported by their teachers.
- Teaching *about* entrepreneurship when combined with teaching *through* entrepreneurship has the highest impact.
- Entrepreneurship education has the greatest impact at the early levels of education.
- The teachers' teaching style has a major impact on whether entrepreneurship education has a positive effect.

### Secondary education

- The barriers to entrepreneurship are reduced, especially for girls, who feel that they become better at managing ambiguity and marshalling resources after participating in Company Programme.

### Higher education

- Entrepreneurship students improve their creative skills and strengthen their attitude to entrepreneurship significantly more than students who have not taken part in this type of education.
- Entrepreneurship teaching leads to more students starting their own company, while "standard" university education has a negative effect on students' start-up activity.
- For students without previous entrepreneurship experience, it is important for their desire to become entrepreneurs that they are taught planning and financial understanding.
- It is important for students' entrepreneurial behaviour that during teaching they feel they have ownership of the projects they are working with and that their earlier contextual experiences are involved.

### Postgraduate education

- People who have been trained/educated in entrepreneurship have a significantly higher income than those not educated in entrepreneurship. The more training and teaching, the higher the income, even when we check other conditions such as gender, age, education and employment.
- Entrepreneurship education encourages the desire and especially the skills needed for innovation and start-ups.

All mentioned results are described in detail in the Foundation's reports "Impact of Entrepreneurship Education in Denmark", which can be downloaded from [eng.ffe-ye.dk/knowledge centre](http://eng.ffe-ye.dk/knowledge%20centre).





## Foreword

Four years have passed since the Danish Foundation for Entrepreneurship began work on the impact measurement of entrepreneurship education in the Danish education system. In this year's report, we present new and exciting results that build on the results of previous years. These results point in the same direction as the results from some of our collaboration partners, which you can also read about in this report.

During the four years that have passed, we followed a large group of state school pupils, from year 9 until the present where they have ended their compulsory education. During the same period, the Foundation also followed a group of university students in 12 different Master's programmes. Our knowledge of the impact of different types of entrepreneurship education on different levels of education has therefore increased, and you can read more about this in the first chapters of the report. This knowledge must of course be further developed and the impact measurement continued. The Foundation will continue to follow the pupils in order to understand the more long-term effects in the future. And the new knowledge that we have gathered up to now will also be used for new projects, such as our recently launched project on postgraduate education of teachers.

The significance of teachers' skills is one of the results that has emerged from the previous year's impact measurement. Another interesting result is that entrepreneurship education provided at an earlier point in young people's education has a greater impact than if only provided at a later stage of their education. And these two results go hand-in-hand. During the first level of education, it is important for pupils to enjoy school and increase their desire to learn. And this is one of the strengths of entrepreneurship education in relation to traditional teaching. By increasing teachers' skills in teaching entrepreneurship, we will be able to generate even greater results in this area.

The Foundation's work is backed by the new school reform, which came into force in the summer of 2014. Measures have been taken both on the middle level, years 4-7, with "Håndværk og Design" (Craft and Design) added as a new subject to the curriculum which includes entrepreneurship as an obligatory element, and in lower secondary education, where, among others, pupils' readiness for education and knowledge of the job market need to be strengthened. The link between education and the job market will also contribute to entrepreneurship becoming a part of education further up through the education system. Because it is of course not only primary school teachers' skills that need strengthening.

All of this follows the Foundation's strategy for 2015 – 2020, which contains a goal to increase quality in education at all three levels and a goal to build up knowledge about catalyst activities: what happens between education and company start-up or employment. The Foundation is therefore involved in many new projects and in knowledge building, all of which will benefit pupils, students and their teachers in years to come.

### Christian Vintergaard

CEO // The Danish Foundation for Entrepreneurship



## Executive summary

In this report we present the results of our assessment studies, which focus on the effects of different educational approaches, that is education *about*, *through* and *for* entrepreneurship at secondary and tertiary level of education. The analyses are based on longitudinal data that we have been collecting since 2011. In addition to these analyses the report includes three chapters by external researchers who have performed analyses on related issues. The main findings in this report are the following:

1. Education *about*, *through* and *for* entrepreneurship have very different effects.
2. The way in which the educational approaches are taught and the teaching style which the teacher uses are both very important factors.
3. Educational interventions in entrepreneurship at an early educational level influence the pupils more than if these interventions come at later educational levels.
4. Parents' influence on their children's entrepreneurial attitudes is determined to a larger extent by social factors (nurture) than by biological factors (nature).
5. Entrepreneurship has become a youth phenomenon.

The Global Entrepreneurship Monitor (GEM) study, which has been performed in collaboration with Thomas Schøtt from SDU, demonstrates the last point and shows that entrepreneurship seems to have become a youth phenomenon. When comparing the results of the GEM study performed in 2010 with the GEM study performed in 2014, it is clear that the interest in entrepreneurship has increased among individuals in the age group 15-34, whereas it has decreased among individuals in the age group 35-64. The analysis furthermore shows that entrepreneurship education has a positive association with individuals' entrepreneurial self-efficacy, that is, their confidence in performing entrepreneurial activities.

This finding is further strengthened by the findings presented by Henrik Barslund Fosse from the Danish Agency for Science, Technology and Innovation in his analysis of how start-up activities among university graduates have developed since the start of the millennium. The analysis shows that the entrepreneurial activity among graduates has increased with 43 percent, and that this significant rise is mainly explained by graduates from master's level programmes whose entrepreneurial activity has increased with 159 percent. Furthermore Barslund Fosse's analysis shows that graduates who start a business have a significantly higher growth in productivity, which demonstrates the high competitive capacity of their businesses.

Anders Hoffman from the Danish Business Authority and Martin Junge from DEA have performed an analysis about the influence that parents have on their children when it comes to self-employment. This analysis shows that the trans-generational effect is explained by social factors (nurture) rather than by biological ones (nature). Parents' attitudes and motivation as well as whether they work as entrepreneurs have an impact on children's attitudes and motivation and later work as entrepreneurs, but it is, in particular, the self-employment of parents that has an effect. Hoffman and Junge's results point toward the importance of identification with role models, because as their analysis shows, the influence of parents is to a large extent decided by whether or not they have the same sex as their children.

In our longitudinal studies at tertiary level, where we investigated which dimensions are important in education for entrepreneurship, we show that student ownership over entrepreneurial projects and inclusion of students' prior contextual knowledge in the educational process are crucial dimensions that decide whether or not the educational interventions have a positive influence on students' levels of entrepreneurial self-efficacy and entrepreneurial activities.

At secondary level of education we have investigated how education *about* and education *through* entrepreneurship are associated with pupils' level of school engagement and entrepreneurial intentions, which roles educators play in this process, as well as to what extent these associations remain over time. In addition, we analyse how a change in these educational approaches affects the pupils' educational motivation, self-esteem, relationship to classmates and teachers, as well as how education *for* entrepreneurship affects these variables at different educational levels. The analyses show that education *about* and education *through* entrepreneurship have very different effects; the former - which mainly focuses on fostering cognitively-oriented entrepreneurial skills - has a positive association with the pupils' level of entrepreneurial intentions but a negative association with their level of school engagement, whereas the opposite is the case for the latter which has a stronger focus on non-cognitive skills. However, the level of teacher support plays a crucial role here. The analyses furthermore show that both of these approaches seem to be most influential on younger pupils (year 9 and year 10) compared to older pupils (year 11 and year 12), and that the most effective approach seems to be education *for* entrepreneurship, where the focus is equally distributed on cognitively-oriented entrepreneurial skills, which we refer to as 'business-oriented skills' in the report, and non-cognitive entrepreneurial skills, which we refer to as 'enterprising skills' in the report.



## Introduction

This year's report is a bit different from the other reports that we have been producing since the start of our four-year-long assessment project. We will in this report take stock of the development that the field has undergone since 2010, and summarise some of the advances that have been made. We began our project in 2010 by investigating how entrepreneurship education for the general Danish population was associated with factors such as entrepreneurial intentions, entrepreneurial self-efficacy<sup>1</sup>, willingness to take risks, alertness for opportunities as well as entrepreneurial activities and salary levels. We did this in collaboration with researchers at the University of Southern Denmark, who on a yearly basis perform the Global Entrepreneurship Monitor study (GEM). Now, at the end of the project we have followed up this survey with a new GEM study. This makes it possible for us to analyse how the field has been changing and how this has affected the general Danish population when it comes to the above listed factors. The analysis indicates that during the past four years, entrepreneurship seems to have become a youth phenomenon.

The focus of the report will naturally be on our own longitudinal studies at secondary and tertiary level, which focus on assessing education *about*, *through*<sup>2</sup> and *for* entrepreneurship. We have, however, also invited organisations we collaborate with to contribute chapters and present their studies. Henrik Barslund Fosse from The Danish Agency for Science, Technology and Innovation has contributed a chapter about their study of how start-up activities have developed among university graduates since the start of the millennium. Anders Hoffman from the Danish Business Authority and Martin Junge from DEA have contributed a presentation of their study about the influence parents have on their children's inclination to pursue a career as self-employed.

In our longitudinal studies on students at tertiary level and pupils on secondary level we have analysed the effects of education *about*, *through* and *for* entrepreneurship and the role educators play in this process. Education *about* entrepreneurship is typically focused on content, declarative knowledge and cognitive-oriented entrepreneurial skills. Education *through* entrepreneurship, on the other hand, is more pedagogically-oriented and focuses on non-cognitive entrepreneurial skills. Education *for* entrepreneurship can be viewed as a combination of education *about* and *through* entrepreneurship, but unlike the pedagogically-oriented through-approach, education *for* entrepreneurship has a strong content-oriented focus.

1. The concept of "entrepreneurial self-efficacy" (ESE) was developed by Albert Bandura and is an expression of the individual's belief in own entrepreneurial competences.

2. Sometimes the expression "education *in* entrepreneurship" is used.

At secondary level we have contrasted the effects of education *through* entrepreneurship with the effects of education *about* entrepreneurship. In this longitudinal survey we have now collected sufficient amounts of data which allow us to perform many different types of analyses and answer many different questions - such as which effects these approaches have on pupils at different educational levels, the time-lagged effects of the approaches as well as how an increase in these approaches from one educational level to another affects the pupils, both when it comes to entrepreneurship-related variables as well as education-related outcomes. However, our investigations have still not lasted long enough for us to be able to say much about the respondents' education and career in the long run.

At tertiary level our focus was on different approaches to education *for* entrepreneurship. In this study we investigated which dimensions in entrepreneurship education that are required in order for university programmes to have a positive influence on students' entrepreneurial self-efficacy and entrepreneurial activities.

The results of each of these analyses will be discussed thoroughly in the six chapters of the report. We will, however, begin with a thorough presentation of our definition of entrepreneurship and entrepreneurship education as well as the theoretical background and prior research, which our analyses are based upon. Readers who are only interested in the results of our analyses can skip this part of the report and go directly to chapter 2. However, in order to understand the rationale of our analyses some important dimensions need to be presented and discussed. We therefore advise the reader to read the theoretical presentation in chapter 1 before attending to the evaluation part.



## 1. What is entrepreneurship and entrepreneurship education?

According to Landström (2005), the research interest in entrepreneurship started among economists who wanted to explain the function that entrepreneurs and innovations played in changing the economy. This was followed by an increased interest among behavioural scientists who focused on explaining which characteristics that separated entrepreneurs from other individuals. This trait-based focus did, however, fall out of fashion in the late 1980s as it was recognised that studies that focused on entrepreneurial characteristics had very limited explanation power and inconsistent results were more the rule than the exception (Davidsson, 2004). The focus instead turned towards entrepreneurial processes, i.e. how entrepreneurs managed to create new innovations, value and organisations. It was mainly management scholars who entered the field at this time, which to some extent explains the contextual focus on small and new firms, as well as the popularity of teaching management methods such as business planning and market and competitor analysis (Honig, 2004). During the last decade this management-oriented process focus has been criticised by researchers who view entrepreneurship as a method and who propagate that rather than teaching students the discipline we should teach them the toolbox that enables them to navigate the discipline.

This multidisciplinary research has generated multiple definitions of entrepreneurship. Some of the more commonly used are: *The creation of new enterprise* (Low & MacMillan, 1988); *the creation and emergence of new organizations* (Gartner, 1988); *the process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they currently control* (Stevenson & Jarillo, 1990); *alertness to new opportunities* (Kirzner, 1973); *identification, evaluation and exploitation of opportunities* (Shane & Venkataraman, 2000); *judgmental decision-making under uncertainty* (Foss & Klein, 2012; Knight, 1921); and *the creation of new economic activity* (Davidsson & Wiklund, 2001). These definitions can roughly be divided into two groups. On the one hand, there are the definitions that focus on occupational form and outcome (self-employment, start-ups), and on the other, there are those that focus on behaviour (ways of thinking and acting) and the function this behaviour plays in society.

The former perspective has a narrower focus regarding the context, whereas the latter views entrepreneurship as a phenomenon that takes place within multiple contexts. Individuals can engage in uncertain activities and pursue opportunities in order to create new economic activity within established companies as well as governmental and civic organisations. Our definition is in line with the latter perspective and has a strong focus on new value creation. We define entrepreneurship as:

*"When you act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural, or social."*

Starting a new venture is thus only one way, although a very important one, to act upon opportunities and create value for others. This phenomenon- and value creation-oriented definition of entrepreneurship naturally makes our definition of entrepreneurship education fairly broad and inclusive:

*"Content, methods and activities that support the development of motivation, skill and experience, which make it possible to be entrepreneurial, to manage and participate in value-creating processes."*

This definition of entrepreneurship education in turn influences the type of assessment studies we perform and which type of variables that we focus on. Naturally, we have a focus on self-employment and new venture creation, since this is an important way to generate innovation and new value creation. However, it is difficult to use the number of students who become self-employed as an outcome measure, since the discrepancy between the age at which individuals typically finish their education and the age at which individuals generally transfer to a career as self-employed is significant (Delmar & Davidsson,

2000). Many researchers have therefore turned their focus to variables that can be assessed in the short term, such as entrepreneurial intentions and attitudes. We use these measures in our evaluation studies, but our strongest focus is on skills and competences, since the main objective of educational institutions is typically competence building and knowledge transfer.

At the lower levels of education we also have a strong focus on school-related variables such as educational motivation, relationship with classmates and teachers, and school engagement. Since pupils at this level of education are far away from the labour market the validity of career-related variables is limited. This increases the importance of focusing on other factors that are important in the short run, but which are also associated with future labour market success. In the following part of the text we will present the theoretical rationale of the measure that we have used in our assessment studies. However, before we do this we need to define what we mean by cognitive and non-cognitive entrepreneurial skills, since these are central concepts in our evaluation studies.



## 1.1 Cognitive and non-cognitive entrepreneurial skills

The concept of cognitive and non-cognitive skill development has been extensively used in educational science (see for example Levin, 2011) as well as in economics (Bowles & Gintis, 1976, 2002; Cunha & Heckman, 2006, 2007, 2010; Heckman et al., 2006) and psychology (Wolfe & Johnson, 1995; Duckworth & Seligman, 2005), but it has only recently been discovered by entrepreneurship researchers (Rosendahl-Huber et al., 2014). Cognitive skills are usually defined as the individual's intellectual capacity and are typically measured with IQ-tests. Non-cognitive skills can in this sense be understood as the residual of cognitive skills, and they are often defined as character and social skills such as attentiveness, perseverance, impulse control, sociability, motivation, self-esteem, self-control, and forward-thinking behaviour (Cunha & Heckman, 2010). Few aspects of human behaviour are, however, devoid of cognition (Borghans et al., 2008), and the concepts should therefore be understood as a useful classification rather than a firm and unquestionable categorisation (Heckman, 2011).

In our assessment studies we define cognitive-oriented entrepreneurial skills as skills which contain a high level of declarative knowledge. These types of skills are thus easy to codify and teach in educational settings. Business plan writing, assessing entrepreneurial opportunities and financial literacy are typical examples of cognitive-oriented entrepreneurial skills. We will hereafter refer to these as 'business-oriented skills'.

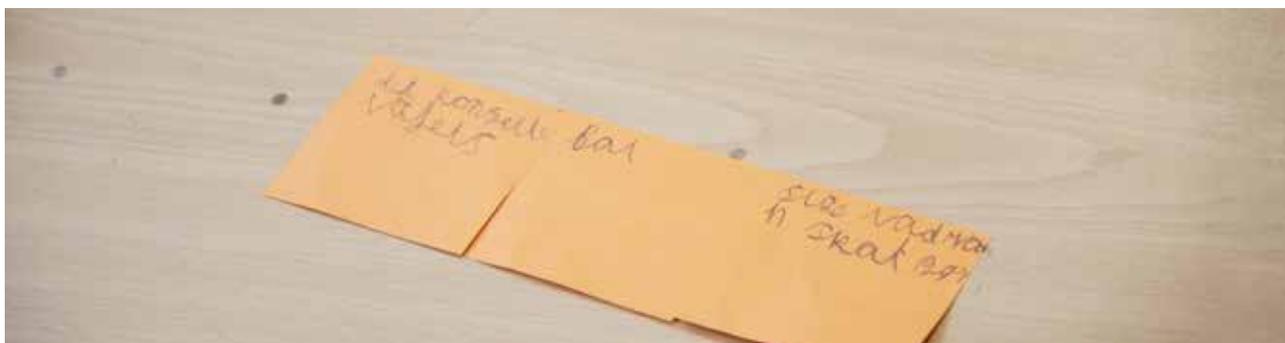
Non-cognitive skills, on the other hand, contain a high level of tacit knowledge and require practice to be learned. Typical examples of entrepreneurial skills of a non-cognitive character are creativity, resource marshalling, ambiguity tolerance and sense of initiative. These types of skills have been viewed as un-teachable traits, which are innate rather than fostered (Hindle, 2007). Researchers have commonly categorised them as belonging to the art, rather than the science, of entrepreneurship, and thus, as a part of the entrepreneurial mindset rather than the entrepreneurial skillset (Moberg, 2014a). We will hereafter refer to these as 'enterprising skills'.

In our assessment studies we have measured students' level of entrepreneurial self-efficacy (ESE) in order to assess how different approaches to entrepreneurship influence both their cognitive (that is, business-oriented) and their non-cognitive (that is, enterprising) entrepreneurial skills.



## 1.2 The dimensions we focus on

Our main interest has been to evaluate how different approaches to entrepreneurship education affect different sets of skills. Whether or not the educational initiatives affect pupils' and students' attitudes and career intentions is in our view secondary since the primary objective of educational institutions is to transfer knowledge and foster skills that are necessary in today's society and labour market. Many argue that the main objective of entrepreneurship education should be to foster entrepreneurial mindsets, and to some extent we agree. However, in our view the fostering of entrepreneurial mindsets is closely related to increasing pupils' and students' confidence in performing entrepreneurial activities, that is, their entrepreneurial self-efficacy. So, even if we do include many measures of entrepreneurial mindset, attitudes and intentions in our evaluation studies, the lion share of the measures focus on the multiple skills that are required in order to perform entrepreneurial activities.



We have also paid close attention to dimensions that evaluation studies within educational psychology have had a strong focus on. At lower levels of education the pupils are far away from the labour market and many career-related measures thus have limited validity. At this level of education the school constitutes a large part of the pupils' everyday life and thus has a strong impact on their self-image and self-perception. Variables such as school engagement and educational motivation have been shown to have a high predictive validity, both when it comes to current as well as future success. These variables are commonly interdependent with the relationship pupils have with their classmates and their teachers. We have therefore included many education-related variables in our survey of pupils at secondary level of education. In the following, the variables included in our surveys and the theoretical rationale behind them will be presented. We will start by presenting the entrepreneurship-related variables and explaining how these are related to the more education-related variables. All items included in our assessment studies can be found in Appendix A. The chapter will end with the presentation of a model that shows what we can expect from the three different approaches to entrepreneurship education, that is, education *about*, *through* and *for* entrepreneurship.

### 1.2.1 Entrepreneurship-related variables

#### *Entrepreneurial self-efficacy*

Entrepreneurial activities require many different types of skills and abilities, both business-oriented skills and enterprising skills (Rosendahl-Huber, Sloof & Van Praag, 2014). Different stages in entrepreneurial ventures entail different challenges that make it necessary for the entrepreneur to be a jack-of-all-trades (Lazear, 2005). Entrepreneurial self-efficacy is a theoretical concept that has its roots in Bandura's social learning theory and the focus is on an individual's confidence in his or her own skills related to a specific behaviour or in performing a specific activity (Bandura, 1977; 1997). Already at the beginning of the 1990s, Boyd and Vozikis (1994) developed a conceptual framework about how entrepreneurial self-efficacy could be related to both entrepreneurial intentions and entrepreneurial activities, as well as the extent to which the individual will persist in his/her entrepreneurial efforts and the likeliness that (s)he will succeed (Boyd & Vozikis, 1994).

Social learning theory presupposes that individuals will not perform activities that they perceive to be beyond their capabilities, regardless of whether there is an apparent social demand for those kinds of behaviour (Bandura, 1991; Boyd & Vozikis, 1994). In order to increase the amount of entrepreneurial activities, educational initiatives in entrepreneurship should therefore focus on increasing pupils' and students' perceived beliefs and confidence in their own entrepreneurial abilities/skills (Mauer, Neergaard & Kirketerp, 2009). There is, however, almost an infinite amount of skills that can be included in a scale that is intended to measure entrepreneurial self-efficacy. We have based our measure on the three most established ESE scales<sup>3</sup> and have focused on the dimensions that were included in all of these scales. This resulted in five dimensions, which are the following:

3. That is, the scales developed by Chen, Greene & Crick (1998); DeNoble, Jung, and Ehrlich (1999); and McGee, Peterson, Mueller, and Sequeira (2009).

1. **Creative ability:** the ability to think in new and imaginative ways. Numerous studies have demonstrated that creative ability is of great importance to entrepreneurs (see for example Baron, 2012; Elsbach, 2003; Lee, Florida & Acs, 2004). This ability is typically used during the exploration phase in order to identify and discover business opportunities.
2. **Planning ability:** the ability to plan and structure tasks. The focus on planning ability has a long-standing tradition within entrepreneurship education (Honig, 2004), and there are numerous studies supporting the importance for entrepreneurs of having this ability (see for example Delmar & Shane, 2003, 2006; McGrath & MacMillan, 2000; Stevenson et al., 1985). It should, however, be noted that the concept of entrepreneurial planning has been heavily criticised during the last decade (see for example Alvarez & Barney, 2007, 2009; Karlsson & Honig, 2009; Sarasvathy, 2001, 2008).
3. **Financial literacy:** the ability to understand financial statements and budgets. This is an important ability in order to successfully engage in entrepreneurial activities. Even though issues such as return on investment, cash flow and liquidity may be delegated to experts, it is important that the entrepreneur has at least a basic financial literacy in order to be trustworthy to external and internal stakeholders (Delmar & Shane, 2003, 2006; Stevenson et al., 1985). Planning ability and financial literacy can be viewed as interrelated business-oriented skills. Since these skills are cognitively oriented, they are easy to codify and teach in an educational setting.
4. **Marshalling of resources:** the ability to assemble and organise resources in order to exploit a business opportunity. This ability is by many researchers seen as the essence of entrepreneurship (see for example Foss & Klein, 2012; Gartner & Carter, 2003; Sarasvathy, 2001, 2008). There is often a strong focus on the role which social capital plays in this process (Davidsson & Honig, 2003; Karlsson & Honig, 2009). This process often takes place in a context characterised by high uncertainty (Foss & Klein, 2012), which leads us to the ESE scale's last dimension.
5. **Managing ambiguity:** The ability to manage and cope with uncertainty and ambiguity in the process of implementing and exploiting a business idea. Entrepreneurship has been more or less synonymous with uncertainty ever since the field's pioneering researchers conceptualised entrepreneurship and the activities of entrepreneurs (see for example Cantillon, 1755; Knight, 1921; Schumpeter, 1911), as entrepreneurial activities always unfold in a context characterised by uncertainty (Foss & Klein, 2012; Sarasvathy, 2001). In order to successfully perform entrepreneurial activities, it is thus important that the individual can manage and cope with uncertainty and ambiguity. Marshalling of resources and managing ambiguity can be viewed as interrelated enterprising skills. Since these skills are of a non-cognitive character, they are difficult to teach in an educational setting because they require practice and hands-on experience to be learnt.





Compared to the established scales which we have based our ESE scale on, the wording used is less jargon biased and, thus, more suitable to assessment studies including students of various disciplinary backgrounds and control groups. The problem of high collinearity and limited divergent validity experienced by all of these scales experienced, has also been significantly reduced.

### ***Entrepreneurial intentions, attitudes, and social capital***

The Theory of Planned Behaviour (Ajzen, 1991; 2002) has been the most applied analytical framework in evaluations of entrepreneurship education (Krueger, 2009). The main focus in this theory is to assess how the educational initiatives influence the pupils' and students' entrepreneurial intentions, mainly through three antecedents: attitudes, perceived behaviour control and social norms. Perceived behaviour control is very similar to self-efficacy, but it is typically not measured as a multidimensional construct including multiple skillsets (Ajzen, 2002).<sup>4</sup>

Social norms are typically measured with items gauging what significant others (close family and friends) think about the behaviour in question. This dimension is not likely to be changed by educational interventions and we have therefore instead chosen to measure the respondent's entrepreneurship-oriented social capital, a dimension that includes how individuals in the respondent's network view the particular behaviour. Social capital has been demonstrated to have a major influence on whether or not individuals chose to engage in entrepreneurial behaviour (Davidsson & Honig, 2003; Karlsson & Honig, 2009).

The attitude scale that is usually used in evaluations of entrepreneurship education is a very extensive scale developed by Kolvereid (1996). This scale comprises 33 items and is therefore difficult to use in research settings when survey length is an issue. An alternative scale that only includes 5 items has been developed by Liñán and Chen (2009). The items used in this scale are, however, very similar to items used in intention scales; for example "A career as entrepreneur is attractive for me", which can be compared to intention items such as "My professional goal is to become an entrepreneur" (McNulley et al., 2014). In order to avoid this collinearity we have instead used a scale measuring the respondent's general attitudes towards entrepreneurship, which were developed by McGee and colleagues (2009) and which only includes three items.

4. A construct is to be understood as a range of questions grouped in a certain way so that they measure different dimensions in the best possible way.

We have used a five-question intention scale developed by Krueger and Carsrud (1993). This scale is one of the most commonly used in programme evaluations of entrepreneurship education. In addition to these latent constructs, which are measured on Likert scales ranging from 1 to 7, we have included questions about the respondent's experience with self-employment and whether the respondent is for the moment trying to set up a new business, as well as a 19 item long checklist over various entrepreneurial activities (see Alsos & Kolvereid, 1998). At the lower levels where start-up activities are typically limited we have instead included questions about how many activities the pupils participate in outside of school and whether they are the leaders or founders of any of these activities/organisations; as a measure of the pupils' entrepreneurial behaviour. Except for the entrepreneurial activity checklist, all the entrepreneurship-related measures included in our survey have been validated in a larger European study (the ASTEE project <sup>5</sup>), which included ten countries and 5000+ respondents (Moberg et al., 2014b).



### 1.2.2 School-related variables

Entrepreneurship education based on experiential teaching methods is well in line with dimensions that educational researchers have identified as important in order to generate educational motivation, a positive class room environment and high levels of school engagement. According to Newman (1991), educational tasks should meet five requirements in order to promote engagement in learning: they should be (1) fun; (2) authentic; (3) collaborative; (4) provide opportunities for pupils to assume ownership of their conception; and (5) permit diverse forms of talents. Illeris (2009) has translated this into two simple questions that all education must answer in order to be perceived as purposeful: what does this mean to me? and what can I use this for?

Motivational researchers who specifically focus on which elements that create motivation to learn have identified three dimensions that are especially important: task significance, that is, whether the performed tasks have an impact (Wentzel & Brophy, 2013); skill variety, that is, whether the tasks include opportunities to use a variety of skills (Alleman & Brophy, 1993, 1994); and task identity, that is, whether the tasks allow pupils and students to create a product with which they can identify (Lave & Wenger, 1991). When entrepreneurship education has an experiential-oriented approach, many of these dimensions are included in the educational process. These potential positive outcomes of certain approaches to entrepreneurship education should thus not be treated as side-effects in educational evaluations, especially not at lower levels of education where

5. More information of the ASTEE project and the questionnaires used at different levels of education can be found at <http://asteeproject.eu/>

school comprises a major part of the pupil's daily life. They should rather be viewed as essential for the pupil's connectedness to school, which in turn has a great impact on his/her further education and career.

Researchers within the field of educational psychology have been successful in predicting students' drop-out rates (Finn, 1993) and academic performance (Klem & Connell, 2004) by focusing on their level of school engagement. School engagement stems from the interaction between the context and the individual (Finn & Rock, 1997) and is a measure of to what degree the pupils engage in their educational process and develop positive relations with actors in school, both academically and emotionally (Libbey, 2004). The variable is therefore closely interconnected with the connectedness the pupils feel they have with classmates and teachers (Battistich et al., 1995).

In our surveys targeting pupils at secondary level of education we have therefore included measures of school engagement, connectedness to peers, connectedness to self, connectedness to the future, and perceived teacher support, each of them encompassing six items. The four former scales all come from the Hemmingway scale of 'adolescent connectedness' (Karcher, 2003), whereas the 'teacher support' measure is rooted in self-regulation theory and a part of the learning climate questionnaire (Williams et al., 1994). Self-regulation theory is closely related with research about school engagement, but the focus of research within this strand is foremost on motivation. There are many ways individuals can be motivated, but the most commonly researched factor in educational research is whether the pupils or students are intrinsically motivated or extrinsically motivated. A pupil who is intrinsically motivated engages in school activity out of sheer interest and curiosity, whereas an extrinsically motivated pupil only does this because (s)he will get a reward for doing so - for example a high grade, appreciation from parents and teachers, etc. (Ryan & Deci, 2000). We have therefore also included a short version of the intrinsic vs. extrinsic motivation scale (Ryan & Connell, 1989), which comprises ten items.





### 1.3 Different approaches to entrepreneurship education

In order to analyse how different approaches to entrepreneurship affect pupils and students we have performed comparative analyses. At tertiary level of education we have targeted educational programmes that scored high or low on the variables that we were interested in investigating the effects of, and divided them accordingly into two groups. We will return to this discussion later when we outline differences in approaches to education for entrepreneurship. The data in our survey of pupils on secondary level of education is, however, drawn from a random sample. In order to assess which type of education they have received we have included a large variety of questions about which teaching methods and educational focus they perceive that their education has had. Our primary interest has been to analyse which effects education *about*, *through* and *for* entrepreneurship have on pupils and students, as well as the role educators play in this process, and we have therefore structured our questions accordingly. In this part of the text we will present how we have operationalised and measured these different perspectives according to their educational focus, teaching methods and learning goals. Our primary focus in this operationalisation is the extent to which the approaches focus on fostering business-oriented skills or enterprising skills.

### 1.3.1 Education *about*, *through* and *for* entrepreneurship

When entrepreneurship is discussed and debated it is typically education *for* entrepreneurship that people have in mind. This approach is typically practice-oriented and aims to foster both business-oriented skills and enterprising skills. The focus is thus both on the content and the teaching methods. Still, it is education *about* entrepreneurship, that is, education focusing on transmitting declarative knowledge about what entrepreneurship is and what entrepreneurs do, that is, by far, the most common educational approach (Mwasalwiba, 2010). There is, however, a third approach to entrepreneurship education that is relatively different from the other two. Education *through* entrepreneurship is an approach that focuses on using entrepreneurship as a teaching method (Hannon, 2005). This approach to entrepreneurship education is closely related to the concept 'enterprise education', as the goal is much broader compared to education *for* and *about* entrepreneurship (Jones & Iredale, 2010).

Whereas education *for* and *about* entrepreneurship typically focuses on new venture creation, the focus of education *through* entrepreneurship is more on fostering innovative, creative and enterprising individuals (Blenker et al., 2011; Hannon, 2005). The educational content in this approach does not need to focus on entrepreneurship, at least not in its contextual definition as an organisational form characterised by small business and new venture creation. The focus of this approach is rather on the pedagogy and the teaching methods (Jones & Iredale, 2006). The lack of entrepreneurship-oriented content makes it questionable if this approach can really be regarded as education in entrepreneurship. However, it should be emphasised that there is a clear focus on fostering enterprising skills, such as creativity, resource marshalling and ambiguity tolerance, and similar to the other two approaches, it is by studying entrepreneurs, how they learn and act (Cope, 2005) and how entrepreneurial passion and motivation is developed (Cardon, Wincent, Singh & Drnovsek, 2009), that this approach to education has developed (Jones & Iredale, 2010).

It is clear that the heterogeneity that characterises the field makes it complicated to effectively evaluate entrepreneurship education. Evaluators need to pay attention to the specific objectives of the different approaches, since these differ a lot. It is, however, also important that these different approaches, which have their conceptual roots in the same field, can be compared on the basis of similar standards, at least on some critical dimensions. In the next section we will discuss how the inclusion of the concept of cognitive and non-cognitive skill development in entrepreneurship research can assist evaluators of entrepreneurship education in that it offers a simple, yet effective way to categorise, compare, and evaluate different approaches to entrepreneurship education.



### 1.3.2 Evaluating different approaches to entrepreneurship education

The generic teaching model for entrepreneurship (see figure 1.1), presented by Fayolle and Gailly (2008), is a good starting point when designing and assessing entrepreneurship education. It includes questions that every curriculum designer should ask him- or herself when planning a new course or programme: *why, for whom, what, how, and for which results?* At the lower levels of education, where the educators typically do not have influence on the learning objectives, teaching methods become more important than the content. Treating the teaching methods and the content as separate variables is therefore an important aspect when evaluating the different approaches to entrepreneurship education, especially at the lower levels of education. By applying the teaching model concept, we can identify the differences between and similarities of education *about, for* and *through* entrepreneurship.

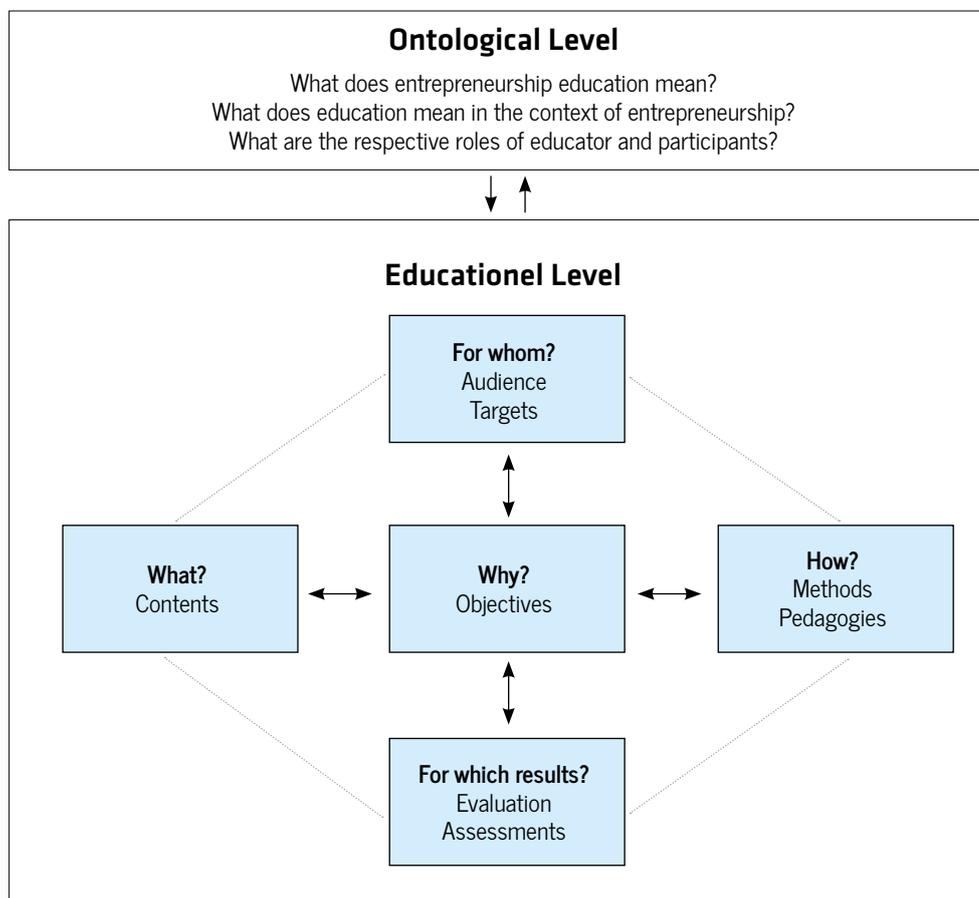


Figure 1.1: Generic teaching model for entrepreneurship education (Fayolle & Gailly, 2008: 572)

Educations *for* and *about* entrepreneurship are to some degree similar when it comes to content and outcomes, and, as a result, it is possible to compare and evaluate these two approaches on the same basis. Both of these approaches focus on teaching students business-oriented skills (what) and on increasing students' awareness of self-employment as a potential career choice (objective). Education *for* entrepreneurship does, however, also focus on teaching students enterprising skills (what), which entails the use of action-based teaching methods (how). Learning outcomes such as an increased competence level in managing ambiguity (objective) as well as an increased understanding of how to apply and use discipline-specific knowledge (objective) can also be viewed as important learning objectives of this approach. In this sense it is possible to

compare education *for* entrepreneurship with education *through* entrepreneurship, as they, to some degree, focus on similar learning outcomes (objective) and use similar action-based teaching methods (how).

Three interrelated categories, each of which can be divided into two dimensions, are therefore specifically important in this categorisation of entrepreneurship education:

1. Skills (business-oriented and enterprising)
2. Teaching methods (active and passive)
3. Outcomes (self-employment and creative self-directed individuals).

In figure 1.2 the three educational approaches are positioned in the models according to their focus on the dimensions in these three categories

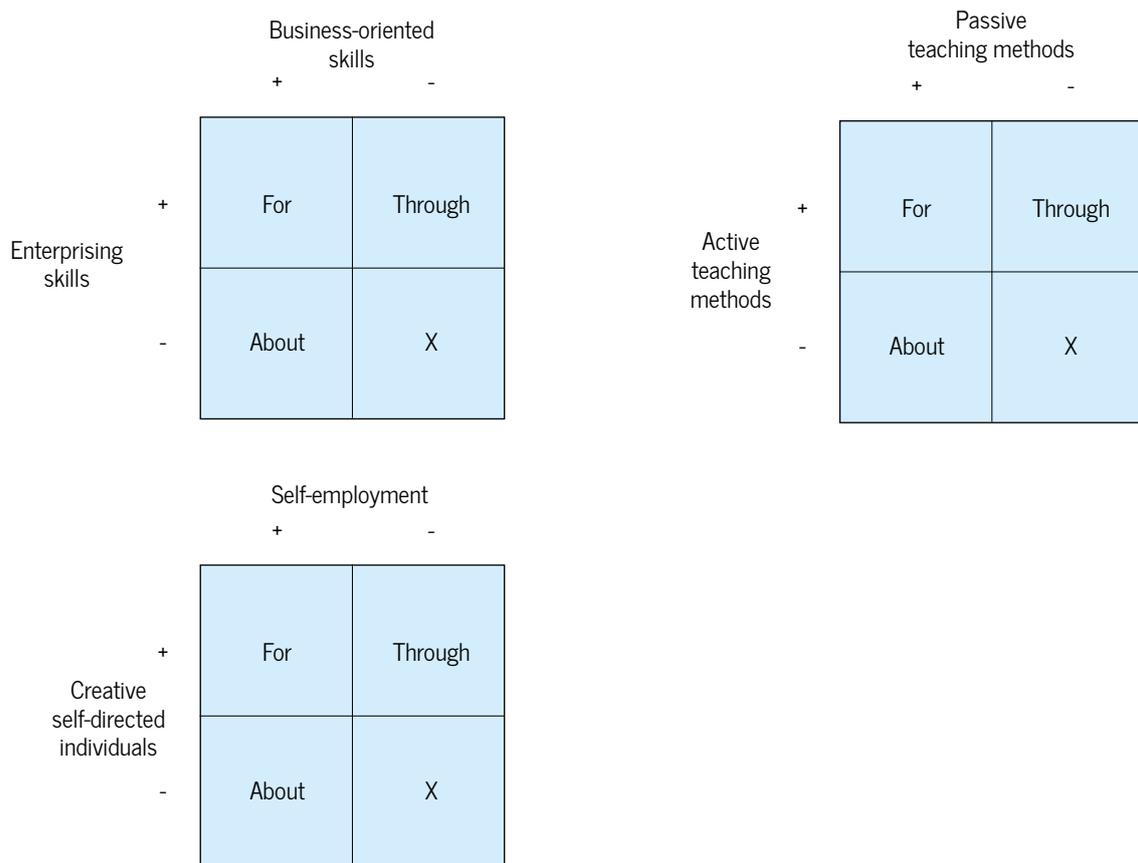


Figure 1.2: Categorization of education *about*, *for* and *through* entrepreneurship

As figure 1.2 shows, it seems that education *for* entrepreneurship is always better than the other two approaches, since it is always located in the plus quadrants. However, this is far from the case, as resources and costs, as well as the specific objectives, all play a major role in determining the effectiveness of an educational approach. Education *about* entrepreneurship can easily be taught to hundreds of students, because it does not rely on action-based teaching methods. If the primary objective

is to increase students' awareness and knowledge of entrepreneurship, then this is probably the most effective educational approach. If, on the other hand, the goal of the intervention is to foster creative and proactive students who understand how they can use and apply their knowledge in innovative ways, probably education *through* entrepreneurship is more effective, because it can be embedded in many different topics in a cross-curricular manner.



### 1.3.3 How to launch these approaches

The model presented above should be seen as a rough overview and a simplification of the approaches to entrepreneurship education that are applied in our education system. However, it functions well as a theoretical framework for our assessment studies as it provides a mean to conceptualising the different approaches. In order to assess whether the pupils have experienced education *through*, *about* or *for* entrepreneurship we have included measures focusing on the extent to which the respondents perceive that there has been a focus on business-oriented and enterprising skills in the teaching. These scales are measured with four items each.

If the pupils perceive that there has been a high focus on business-oriented skills but very limited focus on enterprising skills, then it is highly likely that the pupils have experienced education *about* entrepreneurship or education *for* entrepreneurship with a focus on the early stages of entrepreneurial activities. If, on the other hand, they perceive that there has been a limited focus on business-oriented entrepreneurial skills but a strong focus on enterprising skills, then it is likely that they have received education *through* entrepreneurship. If the pupils perceive that there has been extensive focus on both business-oriented skills and enterprising skills, then it is highly likely that they have received education *for* entrepreneurship. In order to assess the extent to which the education has been practice-oriented we have also included a six-item scale which assesses this.

Education *for* entrepreneurship is, nevertheless, a very broad category that needs further categorisation in order to be assessed properly. The main factor that differentiates various approaches *for* entrepreneurship is which stage in entrepreneurial

project they focus on (Moberg, 2014a). This determines to a large extent in what degree there is a focus on business-oriented and enterprising skills. This variation naturally also decides, to some extent, the choice of teaching methods that are applied. In our assessment study on tertiary level we have focused on which effects these different approaches have.

The programmes included in this study were chosen based on the extent to which they focus on including the students' prior contextual knowledge in the educational process and in which degree the students had ownership over the entrepreneurial projects that they executed in their educational programmes. In figure 1.3 an overview of this categorisation is presented.

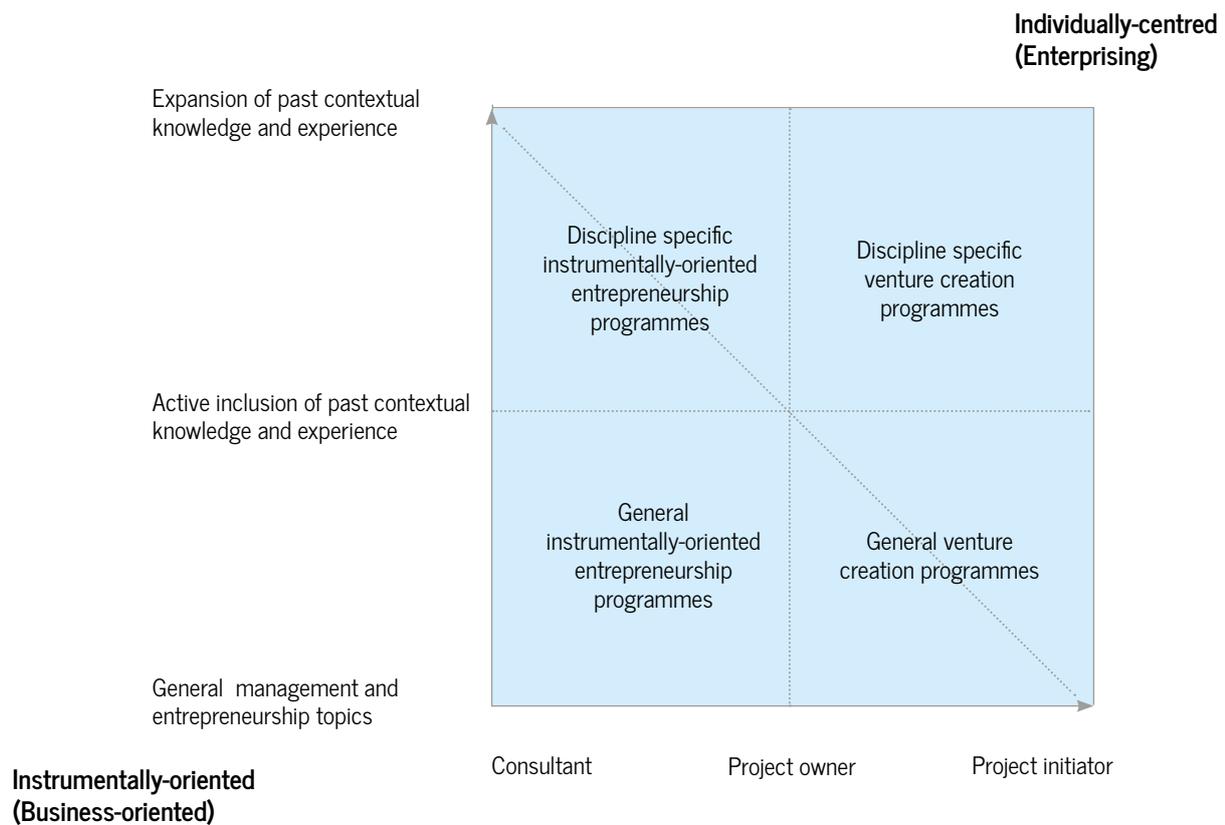


Figure 1.3: Different approaches to education for entrepreneurship.

At the lower right of the model, programmes with a limited focus on student ownership of the entrepreneurial projects and with a limited focus on including students' prior contextual knowledge are located. These types of programmes most often have a practice-oriented approach, but it is typically the knowledge that the students have gained in the classroom that they are expected to apply in the entrepreneurial projects, which are typically ongoing entrepreneurial projects in established organisations. It is typically the early stages of entrepreneurial projects that these types of programmes focus on, that is, the exploration and evaluation stage, and these stages mostly require business-oriented skills (Moberg, 2014a). These types of programmes have become increasingly popular as there has been an increased focus on universities' third mission, that is, innovation and dissemination of knowledge in order to increase local growth (Heinonen & Hytti, 2010). This focus on the students' function as consultants gives these programmes an instrumental character, and we have therefore given them this label in the model.

Much research in entrepreneurship has during the last decade focused on the role which prior experience and contextual knowledge play in new venture creation processes (Baron, 2006; Sarasvathy, 2001, 2008; Shane, 2000; Shane & Venkataraman, 2000). According to Saras Saravathy (2001, 2008), the first step in an entrepreneurial process is for the potential venture creator to ask him- or herself: Who am I?, What do I know?, and Whom do I know? The answers to these questions should to a large extent determine what type of venture process the entrepreneur ought to engage in, as it affects the enthusiasm and motivation he/she will bring to the project as well as his/her suitability to engage in it (Sarasvathy, 2008).

Ownership is also a central ingredient in entrepreneurial activities (Foss & Klein, 2012; Klein, 2008) as well as in entrepreneurial learning (Cardon et al., 2005; Cope, 2003; 2005). This ownership dimension involves the entrepreneur in his or her venture and makes it impossible for him or her to distinguish between the private and professional life. This has a major impact on the learning processes (Cope, 2005) and the emotional connectedness that entrepreneurs have with their venture projects (Cardon et al., 2009). In order to mimic entrepreneurial learning, both when it comes to the negative and frustrating emotions and the high level of passion and motivation that this learning spurs, these dimensions are of major importance since they make it harder for the students to distance themselves from the projects and view them from a student's perspective rather than from the entrepreneur's perspective. Entrepreneurial learning requires practice and execution, and therefore these programmes typically have strongest focus on the exploitation stage in entrepreneurial venture projects and this stage mostly requires the practice of enterprising skills (Moberg, 2014a).



#### 1.3.4 Control variables

We have also included many control variables that are known to have an influence on the outcome variables that we are interested in measuring. Appendix A contains an overview of these and the rest of the measures we have included in our surveys. Two of these control variables can be viewed as particularly interesting when it comes to their influence on entrepreneurship related outcomes and education-oriented outcomes. Parents' entrepreneurial experience has been shown to have a major association with their children's career aspirations and inclination to pursue a career as self-employed. This will be discussed in Hoffman's and Junge's study that is presented in chapter 5.

The educational level of their parents has also been shown to have a major impact on the academic performance of pupils and students and naturally also associates with their educational motivation and level of school engagement. Research has, however, also shown that it is particularly pupils with a non-academic background who react positively to entrepreneurial teaching (Surlimon, 2009). This can be related to the practice-oriented teaching methods that are applied, the supporting teaching style that is used and the fact that they get to work with projects that are authentic and have personal meaning for them. We have therefore in our effect analyses had a special focus on how the educational background of pupils moderates and affects their level of school engagement.



## 1.4 Summary of chapter 1

In this chapter we have presented the design of our longitudinal assessment studies of pupils on secondary level of education and on students at tertiary level of education. We have also presented the measures we use and the theoretical rationale behind these. Since certain approaches to entrepreneurship education have been shown to have a positive influence, not only on entrepreneurship-related variables but also on variables such as educational motivation and school engagement, we have had a strong focus on these types of variables as well.

A categorisation model which focuses on the expected outcomes of education *about*, *through* and *for* entrepreneurship has been presented and we have argued that the main difference between these approaches is the extent to which they focus on fostering business-oriented or enterprising skills. Education *for* entrepreneurship can furthermore be categorised according to which stage in the entrepreneurial venture project it focuses on, which to a large extent determines which types of entrepreneurial skills it focuses on. In the following chapters we will present the results of our longitudinal analyses of different approaches to entrepreneurship education at secondary and tertiary level of education.

## 2. The effects of entrepreneurship education at secondary level of education

In order to assess how different approaches to entrepreneurship education affect pupils in secondary education, we have set up a longitudinal study in which we collect data on thousands of pupils on a yearly basis. The focus is on how education *about*, *through* and *for* entrepreneurship affect pupils' career ambitions, enterprising behaviour and entrepreneurial attitudes and intentions, but we have also focused on more school-related variables, such as educational motivation, school engagement and connectedness to classmates and teachers. The educational approaches we have been focusing on differ from one another, but their common factor is their focus on entrepreneurial activities and their goal of making pupils more enterprising and innovative. The main difference between these approaches is the type of skills they focus on.

We have contrasted the effects of entrepreneurship education that is taught as a sole standing topic and where the focus is on teaching business-oriented skills (e.g. business planning and opportunity evaluation) with entrepreneurship education that is taught in a cross-curricular manner where the focus is on fostering enterprising skills (e.g. managing uncertainty and resource marshalling). In addition, we have investigated the effects of the approaches that have an equal focus on these types of skills, i.e. education *for* entrepreneurship. The longitudinal character of our dataset allows us to analyse how these approaches influence pupils at different class levels. This enables us to further our knowledge on which stage of education these different approaches to entrepreneurship are most influential, at least, so far, in the short run.

Each year 2,000 randomly selected year 9 pupils have been added to the survey. This has resulted in a very rich dataset, which makes it possible to perform many different types of analyses. In this chapter we will present the results of three different analyses. We will start by investigating how the two approaches affect pupils' school engagement and entrepreneurial intentions at three stages of education (year 9, year 10 and year 11 and 12). This will be followed by an analysis of the longitudinal effects of these approaches. The chapter will end with an analysis of how a change in the educational approaches, that is, an increase in their use, affects young pupils (year 9 and 10) and older pupils (year 11 and 12), respectively. We will start with a presentation of how we have collected the data in this project.



## 2.1 The sample of pupils

In 2011 we collected the first round of data in this project. Out of the 2,000 randomly contacted year 9 pupils (born in 1996) we got 622 viable responses. In this initial stage of data collection we only included a limited number of questions gauging teaching methods, and all constructs were measured on scales ranging from 1-4. It is therefore somewhat problematic to use this initial data collection and we usually exclude this data from our analyses.

In 2012 we included many more questions about what content and which teaching methods the pupils perceived that their education had been focusing on. We also changed the range of the Likert scales to 1-7. We contacted 2,000 new year 9 pupils (born in 1997) and followed up on the pupils born in 1996 that we had collected data on in 2011. In 2013 we skipped collecting data on our first sample, but a new round of randomly selected year 9 pupils (born in 1998) were included in the dataset and follow-up questionnaires were sent to the pupils born in 1997.

In our latest round of data collection we did not include an additional cohort of year 9 pupils, but we contacted all the respondents in our database. This process has generated a dataset consisting of 2,576 unique respondents. We have 1,010 pupils who have responded to our questionnaires twice and 606 pupils who have responded to our questionnaires three times. In table 2.1 below is an overview of the data collection.

Number of responses	1996	1997	1998	Total
One	346	314	300	<b>960</b>
Two	315	239	456	<b>1,010</b>
Three	319	287	0	<b>606</b>
	<b>980</b>	<b>840</b>	<b>756</b>	<b>2,576</b>

\*The number of respondents from whom we have at least one response are presented in bold numbers. The number of respondents from whom we have at least two responses can be calculated by adding the numbers from column "two" and "three".

Tabel 2.1.: The dataset

Given the mandatory nature of education at lower secondary level, it is unlikely that we will experience a problem with self-selection, i.e., that the pupils we follow have chosen to take entrepreneurship education due to interest in the topic. However, since we are following the pupils longitudinally in this study, this might be the case during later stages. Thorough 'non-response bias tests are therefore essential. In order to guarantee a high response rate, all respondents were rewarded with a cinema ticket if they completed the entire questionnaire. We retrieved identification numbers and addresses on the respondents from the State Serum Institute. All questionnaires were sent at the start of the autumn term to the respondents' homes in hard copy. This allowed the pupils to consult their parents on questions that they found hard to answer.

### 2.1.1 The measures

We have mainly focused on two categories of measures in our study: variables focusing on entrepreneurship-related dimensions and variables focusing on education-oriented dimensions. These have previously been described in detail in chapter 1 and all of them can be found in Appendix A. In table 2.2 and 2.3 we present an overview of the variables included in the two categories we focus on.



Variable name	Measures in what degree the respondent	No. of items	Reference	Period
Entrepreneurial intentions	intends to start a company in the future	3	Krueger & Carsrud, 1993 Línán & Chen, 2009	2011-2014
Entrepreneurial attitudes	in general finds entrepreneurship to be a valuable activity	3	McGee et al., 2009	2011-2014
Enterprising behaviour	is engaged in activities outside of school and whether he/she is founder and leader of any of these activities.	3	Nakkula et al., 2003	2011-2014
Career ambition	has ambitious career expectations	1 (3)	Nakkula et al., 2003	2011-2014
Innovative employee	intends to work with an innovative occupation	3	Moberg et al., 2014	2013-2014
Entrepreneurial mindset	has a proactive, entrepreneurial and innovative mindset	12	Moberg et al., 2014	2013-2014

Tabel 2.2: Variables focusing on entrepreneurship-related dimensions

Variable name	Measures in what degree the respondent	No. of items	Reference	Period
Educational focus on cognitive-oriented entrepreneurial skills	finds his/her education to be focusing on entrepreneurial skills which contain a large amount of declarative knowledge	4	Moberg, 2014a	2012-2014
Educational focus on entrepreneurial skills of a non-cognitive character	finds his/her education to be focusing on entrepreneurial skills which need to be learnt through practice and experience	4	Moberg, 2014a	2012-2014
Practice-based teaching methods	feels that he/she has been taught in a practice-oriented way	6	Moberg, 2014a	2012-2014
Perceived Teachers Support	feels that teachers support him/her in the educational process	6	Williams et al., 1989	2012-2014
Connectedness to School	is emotionally connected to his/her school and educational process	6	Karcher, 2003	2011-2014
Connectedness to Peers	has a positive relationship with classmates and peers	6	Karcher, 2003	2011-2014
Connectedness to Self in the Present	has a positive image of his/her self-identity	6	Karcher, 2003	2011-2014
Connectedness to Self in the Future	is preparing for his/her future and has positive expectations	6	Karcher, 2003	2011-2014
Intrinsic motivation	engages in his/her educational process because he/she finds their education to be fun and interesting	6	Ryan & Connell, 1989	2012-2014
Extrinsic motivation	engages in his/her educational process because he/she gets externally rewarded for it	4	Ryan & Connell, 1989	2012-2014
Core Self-evaluation	has a positive self-image, positive self-efficacy and an internal locus-of-control	12	Judge et al., 2002	2012-2014

Table 2.3: Variables focusing on education-oriented dimensions

Since parsimony is important in order to obtain clear information about the influence of different variables, as well as the fact that too many variables typically lead to an increased risk of spurious correlations, we have chosen to only include a limited number of variables in our structural models. In our difference-in-difference analysis we do, however, test the effects of the different approaches on all the latent constructs (for a definition of construct, see footnote 4 on page x).

## 2.2 Education *about* and *through* entrepreneurship at different levels of education

In this analysis we will test how education *about* and *through* entrepreneurship influence pupils' level of school engagement and their entrepreneurial intentions as well as how pupils' perceived teacher support affects this relationship. We have divided the sample into three groups (year 9 pupils, year 10 pupils and year 11 and 12 pupils).

Education *through* entrepreneurship typically focuses on fostering enterprising skills such as pro-activeness, perseverance and creativity. Given the character of these skills, this type of education is often taught in a cross-curricular manner rather



than as a sole standing topic. Since such entrepreneurial skills of a non-cognitive character require practice to be learnt, this type of education is normally taught through practice-based and experiential teaching methods and the teacher often functions as a mentor and coach rather than as an instructor. The most important factors to foster school engagement is whether or not the pupils perceive their education as meaningful (Connell et al., 2000; Whitlock, 2006) and whether or not the learning climate is supportive and encouraging (Battistich et al., 1995). This approach to education is therefore expected to have a positive influence on pupils' level of school engagement.

Education *about* entrepreneurship, on the other hand, has a strong focus on business-oriented skills. Since these types of skills typically include a large amount of declarative knowledge, which can easily be codified, they can be taught in traditional lectures. There is therefore no reason to expect that this approach is taught with either practice-based teaching methods or a particularly supportive teaching style. However, due to the clear content focus and the fact that entrepreneurship is something that not many pupils at this level have any experience with, probably many of them will be inspired to consider self-employment as a viable and attractive career choice, as they will view it as something new and exciting.

### 2.2.1 Statistical properties

Our model in this analysis includes measures about the extent to which the pupils perceive that there has been a focus on business-oriented and enterprising skills in their education as well as measures of their perceived teacher support, school engagement and entrepreneurial intentions. In addition to this we have included measures of the pupils' educational and entrepreneurial background as well as covariates such as gender and ethnicity. In order to test the model we performed a 'confirmatory factor analysis'<sup>6</sup> (Brown, 2006). This test showed excellent 'fit indices', which indicates that the measures are reliable and valid. To make sure that all measures demonstrated sound statistical properties we also tested the convergent and discriminant validity of each of the variables by performing a *Fornell and Larcker-test* (Fornell & Larcker, 1981). In addition to this we investigated whether respondents in the different age groups understood the questions in a similar way. In order to assess this we performed tests for weak and strong 'factorial invariance'<sup>7</sup> (Little, 2013). All these tests showed that the variables included in our models have sound statistical properties. The results of these tests can be found in Appendix B.

### 2.2.2 Structural Equation Models<sup>8</sup>

Since the statistical properties of the measures were sufficient, the variables were structured in models as independent variables, dependent variables and covariates, respectively, in order to analyse their associations. Since the approaches we want to investigate the effects of in some cases are used as intervention strategies in schools that struggle with lack of motivation among their pupils, we have included the pupils' educational and entrepreneurial family background as well as gender and ethnicity as control variables in order to control for these factors, so that the result would not be skewed. The models are presented in figure 2.1 below.



6. CFA is used to test whether the construction of a "construct" corresponds with the theoretical understanding of the character of this construct and the mutual relation between constructs.

7. That the indicators in the constructs do not correlate in different ways for different groups or at different times.

8. SEM is a general term for a group of statistical methods, designed to test a conceptual or theoretical model. CFA is part of SEM.

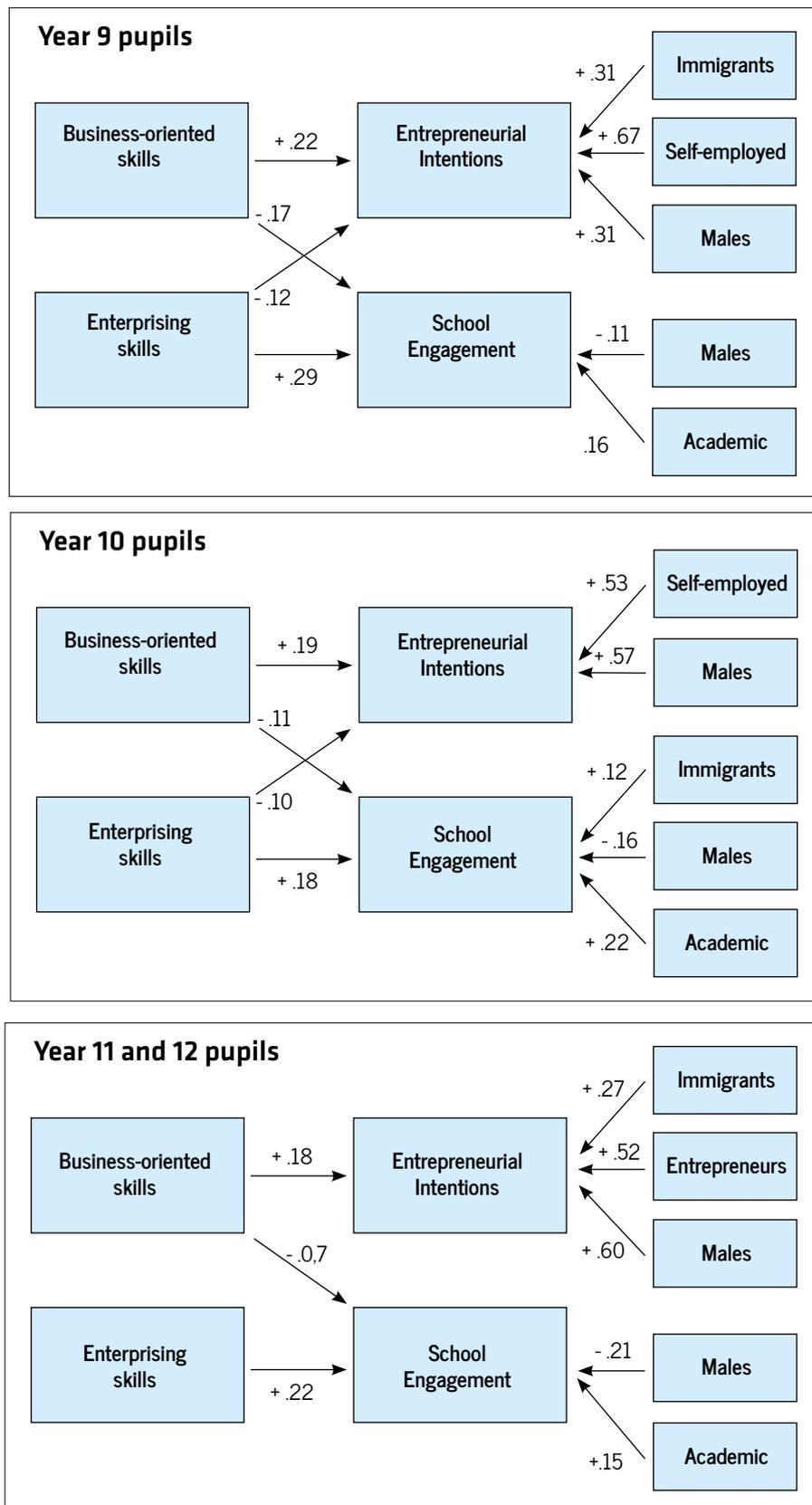


Figure 2.1: The association between education *about* and *through* entrepreneurship and entrepreneurial intentions and school engagement



As we can see in figure 2.1, the associations between the variables are very similar for the different age groups. This demonstrates that the findings are robust. For all of the age groups, education *about* entrepreneurship has a positive association with the pupils' entrepreneurial intentions, but a negative association with their school engagement. The opposite is the case for education *through* entrepreneurship. However, the negative association between this approach and the pupils' entrepreneurial intentions are insignificant for pupils in the older age group (year 11 and 12).

These results indicate that education *about* entrepreneurship is not perceived as relevant or engaging by several pupils. Evidently there is a problem with how this topic is taught, which highlights the need for an increased focus on teacher training. The negative association between education *through* entrepreneurship and entrepreneurial intentions can also be perceived as somewhat problematic as it indicates that the values that the teachers transfer to their pupils are, to a high degree, geared towards a work-taker mentality rather than a work-creator mentality. This is also something that could be remediated with a teacher training initiative, but at higher levels this does not seem to be as crucial since the influence teachers have on their pupils generally decreases as the pupils get older.

In order to test the role that educators play in these approaches to entrepreneurship education we investigated whether the association that the approaches have with school engagement are mediated by the pupils' perceived teacher support. In figure 2.2 the results of these analyses are presented.

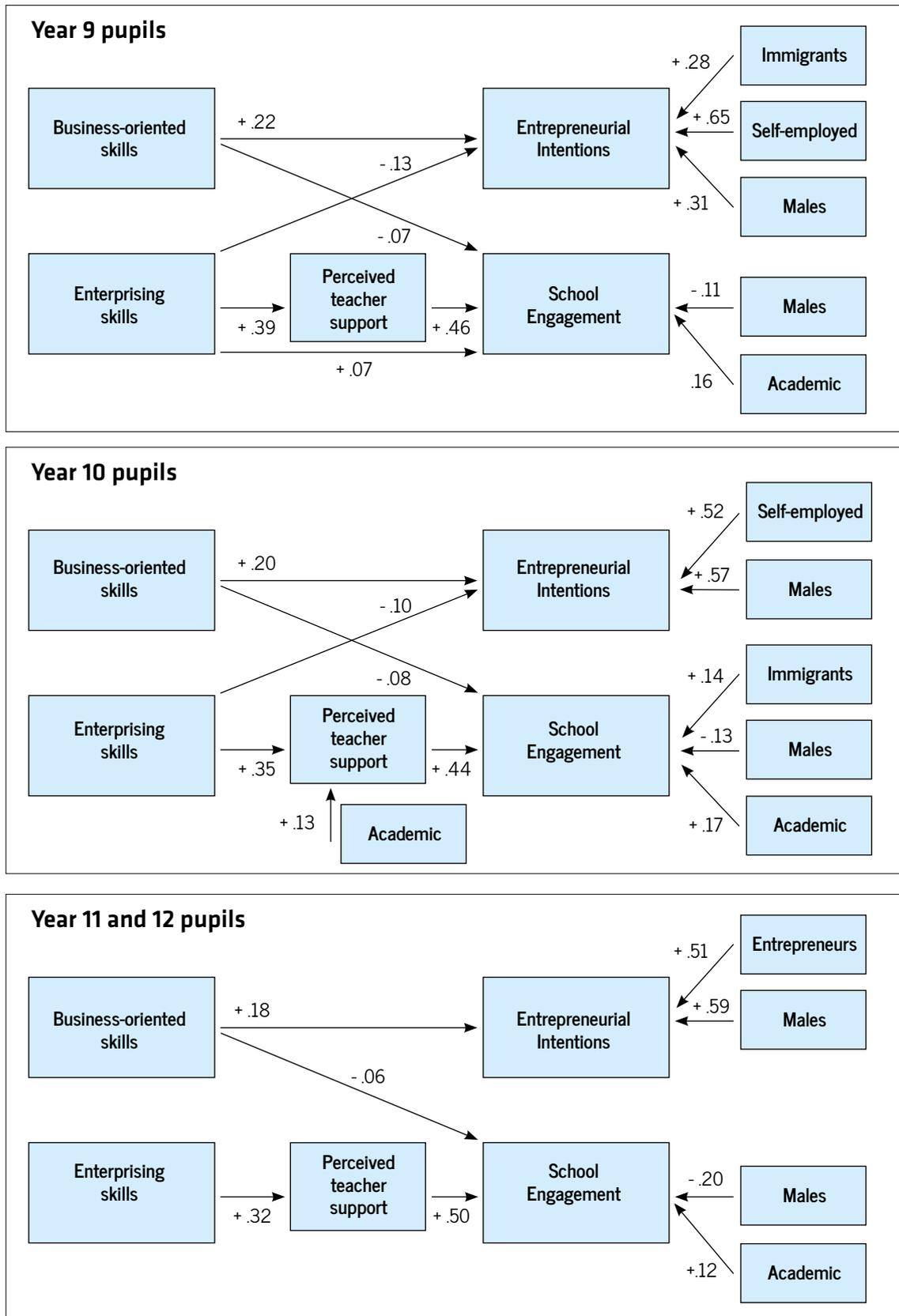


Figure 2.2: The link between each of the approaches *about* and *through* entrepreneurship and school engagement as mediated by perceived teacher support in the three groups of pupils.

The models clearly show that the pupils' perceived teacher support mediates the influence that education *through* entrepreneurship has on school engagement. It should however be pointed out that there is only partial mediation for year 9 pupils, which indicates that it is not only the supportive teaching style that teachers apply in this approach that explains the positive association on these pupils' level of school engagement. The models further show that, in general, teachers do not apply a supportive teaching style when teaching *about* entrepreneurship, as there is no significant association between these constructs.

The control variables included in the model also demonstrate quite similar patterns for the three age groups. We can see that males and pupils with non-academic backgrounds have significantly lower levels of school engagement in all of the age groups. We can also see that males and pupils with self-employed parents have significantly higher entrepreneurial intentions. This is also the case for pupils with parents who are born in a country outside of Denmark for pupils in year 10, 11 and 12. This is, however, not true for pupils with immigrant parents in year 10. Instead, these pupils have significantly higher levels of school engagement. This suggests that there are probably some sample specific variations in our sample.

We also investigated whether the educational background of the pupils' parents influences the magnitude of any of the associations we identified in our models. There was a significantly positive interaction effect between this variable (parents' education) and education *through* entrepreneurship, which magnified the effect it had on school engagement for pupils in year 10. This indicates that pupils from non-academic homes significantly benefit from this teaching approach (in which working methods are less abstract and more practical). However, since we could not identify this relationship for pupils in year 9, 11 and 12, it is difficult to generalise this result. The only explanation we can find as to why we obtained this result for the year 10 pupils and not for pupils at lower levels is that most pupils at this level have changed educational institution and moved from primary to the lower-secondary level of education. Nevertheless, to determine that this is not simply a sample-specific result we would need to perform additional replication studies.

The next question we posed to our dataset was whether or not the effects we have identified in the cross-sectional analyses presented above also remained over time. This longitudinal analysis will be presented next.



### 2.3 The longitudinal effects of education *about* and *through* entrepreneurship

We have three rounds of data on pupils born in 1996 and 1997. However, the first round of data collected on pupils born in 1996 did not include measures of the different educational approaches so we will only base our longitudinal analysis on pupils born in 1997. In order to assess the statistical properties of the measures, we followed the same procedures as in the analysis presented above. However, instead of testing whether different age groups understood the questions in the same way we assessed whether or not the pupils interpreted the questions in the same way at different points in time. The measures passed the tests of weak and strong factorial invariance and demonstrated both convergent and discriminant validity. The fit indices in the confirmatory factor analysis also demonstrated sufficient levels of model fit. A detailed presentation of this analysis can be found in Appendix B.

In longitudinal structural equation models, the respondents' prior levels in the variables are set to explain the latter. This makes it possible to assess time-lagged effects as well as the time variant stability of the constructs. Entrepreneurial intentions and school engagement can be expected to be fairly stable over time, unlike the educational approaches as these are generally determined by external factors. For instance, different schools can be expected to focus in various degrees on the different approaches to education, and in this way the approaches will, to a larger extent, be determined by external factors. Entrepreneurial intentions and school engagement will also be influenced by external factors, but to a lesser extent and not as directly.

In figure 2.3, the results of the structural model are presented. Given the multiple time-points included in this analysis, we appreciate it may be somewhat complex for a reader who is unfamiliar with longitudinal SEM to interpret the results.

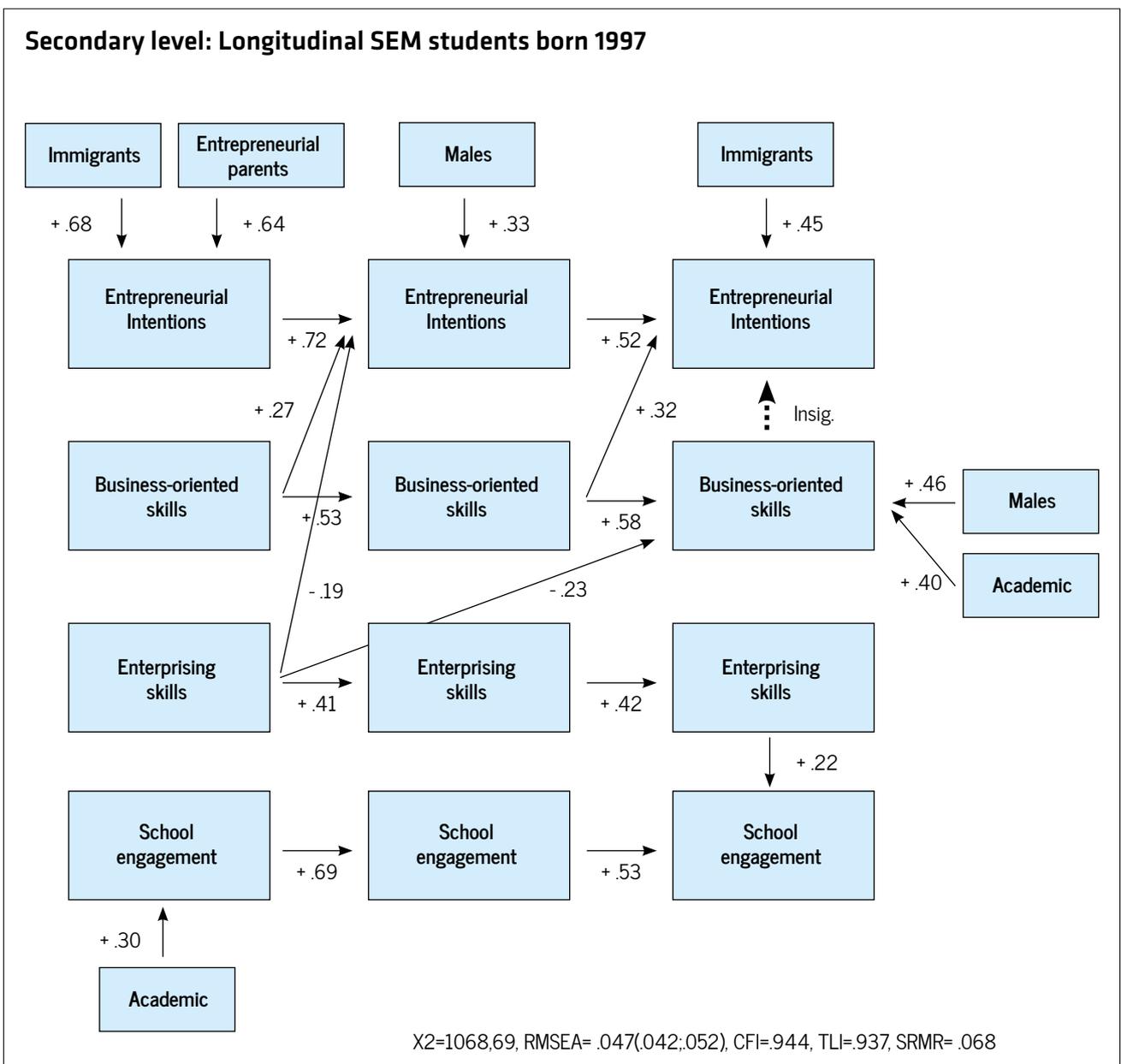


Figure 2.3: The longitudinal relationships between the educational approaches and the pupils' level of school engagement and entrepreneurial intentions



The results presented in figure 2.3 show that the associations between the two approaches and school engagement in the cross-sectional analysis presented in figure 2.2 do not last over time. It is only when we regress the approaches on school engagement within the same year (their 11th year of education in this model) that we observe a significant association. This indicates that education *through* entrepreneurship needs to be sustained in order to retain its positive influence on pupils. What pupils at this educational level seem to need first of all is to have their connectedness to school, peers and teachers strengthened. And to have a focus on career-related dimensions when they are at a later stage in the education system. However, these theories are not unambiguous, as we can see below.

When it comes to the approaches' time-lagged effect on entrepreneurial intentions, we do, however, observe some quite interesting relationships. Similar to the results presented in the cross-sectional analysis (figure 2.2) we can see that education *about* entrepreneurship has a positive time-lagged effect and that education *through* entrepreneurship has a negative time-lagged effect on the pupils' entrepreneurial intentions. This is, however, only the case when it comes to pupils moving from year 9 to year 10. The pupils' perception of the degree to which they receive education *about* entrepreneurship during year 10 actually has a significantly negative time-lagged effect on their entrepreneurial intentions in year 11, whereas the relationship between education *through* entrepreneurship and the pupils' entrepreneurial intentions becomes insignificant. These are quite puzzling results, which may have many explanations. It is likely that education *about* entrepreneurship at later stages gives pupils a more realistic image of all the problems and challenges that new venture creation entails, whereas at earlier stages it rather serves as an eye-opener for a new career alternative to many pupils.

There are also some quite interesting associations between the control variables and the constructs in the model. Also in this model males, pupils with self-employed parents and pupils with parents born outside Denmark have high entrepreneurial intentions. The effect of the control variables on all the constructs are carried from the first round of data to the third. This means that their effect decreases between 'time 1' and 'time 3', and that if they are still significant at later stages then this is something that is specific to the year level. During year 11, the entrepreneurial intentions of pupils with immigrated parents thus increases. We can also see that it is significantly more males and pupils with a non-academic background who have experienced that there has been a focus on education *about* entrepreneurship during year 11. This informs us about the type of pupil that receives this type of education at this level and, thus, about the type of educational institution that uses this educational approach.

The longitudinal analysis has thus given us knowledge about the extent to which the effects of the educational approaches remain over time, about how the effects change depending on educational level as well as about the type of pupil that is most frequently taught the different educational approaches. In our third and last analysis we have analysed the effects which an increase in the approaches has on a large variety of entrepreneurship-related and education-oriented variables. We have used difference-in-difference (DID) analysis in order to assess this.



## 2.4. Increases in the use of different educational approaches and the effects that this has on education-oriented and entrepreneurship-related variables

In order to analyse how an increase in education *about* or *through* entrepreneurship affects pupils at different levels, we have divided our sample into two groups: younger pupils (year 9 and 10) and older pupils (year 11 and 12), respectively. These groups were additionally divided into groups depending on whether they had increased with more than 1 (on a scale ranging from 1-7) in the variables in either of the educational approaches. On the basis of these groups, we performed a difference-in-difference (DID) analysis to assess whether any of them had increased or decreased significantly more than the other groups in the education-oriented and entrepreneurship-related variables included in our survey.

In order to assess whether the 'treatment' (which in our case is operationalised as a significant increase in either education *about* or *through* entrepreneurship) has a significant effect, it is not enough to only analyse whether the treatment group has significantly different ex post values (time 1) compared to its ex ante values (time 0) in the outcome variables included in the analysis. This change could be due to a number of different factors, such as societal changes or the ordinary maturity process of pupils of this age. It is therefore important to include a control group in this type of analysis. In order to assess the effect that can be assigned to the treatment, that is, the actual education initiative, we subtract the change experienced by the pupils in the control group from the change experienced by the pupils in the treatment group. In order to check for ceiling effects (i.e. if the respondent has high initial values in the variable it is more difficult to increase them), we also include the ex ante values of the respondents in the regression. Furthermore, we include control variables such as gender, ethnicity, educational and occupational background of the parents as well as the pupils' work experience. The results of our DID analysis for the younger pupils are presented in table 2.4 (increase in education *through* entrepreneurship) and in table 2.5 (increase in education *about* entrepreneurship).

Variables	Increase in education <i>through</i> (n=223)					No increase (n=767)					DID		DID			
	T=0	T=1	Diff		SE	T=0	T=1	Diff		SE	No control		Control			
Self-image	5.03	5.25	.22	*	(.097)	5.17	5.14	-.03		(.045)	.186	*	(.088)	.178	*	(.088)
School eng.	5.32	5.55	.23	***	(.055)	5.39	5.40	.01		(.028)	.188	**	(.054)	.178	**	(.054)
Classmates	5.57	5.85	.27	**	(.099)	5.65	5.65	.00		(.045)	.225	**	(.075)	.221	**	(.076)
Future	5.32	5.54	.23	*	(.095)	5.39	5.43	.04		(.042)	.132		(.071)	.124		(.071)
Teacher sup.	4.83	5.33	.49	***	(.078)	5.06	4.97	-.08	*	(.038)	.045	***	(.070)	.451	***	(.070)
About Ent.	1.99	2.94	.95	***	(.103)	2.48	2.46	-.02		(.047)	.722	***	(.096)	.726	***	(.096)
Intentions	3.88	4.33	.45	***	(.108)	3.80	4.05	.25	***	(.055)	.232	*	(.109)	.226	*	(.110)
Attitudes	5.51	5.63	.11		(.086)	5.50	5.57	.07		(.064)	.057		(.092)	.042		(.092)
Int. Motivation	4.55	4.83	.28	***	(.079)	4.66	4.67	.01		(.040)	.222	**	(.075)	.212	**	(.075)
Ext. Motivation	4.86	4.95	.09		(.079)	4.90	4.83	-.07		(.042)	.140		(.076)	.146		(.076)
Action meth.	4.80	5.36	.56	***	(.064)	5.03	4.91	-.12	***	(.029)	.575	***	(.060)	.578	***	(.060)

Significance levels: \* <0,05 \*\* <0,01 \*\*\* <0,001

Table 2.4: Difference-in-difference analysis for year 10 pupils who have significantly increased in education *through* entrepreneurship

Variables	Increase in education <i>about</i> (n=190)					No increase (n=790)					DID		DID			
	T=0	T=1	Diff		SE	T=0	T=1	Diff		SE	No control		Control			
Self-image	5.15	5.20	.06		(.075)	5.14	5.15	.01		(.074)	.047		(.092)	.053		(.092)
School eng.	5.34	5.51	.17	**	(.060)	5.39	5.42	.03		(.027)	.117	*	(.057)	.116		(.057)
Classmates	5.69	5.90	.21		(.137)	5.62	5.64	.02		(.039)	.242	**	(.078)	.24	**	(.079)
Future	5.44	5.67	.22		(.130)	5.36	5.40	.05		(.036)	.237	**	(.074)	.242	**	(.073)
Teacher sup.	5.00	5.32	.31	***	(.076)	5.01	4.99	.02		(.038)	.334	***	(.073)	.333	***	(.073)
Through Ent.	3.94	4.82	.88	***	(.099)	4.04	3.95	-.09		(.048)	.92	***	(.092)	.092	***	(.092)
Intentions	3.89	4.36	.47	***	(.119)	3.80	4.05	.25	***	(.053)	.254	*	(.114)	.255	*	(.114)
Attitudes	5.45	5.57	.12		(.124)	5.51	5.58	.07		(.063)	-.003		(.097)	.003		(.096)
Int. Motivation	4.52	4.84	.33	***	(.087)	4.66	4.67	.01		(.038)	.253	**	(.078)	.250	**	(.078)
Ext. Motivation	4.73	4.83	.10		(.088)	4.93	4.86	-.07		(.040)	.055		(.080)	.065		(.079)
Action meth.	4.99	5.34	.36	***	(.063)	4.98	4.93	-.05		(.032)	.415	***	(.064)	.412	***	(.063)

Significance levels: \* <0,05 \*\* <0,01 \*\*\* <0,001

Table 2.5: Difference-in-difference analysis for year 10 pupils who have significantly increased in education *about* entrepreneurship



As we can see in table 2.4, the year 10 pupils significantly increase their school engagement, connectedness to classmates, and intrinsic motivation when they perceive that their education has become more focused on enterprising skills, and they also get a more positive self-image. We can also see that they significantly increase their entrepreneurial intentions, which is a contrary finding to that of our structural equation analysis, which showed that education *through* entrepreneurship has a negative time-lagged effect on intentions at the lower levels (see page 11). Table 2.5 shows that year 10 pupils who perceive an increased focus on business-oriented skills also become more intrinsically motivated and increase their entrepreneurial intentions, but instead of getting a higher level in school engagement, these pupils increase their connectedness to their future career. Both approaches, the one with focus on business-oriented skills and the one with focus on enterprising skills, have a similar influence on perceived teacher support and action-oriented teaching methods, and an increase in either of these approaches has a positive influence on the other. It would therefore be advantageous to teach entrepreneurship with a focus on both business-oriented and enterprising skills.

Education *through* and *about* entrepreneurship thus have different effects, but due to the similar associations with the more externally determined variables and their interconnectedness, it is fairly safe to say there is a strong relation between the two approaches. This indicates that education *for* entrepreneurship, i.e. when there is an equally strong focus on business-oriented and enterprising skills, is practised to a fairly large degree at this level of education. We investigated whether this approach, which has a strong focus on both entrepreneurial content and practice-based teaching methods, has any particularly positive effects on the pupils. There was a significantly positive interaction effect between the two approaches on the pupils' level of school engagement. This indicates that education *for* entrepreneurship is superior to the other two approaches for this age group, when it comes to increasing the pupils' emotional attachment to their education and their school. The detailed results of this analysis can be found in Appendix B.

For the older pupils, i.e. year 11 and 12 pupils, we could not identify any particular positive or negative effects of the two approaches, except on perceived teacher support and use of action-oriented teaching methods. Nor did we find any significant interaction effects between them. The results of the analyses are presented in table 2.6 and table 2.7.

Variables	Increase in education <i>through</i> (n=137)					No increase (n=467)					DID		DID			
	T=0	T=1	Diff		SE	T=0	T=1	Diff		SE	No control		Control			
Self-image	5.31	5.20	-12		(.083)	5.14	5.07	-07		(.040)	.009	(.081)	.034	(.081)		
School eng.	5.56	5.48	-08		(.080)	5.48	5.30	-18	***	(.038)	.136	(.076)	.138	(.076)		
Classmates	5.76	5.61	-15		(.103)	5.68	5.60	-08		(.043)	-.019	(.081)	-.02	(.081)		
Future	5.5	5.56	.06		(.072)	5.48	5.44	-.04		(.038)	.105	(.072)	.117	(.072)		
Teacher sup.	4.59	5.01	.42	***	(.102)	5.11	4.74	-.37	***	(.054)	.46	***	(.097)	.47	***	(.097)
About Ent.	2.08	3.13	1.05	***	(.151)	2.40	2.36	-.04		(.064)	.963	***	(.136)	.943	***	(.136)
Intentions	4.23	4.23	.00		(.143)	3.96	3.94	-.02		(.070)	.110	(.139)	.084	(.139)		
Attitudes	5.72	5.54	-.18		(.136)	5.65	5.64	.00		(.062)	-.131	(.119)	-.106	(.119)		
Int. Motivation	4.70	4.73	.03		(.114)	4.68	4.54	-.14	**	(.050)	.181	(.098)	.184	(.099)		
Ext. Motivation	4.80	4.88	.08		(.106)	4.99	4.92	-.06		(.065)	.014	(.097)	.043	(.098)		
Action meth.	4.43	5.26	.83	***	(.085)	5.04	4.90	-.14	**	(.043)	.608	***	(.080)	.595	***	(.080)

Significance levels: \* <0.05 \*\* <0.01 \*\*\* <0.001

Table 2.6: Difference-in-difference analysis for year 11 and 12 pupils who have had a significant increase in education *through* entrepreneurship

Variables	Increase in education <i>about</i> (n=124)					No increase (n=479)					DID		DID			
	T=0	T=1	Diff		SE	T=0	T=1	Diff		SE	No control		Control			
Self-image	5.32	5.25	-07		(.084)	5.14	5.06	-08		(.041)	.067	(.084)	.089	(.084)		
School eng.	5.51	5.29	-.21	**	(.077)	5.50	5.36	-.14	***	(.038)	-.068	(.079)	.062	(.079)		
Classmates	5.69	5.44	-.26	*	(.101)	5.70	5.64	-.06		(.044)	-.201	(.083)	-.182	(.084)		
Future	5.53	5.58	.05		(.076)	5.47	5.43	-.03		(.038)	.119	(.074)	.136	(.075)		
Teacher sup.	4.81	4.95	.14		(.116)	5.04	4.76	-.27	***	(.054)	.264	**	(.100)	.270	**	(.100)
Through Ent.	3.81	4.76	.95	***	(.139)	3.98	3.90	-.08		(.070)	.922	***	(.130)	.924	***	(.130)
Intentions	4.33	4.35	.02		(.144)	3.94	3.91	-.02		(.070)	.175	(.144)	.171	(.143)		
Attitudes	5.85	5.80	-.05		(.129)	5.61	5.57	-.05		(.063)	.136	(.124)	.172	(.124)		
Int. Motivation	4.80	4.72	-.09		(.102)	4.65	4.55	-.11		(.053)	.090	(.102)	.104	(.103)		
Ext. Motivation	5.07	4.88	-.18		(.110)	4.91	4.92	.01		(.064)	-.087	(.101)	-.075	(.101)		
Action meth.	4.72	5.17	.45	***	(.084)	4.95	4.92	-.02		(.047)	.321	***	(.082)	.319	***	(.082)

Significance levels: \* <0.05 \*\* <0.01 \*\*\* <0.001

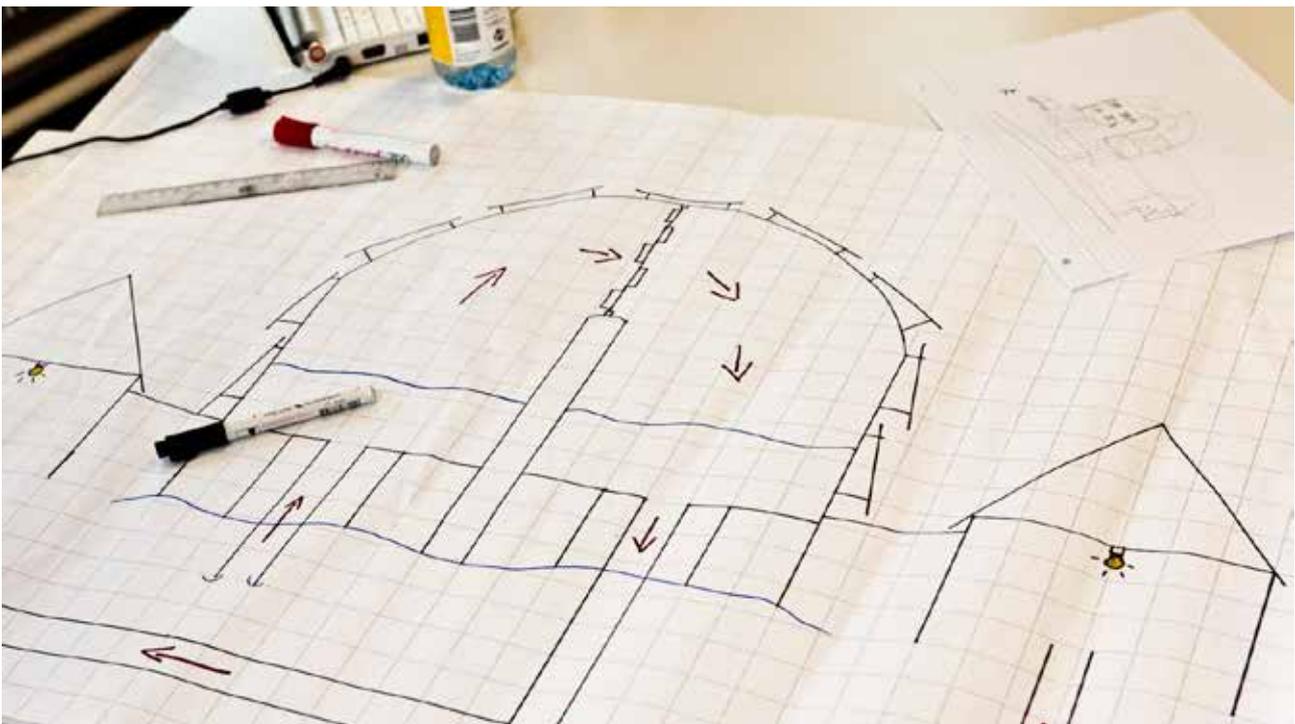
Table 2.7: Difference-in-difference analysis for year 11 and 12 pupils who have had a significant increase in education *about* entrepreneurship

## 2.5 Summary and conclusion

From the three analyses presented in this chapter, we can conclude that whether the educational approaches focus on fostering business-oriented or enterprising skills (i.e. whether the approach used is education *about* or *through* entrepreneurship) has a major consequence when it comes to the effect on entrepreneurship-related and education-oriented outcome variables. However, teachers play a very important role here as their influence determines whether or not the approach is effective. In order to get the most out of entrepreneurship education it is important that teachers obtain proper training to teach the subject.

Furthermore, our longitudinal analysis indicates that education targeting younger pupils has a greater effect. This finding is further strengthened by the results of our difference-in-difference analyses, which conclude that education *about*, *through* and especially *for* entrepreneurship are most effective for year 10 pupils, rather than year 11 and 12 pupils. This result is not surprising since, besides school, there are fewer factors that influence the variables we have studied in the case of younger pupils when compared to older pupils.

This does not mean that we should switch our focus from older to younger pupils when it comes to entrepreneurship education. We would need longitudinal data that span several years in order to assess this. Furthermore, numerous well conducted evaluation studies exist, which show that education at the later stages of secondary education does have a positive effect on entrepreneurship-related variables, both in the short term (Peterman & Kennedy, 2003) and in the long term (Elert et al., 2015). However, based on the analyses presented in this chapter, we can conclude that younger pupils are more susceptible to entrepreneurship education. Thus, in order for our educational interventions to have the highest impact, at least in the short run, we should target pupils at a young age. This follows the recommendations by researchers such as Cunha and Heckman (2007), although according to them, it is crucial that early educational interventions are followed up with quality education at later stages for optimum benefits from the investment. Future studies will show if this also applies to different approaches to entrepreneurship education.



### 3. The effects of education *for* entrepreneurship on university students

In this chapter we will present the latest results from our longitudinal survey, which focuses on the effects of different approaches to education *for* entrepreneurship on university students. The programmes included in this study are all practice-based and have a strong focus on entrepreneurship; nevertheless, they have very different effects on students. We have sourced these differences in effects to the programmes' focus on two areas, both of which are central to entrepreneurial learning: psychological ownership and prior contextual knowledge.

The analyses are based on 12 Master's programmes, which we have followed since 2011. The focus of our analyses is to assess to what degree these programmes have affected the students' entrepreneurial activities and entrepreneurial self-efficacy. We have further analysed the extent to which the programmes have changed their prior perception of their self-efficacy, and which types of students the two approaches are particularly suitable for. The chapter will start with a short presentation on the theoretical and empirical background to our study.



#### 3.1 Different approaches to education *for* entrepreneurship

The rising interest in entrepreneurship education at universities can be viewed as a natural development resulting from the pressure on universities to create growth and to commercialise research, and which has increased significantly during the last decade. By involving students in commercialisation projects, both internally and through collaboration with external partners, the universities can "kill two birds with one stone" so to speak, i.e. they get free manpower to try out and test risky projects and interaction with local organisations while also providing practice-based education of an experiential character to their students (Fayolle & Redford, 2014; Heinonen & Hytti, 2010). Many lecturers are in favour of this approach since it provides students with readymade "business embryos", meaning they don't have to worry about the quality of students' venture ideas (Laukkanen, 2000; Rasmussen & Sørheim, 2006).

However, as the psychological ownership that the students typically experience, when they are provided with readymade projects, is limited and as these projects are usually viewed as experiential assignments where the students are expected to demonstrate that they can apply the knowledge they have attained in the classroom, most students withhold their student identity and never adopt a more entrepreneurial perspective (Moberg, 2014a). Taken together, this gives these types of programmes an instrumental character, and in this survey we will therefore hereafter refer to this type of programme as instrumental.

Much research in entrepreneurship argues that ownership is a central ingredient in entrepreneurial activities and in entrepreneurial learning (Cardon et al., 2005; Cope, 2003; 2005). Entrepreneurs have a large personal stake involved in their venture projects, which makes it difficult for them to separate their professional life from their private life. This personal investment in the entrepreneurial venture typically creates a lot of frustration, stress and disappointment, but it is also what spurs passion, motivation and increased learning. Without a focus on this dimension it is difficult to simulate the entrepreneurial process in educational programmes, which then limits the level of entrepreneurial learning that can be achieved.

Furthermore, there has been a strong focus on the role that prior contextual knowledge and experience play in entrepreneurial processes (Baron, 2006; Sarasvathy, 2001, 2008; Shane, 2000, 2003; Shane & Venkataraman, 2000). Whether or not entrepreneurs engage in an entrepreneurial project is decided to a large extent by their experience, both when it comes to opportunity recognition (Baron, 2006; Shane, 2000, 2003) and when it comes to assessing whether or not the specific venture project suits the individual (Sarasvathy, 2001; 2008). In the view of Sarasvathy, the first step in an entrepreneurial process is for the potential venture creator to start by asking him- or herself: *Who am I?*, *What do I know?*, and *Whom do I know?* The answers to these questions should to a large extent determine what type of venture process the entrepreneur ought to engage in, as it affects the enthusiasm and motivation (s)he will bring to the project, not to mention his/her suitability to engage with it (Sarasvathy, 2008).

The financial and emotional exposure is rarely of the same degree for students as for entrepreneurs and it is not always viable to allow students to completely decide what type of venture projects they want to pursue in the educational process (Pittaway & Thorpe, 2012). However, if educators and curriculum designers make sure that these dimensions are to some degree included in the educational programmes, students will have the opportunity to learn what it is like to be an entrepreneur, including the responsibility, loneliness and liability of newness that accompany new venture creation (Gibb, 2002). There is thus not only a focus on the entrepreneurial process in these types of programmes, but also a strong focus on the entrepreneurial method,<sup>9</sup> and we will therefore hereafter refer to these programmes as method-oriented when referring to them in the analyses.

### 3.1.1 Making the dimensions measurable

In order to analyse the effects of a focus on student ownership and students' prior contextual knowledge, we have set up a quasi-experimental survey design. The programmes included in the survey were selected based on their focus on these dimensions. Four programmes were also included as a control group. Based on the programmes' syllabuses, two researchers from the Danish Foundation for Entrepreneurship assessed to what extent there was a focus on student ownership, using scales ranging from 1-5 (1=consultant, 5=initiator), and to what extent the programmes included the students' prior contextual knowledge in the educational process (1=generic knowledge, 5=specialist knowledge). Following the benchmark levels suggested by Landis and Koch (1977) the inter-rater reliability was rated as substantial since the Kappa values for the two categories were .67 and .68. In figure 3.1 the categorisation of the programmes is presented.

9. See Neck, Greene & Brush (2014) and Sarasvathy and Venkataraman (2011) for an elaborate discussion about what the entrepreneurial method encompasses.

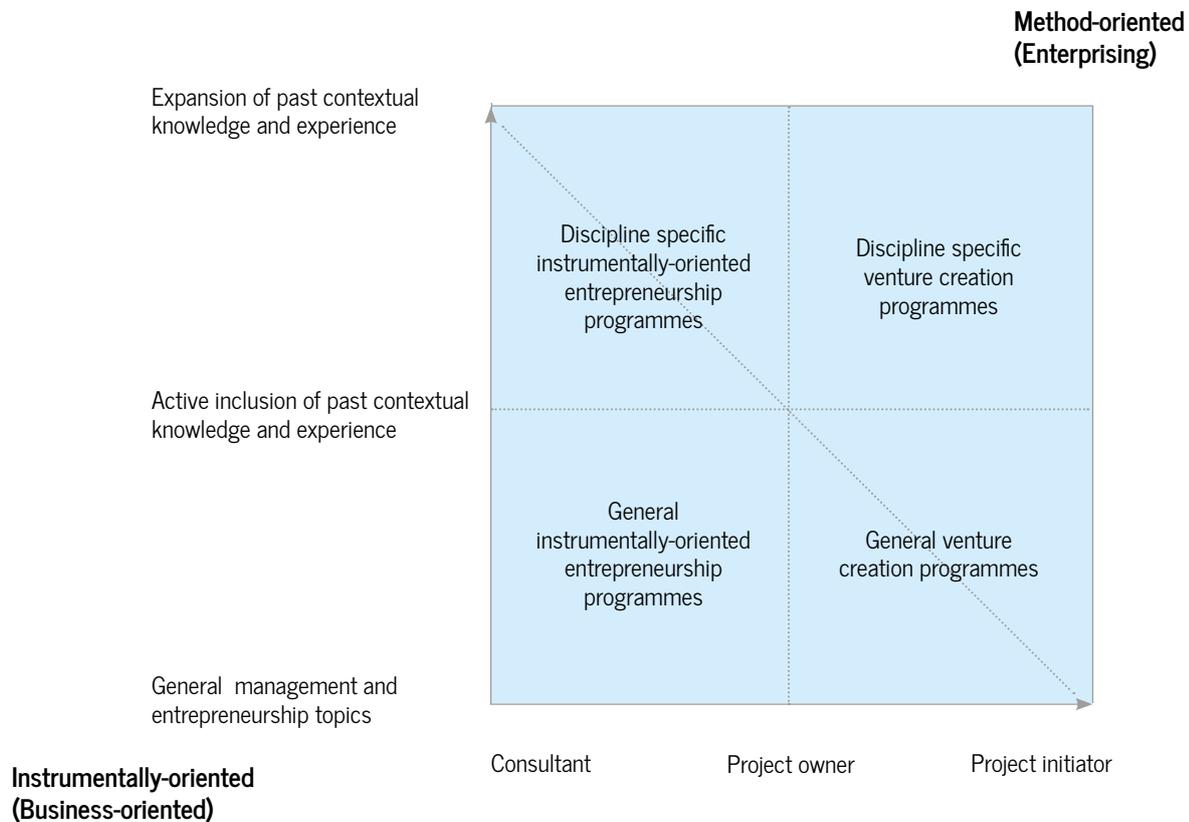


Figure 3.1: Different approaches to education *for* entrepreneurship.

### 3.1.2 Analysis

The main focus in our analysis is on assessing the students' entrepreneurial self-efficacy (ESE), but we have also included measures of their entrepreneurial social capital, entrepreneurial intentions and entrepreneurial activities.<sup>10</sup> As described in chapter 1, we used Moberg's ESE-scale, which focuses on five skill sets: creativity, financial literacy, planning, marshalling of resources, and managing ambiguity. These five dimensions were grouped into three categories depending on which stage in the entrepreneurial project they focused on, as well as on the character of the skills. Financial literacy and planning are grouped together since they are mostly used during the evaluation process and because these types of skills can be viewed as being business-oriented, with a cognitive content. We will henceforward refer to this ESE-category as business-oriented skills. Marshalling of resources and managing ambiguity are also grouped together as these skills tend to be used during the exploitation phase of an entrepreneurial project and because these types of skills can be viewed as enterprising, with a non-cognitive content. We will henceforward refer to this ESE-category as enterprising skills. Creativity is kept as a separate category since there is no clear inter-connectedness between this category and any of the others, and this skillset is typically used during the exploration stage of an entrepreneurial project.

10. We have measured entrepreneurial activities by asking the students whether they were operating a business or for the moment were trying to set up their own business.

Since the measures included in our analysis are latent constructs, i.e. they are hard to observe objectively and therefore measured with multiple items, we have used structural equation modelling as our analysis technique. We started by analysing the statistical properties of the measures and performed a confirmatory factor analysis in order to investigate the model fit. We performed the Fornell and Larcker test to assess the convergent and divergent validity of the measures. In addition to this we tested whether the groups in our sample understood the questions in similar ways by assessing whether or not the measures demonstrated weak and strong factorial invariance. All of these tests showed that the measures had sound statistical properties and that the students had understood them in the same way (a detailed presentation of these tests can be found in Appendix C). We then proceeded by assessing whether the students in the different groups had significantly different levels in their ex post values compared to their ex ante values. The results of this analysis are presented in table 3.1.

The instrumental approach (strong focus on business-oriented skills) n=107					The method oriented approach (strong focus on enterprising skills) n=236				
Variable	Ex ante	Ex post	Difference	Significant	Variable	Ex ante	Ex post	Difference	Significant
Creativity	5.23	5.48	∧.25		Creativity	4.81	5.19	∧.38	***
Business-oriented	4.71	4.86	∧.15	**	Business-oriented	4.22	4.65	∧.43	***
Enterprising	5.03	5.11	∧.08		Enterprising	4.47	5.01	∧.54	***
Ent. Social Capital	5.11	5.13	∧.2		Ent. Social Capital	4.95	5.05	∧.10	
Entrepr. Intentions	4.76	4.83	∧.07	***	Entrepr. Intentions	3.91	4.05	∧.14	
Operating a business	46 (43%)	34 (32%)	∧.12	***	Operating a business	45 (19%)	69 (29%)	∧.24	***

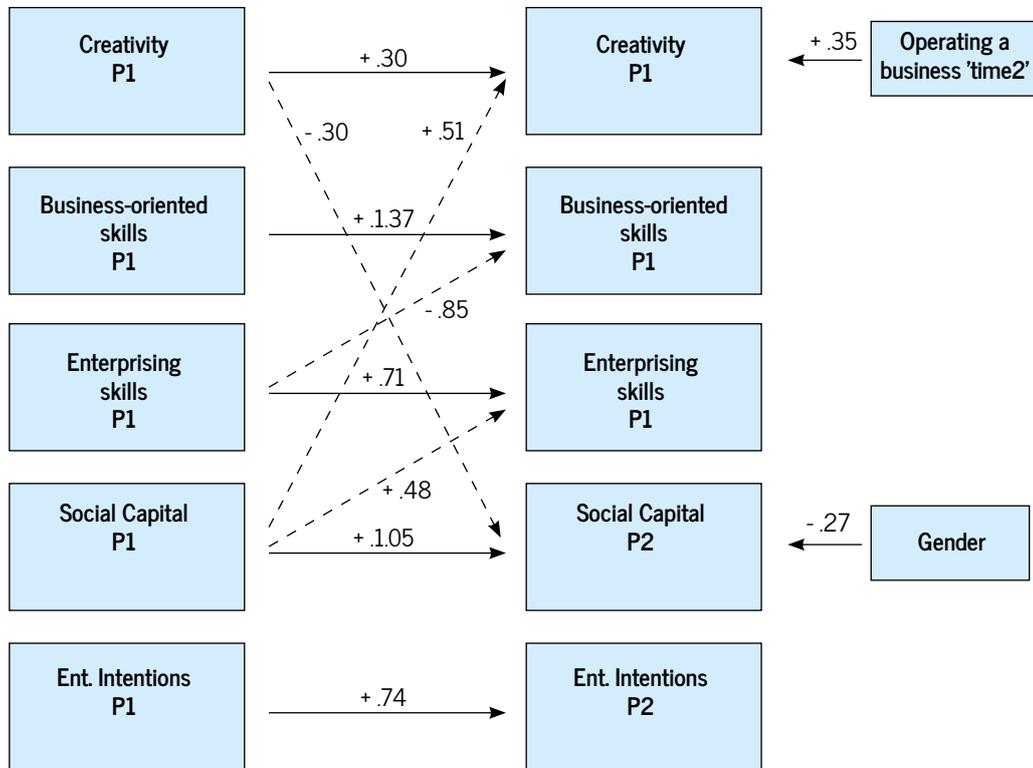
Table 3.1: Analysis of the mean differences (Mean-difference analysis)

As we can see in table 3.1, the students in the method-oriented group – where the focus on student ownership and inclusion of students' prior contextual knowledge is high – have changed significantly more compared to the students in the instrumental group. Students in the method-oriented programmes significantly increased their ESE in all three dimensions and, in addition, they significantly increased their entrepreneurial activities. The students in the instrumental programmes increased significantly in creativity, but only to a small extent in business-oriented ESE-dimensions. They also considerably decreased their entrepreneurial activities. It seems that students in these types of programmes have either been inspired to work with innovation within established organisations rather than in the form of new start-ups, or discouraged to try out their own venture ideas after having experienced how innovation projects in established organisations are managed and the amount of resources these typically require.

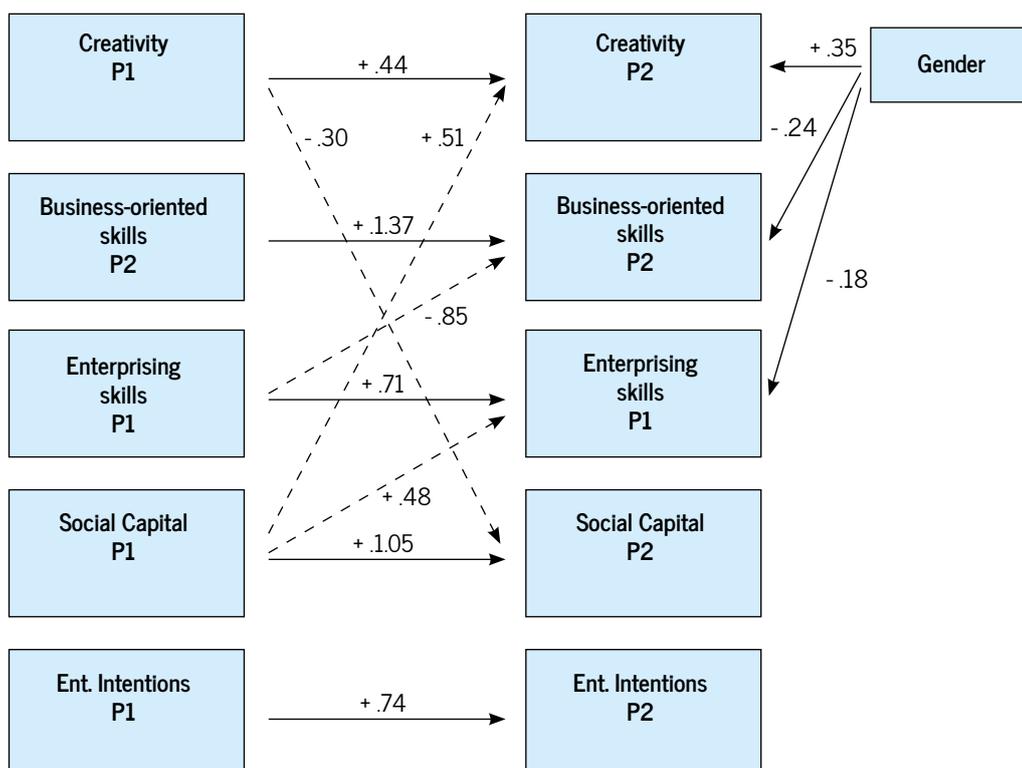
In order to analyse in which extent these types of programmes influence the students' conception of ESE, we investigated in which degree the students' ex ante levels in the dimensions explained their ex post values, as well as whether there were any cross-lagged relationships between the dimensions. In figure 3.2 and figure 3.3 the results of these analyses are presented.

As we can see in figure 3.2 and figure 3.3, the ex ante values explain to a large extent the ex post values in ESE for students in the instrumental group, whereas this is not the case for students in the method-oriented group. The creativity dimension is an exception, but this is due to the cross-lagged effects that social capital and entrepreneurial activities have on this dimension. This indicates that the method-oriented programmes have a more transformative effect on the students compared to the instrumental programmes, as the students' prior conception of their skills to a fairly low degree explain their latter perception.

**Figure 3.2. The instrumental approach**



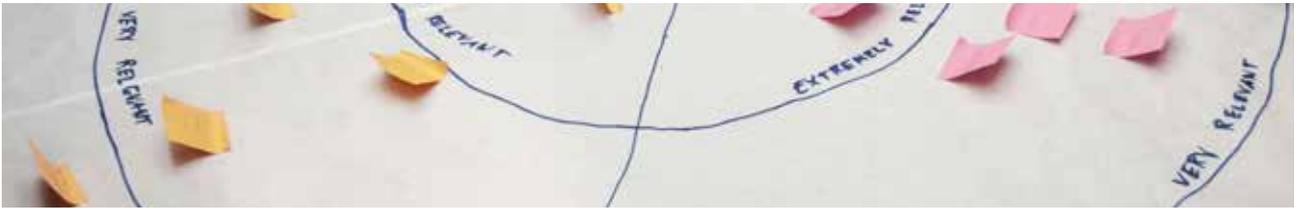
**Figure 3.3 The method-oriented approach**



The cross-lagged effects are also interesting to analyse. In the instrumental programmes there are significantly negative associations between the students' ex ante values in creativity and their ex post values in entrepreneurial social capital, as well as between their ex ante values in enterprising skills and ex post values in business-oriented skills. This indicates that these types of programmes are not suitable for creative and enterprising students. In the method-oriented programmes there is a negative association between the students' ex ante levels in business-oriented skills and creativity, and females have significantly lower levels in each of the ESE-dimensions.

In both of the groups the students' prior levels of entrepreneurial social capital has a positive association with their levels of ESE, which indicates that students who perceive that they have an entrepreneurial network, gain a lot from entrepreneurship education. Neither of the approaches to education *for* entrepreneurship were successful in significantly increasing these dimensions.





### 3.2 Conclusions and limitations

The analyses presented in this chapter indicate that ownership and the inclusion of the students' prior contextual knowledge in the educational process are important dimensions to focus on in educational programmes for entrepreneurship. There are many positive outcomes for the programmes on our sample, for all of the programmes that have a strong focus on these dimensions. The students significantly increase their ESE levels in all dimensions and their ex ante levels only have a small association with their ex post levels, which indicates that the programmes have had a fairly transformative effect. These programmes also have a significantly positive effect on the students' entrepreneurial activities. The programmes in our sample, which have a limited focus on student ownership and where the inclusion of their prior contextual knowledge is narrow, have a very limited effect on the students' ESE and, with the exception of the creativity dimension, their post levels in ESE are to a large extent explained by their initial ESE levels. These programmes also have a significantly negative influence on the students' entrepreneurial activities.

It is, however, understandable that many educators and curriculum designers find it rational to collaborate with external organisations when it comes to performing entrepreneurial activities, as it enables them to provide their students with authentic assignments and readymade innovations with a guaranteed high quality. Nevertheless, it is often necessary in these projects to comply with the professional values that are practised by the partnering organisations, and the margin for errors is thus limited. This favours predictive methods over trial and error procedures, and the students often remain in their student role rather than adopting an entrepreneurial perspective (Gibb, 2002). This does not mean that we should cease this type of education. However, our analyses show that it is important to consider how we can mimic entrepreneurial learning, include the students' prior contextual knowledge and increase the students' psychological ownership levels in these types of programmes.

Another interesting finding in our analyses is that the students' perceived entrepreneurial social capital has a very positive influence on their ESE levels, but neither of the approaches is successful in significantly increasing the students' levels in this dimension. However, this is something that a well-designed entrepreneurship programme should be able to do. Exercises where students have to consider which types of contacts and resources they have in their network could be one way of doing this. Another way could be to task the students with proactively extending their entrepreneurial network, by for example seeking out potential stake-holders, use LinkedIn to establish contacts, visit entrepreneurship associations and student incubators, and so forth.

We should, however, be careful when interpreting the result of the analyses since there are some limitations that need to be considered. The educational treatment is not randomly assigned to the students. This creates a self-selection bias in the sample and we can see that students in the instrumental programmes have significantly higher initial values in the dimensions. As it is harder to increase the students' ESE when they already have a high confidence in their ability to perform these skills, the comparison of the two groups becomes a bit unfair. Furthermore, the results are only based on one year of education. There may well be positive effects of these programmes that first reveal themselves long after the programmes have ended. We would need longitudinal data that span many years in order to assess this.

## 4. Entrepreneurial activity among students and recent graduates in higher education

This chapter has been contributed by Henrik Barslund Fosse from the Danish Agency for Science, Technology and Innovation, who in 2014 conducted a study of entrepreneurial activity among students and recent graduates in higher education, with particular focus on university students. The analysis shows that during the period 2001-2011, entrepreneurial activity at the universities rose by 43%. This rise is firstly due to the fact that graduates at Master's level have increased their entrepreneurial activity by 159%. It is predominantly the women in this group who have increased their entrepreneurial activity. Women have therefore increased from comprising 37% of this group in 2001 to 49% in 2011. The study also shows that the annual growth rate in productivity for this group is 6.8%, when other entrepreneurial companies experienced zero growth in productivity for the same period. The analysis shows that in the last decade, Danish universities have managed to increase the number of undergraduates, who view entrepreneurship as an attractive career choice. The analysis equally demonstrates the importance of increasing this attitude to entrepreneurship among those in higher education, as this group possesses a significant growth potential that can contribute to increasing Denmark's competitive performance.



### 4.1 Entrepreneurial activity in Denmark's universities

In this study we focus on companies launched by entrepreneurs who are either studying, have graduated from a Bachelor or Master's level, including PhD students, at the country's eight universities<sup>11</sup> in the period between 2001 and 2011. The graduates are included if they have started a company within two years of graduating. We will apply the term university entrepreneurship to these entrepreneurs and their companies. We compare university entrepreneurs with two reference groups:

- **NOT UNI** follows the above criteria and includes entrepreneurs connected to other higher education institutions that provide education at a Bachelor and Master's level. These companies comprise a good 1% of all entrepreneurial companies.
- **Others** comprise all other entrepreneurial companies, regardless of other data such as educational background or time when they completed their education. These companies comprise almost 97 % of all entrepreneurial companies.

11. Iværksætterdatabasen includes newly started business with a minimum requirement for activity (see [www.dst.dk/kvalitetsdeklaration/106175](http://www.dst.dk/kvalitetsdeklaration/106175))

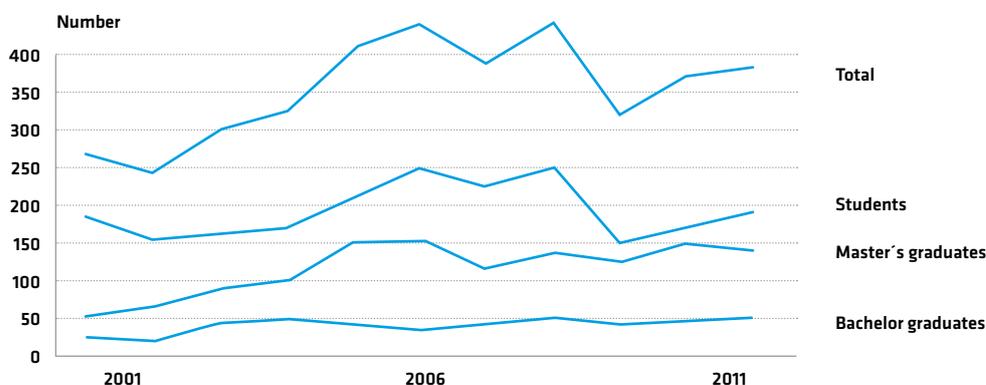


**4.1.1 Entrepreneurial activities at universities rose by 43 % in the 00s.**

In 2001, 268 students and Bachelor and Master’s graduates from the eight universities launched companies. In 2011 this number rose by 43% to 383. From 2001 to 2011, entrepreneurial activity among Master’s graduates rose by 159%. In the same period, the number of Master’s graduates grew by 54%. An estimate for the contribution to the increase in the group’s entrepreneurial activities from graduates at Master’s level (and therefore potentially more entrepreneurs) is approximately a third. Thus the drastic rise points to a significant structural lift in this group’s entrepreneurial activity. The growth in entrepreneurial activity among Master’s graduates is three times as high as the growth in the number of Master’s graduates, which is why an increase in Master’s graduates is only partly responsible for the significant rise in entrepreneurial activity among them. The rise is mainly driven by an increasing entrepreneurial trend.

Bachelor graduates contribute just ¼ of the total rise in activity of the total 43%. In 2011, the students’ activity still comprised the biggest part of overall activity, but the level was the same in 2011 as it was in 2001. Thus, students’ entrepreneurial activity has not contributed to the total rise from 2001 to 2011. Figure 4.1 below shows the development in entrepreneurial activity for the three groups:

Figure 4.1

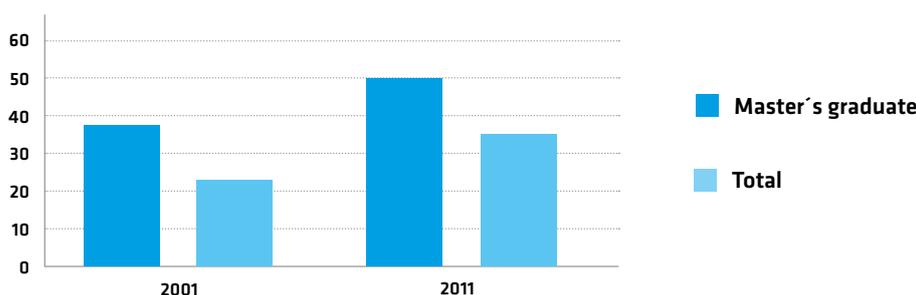


Source: Special run on register data by Statistics Denmark

#### 4.1.2 The number of female entrepreneurs at the universities has increased significantly

Female entrepreneurs have also made their mark on the statistics such that 1 in 2 newly graduated university entrepreneurs holding a Master's degree is female. This is a significant difference from the 34%, which is the figure generally comprised by female entrepreneurs in Denmark. Their share has also grown significantly since 2001, when they only comprised 37% of university entrepreneurs at Master's level (see figure 4.2).

Figure 4.2 Development in the share of female entrepreneurs from the universities (in percentages)



Note: The figure shows women's share of university entrepreneurial activity for Master's graduates only, and for all groups (total).  
Source: The Agency's calculations in a special run on register data by Statistics Denmark

## 4.2 University entrepreneurs generate growth

From 2001 to 2001, students and Bachelor and Master's graduates from the country's eight universities registered just under 4,000 entrepreneurial companies with genuine activity.<sup>12</sup> This corresponds to around 2% of all newly registered companies for that period. Three years after start-up, just under half of the companies were still active and in the period 2001-2008 provided employment for 3,040 full-time equivalents or 380 full-time equivalents per entrepreneurial year. Thus three-year-old entrepreneurial companies employed at least 380 people on a full or part-time basis per year.

Compared with other entrepreneurs, university entrepreneurial companies close down more often than other entrepreneurs. The lower survival rate three years from start-up is mainly caused by the high number of university entrepreneurs who abolish their company registration number just one year following start-up. From one to three years after start-up, a further 20% of the original number of start-up companies close in all the groups. The reason could be that existing undergraduates, who comprise around 70% of entrepreneurs at the universities (the rest are graduates), often found companies for a short-term purpose.<sup>13</sup>

However, our analysis shows that those who continue with their companies are successful. From the first whole year from the foundation year up to and including the third year, university entrepreneurial companies' employment grew on average at a higher rate than the average growth rate of all other forms of entrepreneurial companies founded from 2001-2008. While other entrepreneurial companies have generally not managed to create productivity growth, in the university entrepreneurial companies, productivity has grown at an annual rate of 7%. Table 4.1 shows the number of companies that have survived the

12. During this period there have been fusions of several independent institutions. We have accounted for this, so that earlier independent institutions in the period 2001-2011 are counted below the university with which they have been fused some time between 2001 and today. This means, that e.g. activities of students and candidates from Aarhus University School of Engineering figure below AU, because the institutions fused in 2012, although they were not between 2001-2011.

13. Uncertainty: we don't know the reason why company registration numbers are abolished. It is not necessarily because the company closes. A company may change its company registration number in certain cases in relation with the change to a new company form, through buying-up or other transfer. In this analysis we have not had the possibility to account for this.

first three years, their average employment, turnover and added value per full-time equivalent (labour productivity)<sup>14</sup> for the period 2001-2008.

Table 4.1 Activity and growth among surviving entrepreneurial companies.

#### Average activity one year after start-up for companies founded between 2001 and 2008

Figures in numbers			Figures in DKK		
	Number of entrepreneurs	Average employment (full-time equivalent)	Average turnover	Average value increment	Value increment per full-time equivalent (weighted average)
UNI	1.220	2,4	2.072.717	737.482	313.906
NOT UNI	932	2,2	2.377.069	725.570	329.805
Others	63.917	2,5	2.895.787	869.110	347.644

#### Annual growth rates in percentage (annualised) from year 1 to year 3 after start-up

Growth rates in percentage					
		Employment	Turnover	Value increment per full-time equivalent	
UNI		5,2	7,8	6,8	
NOT UNI		3,3	10,4	-3,3	
Others		4,2	5,0	-0,1	

The number of companies reflects the number of companies that survive three years. NOT UNI comprises companies founded by entrepreneurs associated with other higher education institutions that provide education at Bachelor and/or Master's level. Others comprise all the other entrepreneurs outside the UNI and NOT UNI categories in Denmark. Financial key figures only cover private businesses (72% of companies).

Source: The Danish Agency for Science, Technology and Innovation's own calculations on a special run on register data from Statistics Denmark.

## 4.3 Overall conclusions

As we can see in this analysis, entrepreneurial activity among Danish graduates has risen dramatically, especially at Master's level and among women. These groups are not typically found among normal entrepreneurs, rather studies have shown that a high level of education is the driving factor for entrepreneurship (ERST, 2013). Our analysis supports the importance of the positive trend continuing, as it shows that university entrepreneurs are more productive and competitive.



14. The employment numbers cover all the companies, but financial performance indicators only exist for an extract of the companies in private urban trade companies. The growth figures are inflation-corrected, the other figures are nominal averages.



## 5. Entrepreneurs and attitudes

*By Anders Hoffman, Danish Business Authority, and Martin Junge, DEA*

Can the public sector promote interest in entrepreneurship? Many claim that entrepreneurs are born with special skills, and that the best public authorities could do is to provide the right conditions for entrepreneurs and to refrain from influencing people's attitudes and motivation for strengthening the entrepreneurial culture. Others claim that entrepreneurial skills can be learned and can therefore be encouraged by initiatives such as e.g. entrepreneurship education or promotion of role models. From a political perspective, it is positive if the entrepreneurial culture can be influenced and strengthened through such initiatives.

This chapter is a summarised version of the report "Attitudes, motivations and entrepreneurship in Denmark" (DEA (2013) and focuses on whether entrepreneurs are recognisable by having specific values and motivations - and if so, whether the values and attitudes that characterise entrepreneurs are traits that are passed on from parents to their children, or traits that can be learned.

If attitudes and motivations that lean towards entrepreneurship are formed early on in life, it would be hard for public authorities to intervene.

We wish to answer the following two questions:

1. Do entrepreneurs and wage earners in Denmark have different attitudes and motivations in their working life? And if so:
2. Can these be linked back to the attitudes and motivations of their parents?

## 5.1 Data and method

The study is based on a survey that was conducted by Statistics Denmark from June 2013 - August 2013. The focus was on the link between attitudes and motivations among a group of entrepreneurs and their parents, and a group of wage earners and their parents.

The survey's 1,871 respondents were asked about their level of ambition, their level of competitiveness and their level of risk-taking in their career. We will refer to these as attitudes. They were then asked to state the importance of 11 different job characteristics they would look for if they had to choose a new job. We will refer to these as motivations.

We will use the responses to compare attitudes and motivations among entrepreneurs and wage earners and to compare the parents of entrepreneurs and parents of wage earners to comment on the primary and secondary attitudes and motivations.

We then studied the decision to become an entrepreneur and the significance of attitudes and motivations on this decision through a statistical analysis. This is important because the link between e.g. the decision to become an entrepreneur and attitudes could be due to e.g. gender differences. The model also includes explained variables that have previously proven to be significant when making the decision to become an entrepreneur. The list of explained variables includes: Individual characteristics such as gender, age, background, level of education, marital status and number of children; employment related variables such as industry, region, employment and unemployment history; and parents' employment history and assets.



## 5.2 Attitudes among entrepreneurs and wage earners

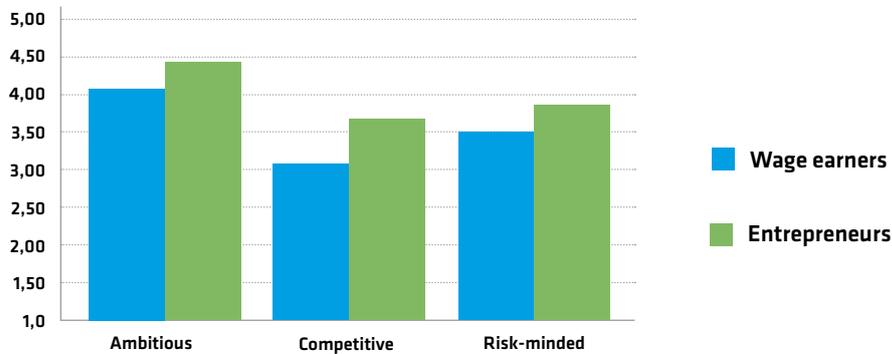
In the survey we asked respondents to what extent they agreed with the following three statements about their working life.

- "Regardless of what I do, I always have the highest demands of myself" (ambitious)
- "I am only satisfied when I'm number 1" (competitive)
- "I am willing to run risks" (willing to take risks)

The responses were provided on a scale of 1 to 5, where 1 equates to "completely disagree" and 5 equates to "completely agree".

Figure 5.1. clearly shows that both wage earners and entrepreneurs agree that they are ambitious, willing to take risks and competitive. But the figure also shows that entrepreneurs are more ambitious, competitive and willing to take risks than wage earners.

Figure 5.1 Attitudes among entrepreneurs and wage earners



Statement: Based on N = 1871. Source: Own calculations.

### 5.3 Motivation among entrepreneurs and wage earners

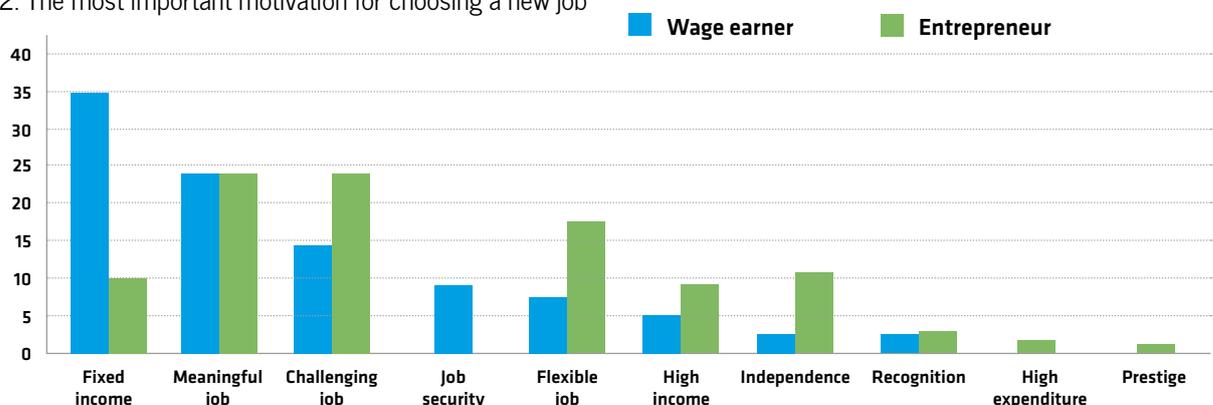
If you ask what motivates wage earners and entrepreneurs in their working life, the study shows that also here there is a difference between the two groups.

In figure 5.2 we compare wage earners and entrepreneurs in their response to the question: Which of the 11 job characteristics would be the most important motivation if you were to choose a new job?

Here the study shows that wage earners are much more likely to respond that characteristics relating to stability are what is most important to them. 35% of them state "fixed income" as the most important job characteristic and a further 10% state "job security". This is a sharp contrast to the answers given by entrepreneurs. Here only 10% respond that a fixed income is the most important. No entrepreneurs state job security as the most important.

Entrepreneurs stand out for choosing "challenging job" (24%), "flexible job" (18%) and "independence" (11%) with greater frequency than wage earners (15%, 8% and 2%, respectively). It is also worth noting that the group of entrepreneurs are more likely to cite "high income" as the most important motivation for choosing a new job.

Figure 5.2: The most important motivation for choosing a new job



Anm.: Based on N = 1871. No one has „meeting parents’ expectations” as the most important motivation. Source: Own calculations

All in all the responses clearly show that while entrepreneurs are driven by a desire for independence and flexibility, wage earners are driven by a desire for stability and security.

## 5.4. Child-parent attitudes and motivation

If we compare children's and parents' attitudes and motivations (table 5.1, first column), the study shows that the link is statistically significant in 7 out of the 14 questions that the respondents were asked.

Our results therefore show some evidence of inheriting a willingness to take risks, and they show that children are, to a certain extent, motivated by the same job characteristics as their parents. The highest correlation is shown in the question on the importance of meeting parents' expectations.

It would be interesting to know whether these correlations are stronger among children/parents of the same gender, because attitudes and motivations are most often passed from parents to children of the same gender. Here the correlation is particularly high for willingness to take risks: if children/parents are of the same gender, the correlation doubles.

The correlation also increases significantly when it comes to the importance of a high income, high expenditure and job security. However, the correlation between the importance of a flexible job and a meaningful job are no longer statistically significant in children/parents of the same gender.

Table 5.1: Link between primary and secondary responses

	Correlation coefficient	Number of observations
Attitudes (on a scale from 1 to 5):		
Ambitious	-0.041	686
Competitive	0.015	676
Willing to take risks	<b>0.102</b>	685
Motivation factor (on a scale of 1 to 4):		
High income	<b>0.091</b>	689
High expenditure	<b>0.092</b>	688
Fixed income	0.009	686
Challenging job	<b>0.114</b>	681
Flexible job	<b>0.087</b>	686
Meaningful job	<b>0.093</b>	689
Independence	0.032	671
Prestige	0,068	684
Recognition	0.029	683
Meet parents' expectations	<b>0.152</b>	679
Job security	0.066	679

Statement: The figures in bold show the statistically significant correlations on the 5% level. Source: Own calculations

All in all the most important find from this part of the analysis is that out of the seven attitudes and motivations where there is a link between the responses from parents and their children, only two differentiate the entrepreneurs and wage earners - namely the degree of willingness to take risks and the importance of a flexible job.



## 5.5 Statistical model for the decision to become an entrepreneur

Finally, we present the results of a statistical analysis of the decision to become an entrepreneur and wage earner and data about individual and parental traits as explanatory variables. The reason that we conducted this analysis is e.g. that the link between willingness to take risks and the decision to become an entrepreneur can be driven by e.g. gender, if men are more willing to take risks and therefore more likely to opt for an entrepreneurial life.

Columns 1 and 2 in table 5.2 present the results of the model, which do not include variables on parents. Columns 3 and 4 present the results of the model with the parents' traits, although only for those people where we have data about both parents in the register database in 2008. The requirement for parents to form part of the analysis means the number of observations drops from 1,871 to 1,284.

Even if we cannot establish any causal relation,<sup>15</sup> we can confirm a strong and positive connection between the traits of being ambitious and competitive and being an entrepreneur. On the other hand, we cannot see any statistically significant connection between the willingness to take risks and being an entrepreneur.

We also find strong correlations between motivations at work and the likelihood of becoming an entrepreneur. Specifically, entrepreneurs are motivated by independence; in contrast, being motivated by high expenditure, a fixed income, job security and recognition reduces the likelihood of becoming an entrepreneur.

The statistical model thereby confirms that while entrepreneurs are driven by the desire for independence, wage earners are driven by the desire for stability and security.

The results remain the same when we add control variables such as parents' assets and employment history (columns 3 and 4 in Table 2). We do not find that parents' assets are an important factor for being an entrepreneur. However, our results point to the parents' employment history being of major significance when it comes to deciding whether to become an entrepreneur. We find this link to be stronger in same gender lines. A mother who is self-employed increases the likelihood of the daughter being an entrepreneur, although this does not affect the son's likelihood of being one. Having a father who is self-employed increases the likelihood of becoming an entrepreneur for both sons and daughters, although the effect is slightly lower for daughters.

15. Causality is a problem, because entrepreneurs may perceive themselves as e.g. competitive, because they have become entrepreneurs, and thus they may answer more in agreement with a widely-held opinion.

Table 5.2: Estimation results

Likelihood of becoming an entrepreneur	Probit 1		Probit 2	
	Coefficient	Standard errors	Coefficient	Standard errors
<b>Independent variables:</b>				
<b>Attitudes:</b>				
Ambitious	<b>0.165</b>	(0.05)	<b>0.197</b>	(0.07)
Competitive	<b>0.247</b>	(0.04)	<b>0.262</b>	(0.05)
Willing to take risks	0.051	(0.04)	0.020	(0.05)
<b>Motivation:</b>				
High income	0.053	(0.05)	0.033	(0.06)
High expenditure	<b>-0.143</b>	(0.06)	<b>-0.217</b>	(0.07)
Fixed income	<b>-0.368</b>	(0.06)	<b>-0.341</b>	(0.07)
Challenging job	-0.069	(0.06)	-0.043	(0.08)
Flexibility	0.051	(0.06)	0.066	(0.08)
Meaningful job	0.005	(0.07)	-0.012	(0.09)
Independence	<b>0.224</b>	(0.05)	<b>0.240</b>	(0.07)
Prestige	0.056	(0.05)	0.064	(0.06)
Recognition	<b>-0.222</b>	(0.05)	<b>-0.249</b>	(0.07)
Meet parents' expectations	0.072	(0.05)	0.114	(0.06)
Job security	<b>-0.304</b>	(0.05)	<b>-0.343</b>	(0.07)
<b>Parents' characteristics:</b>				
"Rich kid" dummy	.		0.323	(0.21)
Mum has been self-employed	.		-0.191	(0.14)
Mum has been self-employed X woman	.		<b>0.769</b>	(0.26)
Father has been self-employed	.		<b>0.468</b>	(0.11)
Father has been self-employed X self-employed	.		-0.141	(0.20)
N		1871		1284
Pseudo-R2		0.2831		0.3155
c2		731.02		561.30
p>c2		0.0000		0.0000

Statement: Individual characteristics such as age, gender, family relationships, background, education, previous years of unemployment and industry are included in the regression. The figures in bold show the statistical significance at a 5% level.

Source: Own calculations.

## 5.6 The entrepreneurial culture is not inherited

The overall conclusion of the analysis is that entrepreneurs are known for having certain values and attitudes compared with wage earners: they are more ambitious, more competitive and more willing to take risks, although these values and attitudes are not necessarily inherited from generation to generation.

Only a very small part of the difference between wage earners and entrepreneurs can therefore be attributed to parents' values and motivations. In other words, it appears that the formation of the values and motivations that separate entrepreneurs from wage earners are the result of the culture and opportunities that have influenced the entrepreneurs along the way. For example, school life and mentors can influence who becomes an entrepreneur.

This does not mean that parents are without influence. A previous analysis of Danish data (Hoffman et al. , 2014) shows that the observed link between children and parents is best explained by a parent role model, which is strongest in same gender lines. It is not because parents have passed on certain values and attitudes, but because they are role models.

The results indicate that entrepreneurs can be taught, which means there exists an opportunity to influence entrepreneurial culture through political intervention such as investment in entrepreneurship education.

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Hoffman, Anders; Martin Junge; and Nikolaj Malchow-Møller (2014): "Running in the family – Parental role models in Entrepreneurship", Small Business Economics, 2014





## 6. The Global Entrepreneurship Monitor

In this chapter we present the results from the 2014 annual Global Entrepreneurship Monitor (GEM). When we began our impact measurement project in 2010, we ordered a GEM study by professor Thomas Schøtt from Syddansk Universitet (SDU), which had a special focus on teaching entrepreneurship. In 2014 we ordered a new study with the same focus. This enabled us to examine how Danish society has developed within this field, and whether the results we found in 2010 are solid. When we compare the two studies, we can see that entrepreneurship appears to be a youth phenomenon. In the study from 2014, young people (<34) had significantly higher entrepreneurial intentions than in the study from 2010, while older people (>34) had higher entrepreneurial intentions in 2010. However, the study shows that younger people had lower belief in their own entrepreneurial skills.

As entrepreneurship education has a positive link with entrepreneurial skills, such as alertness to business opportunities, willingness to take risks and confidence in your own ability to start a business, the study indicates that an increased focus on entrepreneurship education among young people would generate more entrepreneurs.

We can also see that teaching entrepreneurship has become more widespread in our education system, although there is still plenty of room for improvement as entrepreneurship seems to remain mainly theoretical. Nevertheless, entrepreneurship education doesn't just have a positive effect on entrepreneurial intentions or new start-ups. The results of this year's study show that entrepreneurship education also increases the likelihood of entrepreneurial employment in existing companies, which can have a positive effect on salary levels. What is further evident is that entrepreneurial skills, which entrepreneurship education aims to promote, is also sought after on the job market.

We start this chapter by presenting the results of the 2014 study and will thereafter compare them with the 2010 study. However, first we will present how the GEM study is conducted, and the study design it applies.

### 6.1 The Global Entrepreneurship Monitor (GEM)

The study is part of a larger research project, the Global Entrepreneurship Monitor (GEM). GEM is the world's biggest study of entrepreneurship and conducts an annual survey of the adult population in each participating country.<sup>16</sup> The annual survey asks about the population's entrepreneurial skills, attitudes to entrepreneurship, intentions to start a company, and their views on the conditions for entrepreneurial activity. Employees' involvement in entrepreneurial activity in the workplace is also examined.

16. Data as well as reports can be downloaded at [www.gemconsortium.org](http://www.gemconsortium.org)

The Danish GEM study applies to adults aged 15-64. A random draw is made from the population's telephone numbers by a survey company, which then conducts a telephone interview with at least 2,000 adults. In this analysis, the random draw covers 4,208 adults, which include 2,000 adults who were surveyed in 2010 and 2,208 who were surveyed in 2014. The following is a brief presentation of the results of this study. More detailed analyses and statistical explanations can be found in the full report, which can be downloaded from the Danish Foundation for Entrepreneurship's website.<sup>17</sup>

## 6.2 Entrepreneurship education and entrepreneurial skills among young and older people in 2014

The first part of this chapter focuses on the difference between young and older people in Denmark. We investigate how they differentiate from one another in terms of entrepreneurial skills, entrepreneurial intentions, and to what extent they have received entrepreneurship education. We also present what influence entrepreneurship education has on young and older people, their connection to entrepreneurial activities and desire to start a company, and how this relates to entrepreneurial activities in established companies and to their salary level.

### 6.2.1 Entrepreneurship education among young and older people

The GEM study examined to what extent and when young people (15-34 years) and older people (35-64 years) in the Danish population have received entrepreneurship education. All respondents replied whether they had received entrepreneurship education during any of their stages of education, and whether this education was provided during school or outside school. They also had to state whether they had received entrepreneurship education more than once. The results are displayed in table 6.1.

Entrepreneurship education, split according to age (923 young people, 1,278 older people).	15-34 year-olds	35-64 year-olds	Significance
Received entrepreneurship education in primary school	6.3%	2.0%	***
Received entrepreneurship education as part of vocational training	36.5%	14.9%	***
Received entrepreneurship education at sixth-form level	14.4%	6.9%	***
Received entrepreneurship education in higher education	18.8%	10.5%	***
Received education outside school, while in education	7.9%	4.8%	**
Did not receive entrepreneurship education	74.0%	84.2%	***
Received 1 type of entrepreneurship education	19.0%	11.2%	***
Received 2 or more types of entrepreneurship education	7.0%	4.6%	**

Table 6.1: Entrepreneurship education among younger and older people in Denmark 2014

As we can see in table 6.1, entrepreneurship education is much more common among young people. There is a significant difference at all stages of the education system, and a significant number have received education in the subject more than once. More than a quarter of young people have also received entrepreneurship education, which is a positive development as Denmark was lagging behind other countries at the start of the 00s (Coduras et al, 2010; Levie et al., 2015; Schøtt, 2009). However, it must be noted that there is still a long way to go before the target of all young people receiving entrepreneurship education several times during their education is achieved.

17. <http://eng.fte-ye.dk/knowledge-centre/knowledge-analysis/impact>

## 6.2.2 Entrepreneurial skills and intentions among older and younger people

The GEM study includes questions on to what extent respondents think they are alert to business opportunities, to what extent they have entrepreneurial role models in their network, to what extent fear of failure prevents them from starting a company, how self-confident they are in relation to their own skills of starting a company, and whether they have intentions of starting a company within the next few years. There are many reasons to believe that there would be a difference between older and younger people in these dimensions. Older people have more experience and should therefore have greater self-confidence and access to more role models, but they also have a more realistic picture of entrepreneurship and the risks involved in starting a new company. However, the younger people have less to lose, and they have grown up in a more entrepreneurial society. Table 6.2 presents the difference concerning skills and entrepreneurial intentions between younger and older people.

N=923 young people, 1278 older people	15-34 year-olds	35-64 year-olds	Significance
Alertness to business opportunities	63.4%	55.7%	**
Role model	37.2%	27.5%	***
Willing to take risks	52.3%	58.5%	**
Self-confidence	25.9%	38.4%	***
Intention of starting a company	10.8%	6.8%	***

Table 6.2: The difference between younger and older people with regard to entrepreneurial skills and intentions

As we can see in table 6.2, there is a significant difference in all dimensions, although in different directions. The older people are more self-confident and willing to take risks, while the younger have a higher level of alertness. Several also feel that they have entrepreneurial role models in their network, and several also have intentions of starting a company. It appears that the younger people's upbringing in a more entrepreneurship-focused society has greater significance than the older people's life and work experience. It is however a little odd that the older people are more self-confident and willing to take risks, as these are usually traits that are associated with the 'daring' youth. The explanation for this can be that the older group focuses on companies that are less risky than those focused on by young people.

## 6.3 The difference between girls and boys

It is not only the difference between age groups that is interesting to examine. There are other differences in the groups, especially in relation to gender. This difference tends to be established early in life and to continue with age. We have therefore examined how girls and boys aged 15-19 differentiate themselves with regard to entrepreneurial skills and intentions. Table 6.3 shows the results.

N=402	Girls	Boys	Significance
Have received entrepreneurship education	12.7 %	28.3 %	***
Have self-confidence	15.9 %	24.7 %	*
Have alertness	41.9 %	52.0 %	*
Willing to take risks	49.2 %	60.1 %	*
Have a role model	27.0 %	31.0 %	
Have intention of starting a company	4.2 %	13.3 %	***

Table 6.3 The difference between girls and boys

As we can see in table 6.3, there is a major difference between the genders. Boys aged 15-19 have received entrepreneurship education much more frequently than girls, which gives a clear indication of which educational institutions have focused on entrepreneurship. Many more boys also have intentions of starting a company as they are more self-confident, alert to opportunities and more willing to take risks. The only factor that does not separate boys and girls is their perception of whether they have entrepreneurial role models in their network.

It is therefore evident that there is a major difference between younger and older people, and between boys and girls when it comes to entrepreneurial skills and entrepreneurial intentions. This is an important point to consider when designing education in entrepreneurship.

## 6.4 The connection between entrepreneurship education and older and younger people's entrepreneurial skills, intentions and activities

As entrepreneurial skills and activities are important in several contexts in the current job market, it has become even more important that more people receive education that strengthens their ability to act in an entrepreneurial way. This part of the chapter examines the connections between education in entrepreneurship and entrepreneurial employment, enterprising management and salary levels. We start by presenting how entrepreneurship education links to young and older people's entrepreneurial skills, intentions and activities. Entrepreneurial activities are here defined as individuals' experience with company start-ups. The results are presented in table 6.4 below.

		Have received entrepreneurship education	No entrepreneurship education	Significance
Alertness	15-34 years	70.3%	60.6%	*
	35-64 years	58.5%	55.0%	
Role model	15-34 years	47.7%	33.4%	***
	35-64 years	38.1%	25.4%	***
Self-confidence	15-34 years	38.5%	21.6%	***
	35-64 years	52.8%	35.7%	***
Willing to take risks	15-34 years	53.9%	51.6%	
	35-64 years	57.9%	58.6%	
Earlier start-up	15-34 years	7.9%	2.8%	**
	35-64 years	32.8%	17.6%	***
Have intentions	15-34 years	16.3%	8.9%	**
	35-64 years	12.6%	5.8%	***
Starts a company	15-34 years	6.7%	2.6%	**
	35-64 years	5.5%	2.6%	*
Runs a company	15-34 years	6.2%	2.6%	*
	35-64 years	15.3%	7.3%	***

6.4: The connection between entrepreneurship education and older and younger people's entrepreneurial skills, intentions and activities

As we can see in table 6.4, education in entrepreneurship is closely linked to a high level of perceived entrepreneurial skills and entrepreneurial activities, both for younger and older people. However, there is not a significant link between the willingness to take risks and entrepreneurship education, and it is only among younger people that there is a significant difference in levels of alertness. The insignificant difference in willingness to take risks is due to the fact that those who have received education in entrepreneurship also have higher ambitions and are focusing on more risky companies. However, this is an important dimension for teachers of entrepreneurship to work with, as there are many ways to change pupils' and students' perception of entrepreneurship as a highly risky activity.

We can also see that both younger and older people who have received entrepreneurship education also have higher entrepreneurial intentions, more experience of entrepreneurship, and that many are in the process of starting or are already running a company. We will now examine how education in entrepreneurship is connected to entrepreneurial employments, enterprising management and salary levels. Table 6.5 presents the results of this analysis.

	Have received entrepreneurship education	No entrepreneurship education	Number respondents	Significance
Entrepreneurial employment	26.3%	17.3%	1201	***
Have skills to manage a private company	53.5%	36.8%	2111	***
Are employed as manager in a private company	20.0%	11.1%	1543	***
Are employed as a senior manager in a private company	30.7%	41.2%	198 managers	
Income, average	304,306 DKK	296,209 DKK	1754	*

Table 6.5: Link between entrepreneurship education and entrepreneurial employment, enterprising management and salary levels

As we can see in table 6.5, there is a clear connection between entrepreneurship education and entrepreneurial employment, and between respondents' perception of own skills to manage a company and the extent to which they already work as managers in private companies. There is no connection between entrepreneurship education and employment in senior management, but those who have received entrepreneurship education have a significantly higher income.<sup>18</sup> It therefore appears that the skills associated with entrepreneurship education are also sought after in the job market.

## 6.5 Comparisons between studies in 2010 and 2014

In the last part of this chapter, we will compare the GEM study we conducted at the start of our evaluation project in 2010 and the one we conducted in 2014. Much has happened in those four years, but the job market also looked different in 2010, a time when society was in the wake of a financial crisis. We compare the level that younger and older people had when it comes to entrepreneurial skills and entrepreneurial intentions in the two studies, and how entrepreneurship education affected these. We will start by examining how the respondents perceived entrepreneurship education in 2010 and in 2014, respectively. Table 6.6 presents the extent to which respondents in 2010 and 2014 perceived that entrepreneurship education had a practical and theoretical focus.

18. This is also significant when controlling for education, gender, age and occupation in the private sector and in the public sector.

	2010	2014
Learning mostly theoretical	66.2%	63.4%
Learning equally theoretical and practical	23.4%	24.6%
Learning mostly practical	10.4%	12.0%
Total	100%	100%

Table 6.6: Focus of entrepreneurship education in 2010 and 2014.

It seems that respondents in 2014 believed that entrepreneurship education was more practically oriented compared with respondents in 2010. However, this difference is not significant, so from this analysis we cannot conclude that anything remarkable has happened in the teaching of this subject. In table 6.7 below, we examine whether there is a difference in entrepreneurial skills and intentions between young and older people in 2010 and 2014.

		2010	2014
Alertness	15-34 year-olds	4.7%	63.4%
	35-64 year-olds	45.2%	55.7%
Role model	15-34 year-olds	49.1%	37.2%
	35-64 year-olds	40.1%	27.5%
Willing to take risks	15-34 year-olds	56.2%	52.3%
	35-64 year-olds	66.6%	58.5%
Self-confidence	15-34 year-olds	32.9%	25.9%
	35-64 year-olds	46.4%	38.4%
Intention of starting a company	15-34 year-olds	8.7%	10.8%
	35-64 year-olds	7.4%	6.8%

Table 6.7: Difference in entrepreneurial skills and intentions for younger and older people in 2010 and 2014.

As we can see in table 6.7, both younger and older people are more alert towards entrepreneurial opportunities in 2014. This is probably due to the financial crisis, which Denmark was in the wake of in 2010. However, it appears that both younger and older people are less self-confident in 2014, and that there are fewer entrepreneurial role models in their network. The most interesting difference is however that entrepreneurship appears to have become a youth phenomenon. The entrepreneurial intention has risen among younger people and dropped among older people.

We have also examined whether there is a difference in the links between entrepreneurship education and entrepreneurial skills and intentions across the two time periods. The results are presented in table 6.8.

		2010		2014	
		Have received entrepreneurship education	No entrepreneurship education	Have received entrepreneurship education	No entrepreneurship education
Alertness	15-34	52.6%	47.0%	70.3%	60.6%
	35-64	49.6%	43.0%	58.5%	55.0%
Role model	15-34	58.8%	40.9%	47.7%	33.4%
	35-64	52.2%	34.7%	38.1%	25.4%
Self-confidence	15-34	42.9%	24.4%	38.5%	21.6%
	35-64	61.8%	39.4%	52.8%	35.7%
Willing to take risks	15-34	58.2%	54.5%	53.9%	51.6%
	35-64	66.5%	66.6%	57.9%	58.6%
Intention of starting a company	15-34	12.7%	5.7%	16.3%	8.7%
	35-64	10.6%	5.9%	12.1%	5.8%

Table 6.8: Difference in link between entrepreneurship education and entrepreneurial skills and intentions.

There is not a major difference in the links between entrepreneurship education and the variables we studied for the two time periods. The difference in alertness between those who took part and those who did not take part in entrepreneurship education is slightly greater for the young people in 2014; and the difference in self-confidence between those who took part and those who didn't take part in entrepreneurship education is slightly greater for older people in 2010. In both years, those who received entrepreneurship education have approx. double the intention of starting a company, and this applies to both younger and older people.

## 6.6. Final conclusions and limitations

The GEM studies that we conducted in 2010 and 2014 show that entrepreneurship education is closely linked to entrepreneurial skills, intentions and activities. This shows that the results of the GEM study in 2010 are fairly robust. There is not a great difference between the two years, but it is interesting to note that entrepreneurship has become a youth phenomenon as entrepreneurial intentions among young people have grown, whereas these have fallen among older people.

Nevertheless, we must be careful in our interpretation of these comparisons. GEM studies are based on random tests and differences, and may entirely depend on which respondents the survey company managed to convince to participate. As the GEM study is conducted in several countries, it becomes necessary to streamline the questions and also limit their number. This means that we do not have much information about the type of entrepreneurship education they have received and, as the report shows, this does have a major significance on the type of influence the education has. However, were you to compare several years of GEM studies, it would be possible to see a trend of how Denmark has developed within entrepreneurship in recent years.



## 7. Summary and conclusion

This report presents the results of the impact measurement project that we began in 2010. The fact that the project has run over several years has made it possible to create many different analyses, and has thus enabled us to answer many different questions and strengthen our confidence in our results since we have been able to replicate our studies. We have also been able to discard some of the results and explanations that we previously trusted. We have always been convinced that entrepreneurship and entrepreneurial skills are something that can be taught, and that the question is a case of how to best teach the subject at different levels of education and to different groups of pupils and students. But this conviction has often been challenged by people who believe that entrepreneurship has a biological explanation (inherited) rather than a cultural/social one (environment). The study by Anders Hoffman (Danish Business Authority) and Martin Junge (DEA) in chapter 5, which shows that self-employed parents' influence on their children's entrepreneurial attitudes are predominantly determined by culture, is therefore important because it shows that entrepreneurship can be taught.

That entrepreneurship can be explained through social factors is also supported by our analysis results in connection with the GEM studies that we conducted together with professor Thomas Schøtt (SDU) in 2010 and 2014, which are described in chapter 6. When you compare entrepreneurial intentions in the younger population (15-34) and in the older (35-65) in the GEM report in 2010 and in 2014, it is clear that interest in pursuing a self-employed career has increased significantly in the younger part of the population, while it has decreased in the older part. It is therefore apparent that entrepreneurship has become a youth phenomenon. The biological explanation for this would be an increase in the birth of individuals destined to become entrepreneurs, which must be regarded as a rather unsatisfactory explanation.

That entrepreneurship is believed to be a youth phenomenon is further supported by the results in Henrik Barslund Fosse's (Danish Agency for Science, Technology and Innovation) analysis of how start-up activities among graduates have increased in number since the start of the millennium (chapter 4). The number of graduates who start a company after having completed their education has increased by 43% in recent years, and among Master's students the number has increased by 159%. Henrik also shows that these companies exceed other companies in growth. This indicates that these companies have a higher innovation capacity than others, and that they are therefore essential to Denmark's continued growth and international competitiveness. Our longitudinal surveys on secondary level and higher education have increased our understanding of the multiple ways of encouraging entrepreneurial skills through different teaching approaches. However, many questions have been raised, which we would like to discuss further in the final chapter of the report. We would also like to chart the way forward and provide suggestions for future areas of research.

## 7.1 Upper secondary education

The large amount of data that we have gathered over the years has enabled us to conduct multiple analyses. These tests have confirmed our belief in many of our previous results, but have made us doubt some of them too. For example, the results of our cross-section analyses show that teaching *about* and *through* entrepreneurship have many different effects, some of which can work against one another. However, this would be a hasty conclusion to draw. We can only identify associations when we apply cross-section analyses, not causal explanations. What the cross-section analysis shows is that pupils who attend schools that focus on teaching business-related skills typically have a lower commitment to school but higher intentions of becoming an entrepreneur, whereas the opposite applies to pupils in schools with a high focus on teaching enterprising skills.

Our difference-in-difference analysis shows that a rise in teaching through entrepreneurship has a significantly positive effect on pupils' entrepreneurial intentions, and that a rise in teaching about entrepreneurship does not lead to a lower school engagement. However, the result of our cross-section analysis is the exact opposite. And from this we can conclude that the connections we have found in the cross-section analysis must be due to special factors in the schools that focus on teaching through entrepreneurship and in the pupils that typically attend these schools. We have included many control variables to assess this, but apparently there are factors that we have not been able to control for sufficiently.

Our longitudinal analysis clearly shows that pupils who receive entrepreneurship education in year 11 are predominantly young men with a non-academic background (see our analysis in chapter 2, particularly figure 2.3). The analysis shows a negative link between teaching *about* entrepreneurship in year 11 and teaching enterprising skills in year 9. The negative link indicates that at the obligatory school level, enterprising skills (teaching *through* entrepreneurship) are taught in schools where there is a focus on good pedagogy – typically schools with socioeconomically advantaged pupils – but that these socioeconomically advantaged pupils do not continue to an upper secondary education (in year 11) that teaches *about* entrepreneurship. Apparently, teaching *through* entrepreneurship is generally provided at schools where the majority of pupils focus on careers which require a higher education. This result is no surprise. Enterprising skills are required in many different contexts, and it is therefore natural that several schools – even those where pupils typically do not have intentions of becoming self-employed – focus on strengthening these skills. Teaching *through* entrepreneurship can quite simply be considered an example of good teaching/pedagogy. It is our opinion that teaching in enterprising skills, that is, teaching *through* or *for* entrepreneurship, ought to be more widespread in all kinds of schools, also in different upper secondary educations, as all pupils would profit greatly from this kind of education.



It is also interesting to see that the different approaches to entrepreneurship education have many different effects, when pupils move from year 9 to year 10, but almost none when they move from year 10 to year 11, or from year 11 to year 12. This indicates that entrepreneurship education has a greater effect on younger pupils. To get the most out of this kind of education, it should therefore be implemented at an early stage in the education system. We have found that the approach with the greatest effect on pupils is education *for* entrepreneurship targeted at year 10 pupils. There is a significantly positive effect on school engagement in the interaction between teaching that focuses on teaching in business-oriented skills and teaching that focuses on enterprising skills, which shows that when there is a focus on both these categories of skills, the pupils to a greater extent experience their education as meaningful. As shown in chapter 1, there are many reasons to believe that education *for* entrepreneurship will have these effects, because this education typically involves dimensions that have proven to have a very positive effect on motivation, such as task significance, skill variety and task identity. But as our analysis is based on short-term results, it is important to continue gathering data on pupils, because only with access to longitudinal data over a significant number of years can we really assess at what level the teaching approaches *about*, *through* and *for* entrepreneurship are most effective. It should also be noted that in Denmark the majority of pupils change schools between year 9 and year 10, which could be a contributing factor to the results we are seeing. Future studies based on data that span many years will help assess this further.



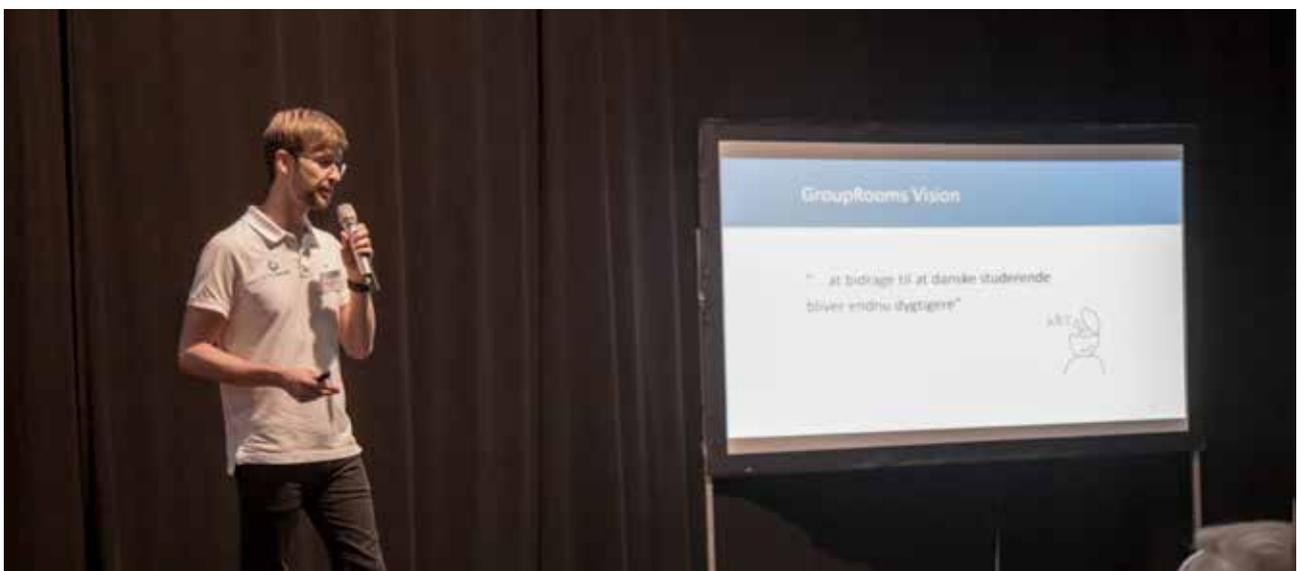
## 7.2 Higher education

On the higher education level, our interest is first and foremost to assess which dimensions in education for entrepreneurship most affect the students' entrepreneurial self-efficacy and entrepreneurial activities. In this study we have focused on assessing the effects of programmes. Compared with our study of pupils at the upper secondary education level, this gives us more information about the specific teaching measures. However, in this study the respondents have not been randomly selected, which poses problems of self-selection, i.e. that there is a specific type of students we work with who have been chosen based on their interest, which then distorts the result of the study. Nevertheless, since we are interested in analysing the short-term results in this study, the problem becomes insignificant because despite the self-selection we still gain an increased understanding of the effects of different dimensions in these kinds of teaching programmes on these kinds of students.

The programmes have been divided in groups according to the degree to which they have focused on involving students' previous contextual knowledge in the teaching process and to what extent the students have been given ownership for their projects. In one group there are thus programmes where the students are the initiators of the entrepreneurial projects, and where they base these projects on their own ideas, knowledge and interests. We have called this approach the "method-oriented approach". In the other group, students were asked to apply the knowledge they had gained in the classroom for innovation projects that take place in established organisations. We have called this approach the "instrumental approach." What these courses have in common is their use of action-oriented and experimental teaching methods. However, their strategies are very different when it comes to encouraging entrepreneurial skills and the extent to which they focus on promoting business-oriented skills and/or enterprising skills.

Our analyses of these courses/programmes show that compared with the instrumental courses, the method-oriented courses have a much greater effect on students' entrepreneurial self-efficacy, especially when it comes to students' belief in their ability to manage ambiguity and marshal resources. The number of students who are in the process of starting a company or who already run a company also increases significantly via the method-oriented courses, whereas for the instrumental courses the opposite is the case. We can moreover see that the method-oriented courses have a transforming effect on students, as their ex ante values in the ESE dimensions we examined only to a very limited extent explain their ex post values. This is not the case with the instrumental courses, which appear to have a very small and incremental effect on the students' entrepreneurial self-efficacy. The results thus indicate that it is more important for the students to have the opportunity to try out their own entrepreneurial ideas and to work in the areas that they are familiar with and which motivate them than to work with start-up projects owned by a third party – even if these projects are more advanced, have a higher level of innovation and have a much greater chance of succeeding.

There are however many more dimensions that are important to analyse and assess the effects of, and many of the programmes that use the instrumental approach to entrepreneurship education could easily and to the benefit of students contain a greater focus on the students' previous contextual knowledge and, based on this knowledge, match the students with the correct existing innovation projects, as well as increase the students' psychological ownership. Thus, there are many interesting options to research. Our results also show that different courses suit different types of students. This is an area that we have only recently started to examine, but which will definitely be interesting to explore further.





### 7.3 The way forward

Even though we have come a long way since we began this project in 2010, we have to say that our studies have raised far more questions than they have answered. We are in the process of conducting studies that will span a long period of time, and the most interesting results still lie in the future. By continuing to follow our respondents, we will be able to assess how well they are coping in their working lives, how many of them have become entrepreneurs, how many of them will work with innovation and renewal, and how well they perform these activities. This will provide us with information about which type of entrepreneurship education pupils and students should be offered and at which level of education it should take place.

However, there are also many interesting questions to investigate in the short term. In light of the distortion that typically occurs in entrepreneurship education, because pupils can choose based on their interests, it will still be necessary to conduct further studies based on random controlled trials (RCT) methodology. When we can provide entrepreneurship education based on a random selection of pupils, we will obtain much more reliable results and thereby gain the opportunity to assess how the education affects the numerous different types of pupils and students. This type of research is naturally very hard to implement in an educational context, but considering the importance of such questions, we need to strive to only use the most thorough methods when conducting educational evaluations and research in this area.

The increased use of IT tools in teaching also provides interesting research and methodological opportunities. There are many ways of teaching *about*, *through* and *for* entrepreneurship in an online format, and this is an area we need to study the

effects of. When courses are digital, it will be easy to build large quantities of data and to many answer questions about the process, and how the process affects learning - which requires ongoing data collection rather than pre and post data. This form of ongoing data collection could also take place in and outside the classroom. What researchers used to achieve using a notepad and pager (see e.g. Csikszentmihalyi & Larson, 1984) can now be done using mobile phone apps. This would enable the identification of interesting dimensions in teaching processes, and how these relate to motivation and learning. It could also open up the opportunity for giving formative evaluation on a pupil-teacher basis (see LoopMe as an example).

In order to achieve a more widespread use of assessment tools, it is important that the results are accessible, understandable and usable for users. In the Danish Foundation for Entrepreneurship we are currently working on developing an app for mobile phones, which will give teachers and users the opportunity to assess how their teaching initiative affects their pupils' and students' entrepreneurial intentions, attitudes and self-efficacy, and also how to measure the more education-related variables such as school engagement, relationship with classmates and teachers, and motivation for education. In this app, the analysis will be automated and will therefore not require any expertise in statistics to understand the results. By thus crowdsourcing the data we need for creating evaluation studies of entrepreneurship education, we will be able to find the answers to many of the questions that have until now remained hidden to researchers who have been limited by their research design and the questions they could focus on.



## Appendix A

### Entrepreneurial Self-efficacy (completely disagree = 1, completely agree = 7)

#### Creativity

*I am able to...*

- Find new ways of doing things
- Brainstorm / find new ideas
- Think out of the box

#### Planning

*I am able to...*

- Manage time in projects
- Prepare an effective project plan to reach targets
- Set up and reach project targets

#### Financial understanding

*I am able to...*

- Read and understand calculations and budgets
- Control project costs
- Assess the budget for a new project

#### Handling ambiguity

*I am able to...*

- Work effectively under stress, pressure and conflict
- Tolerate unexpected change
- Manage ambiguity in projects and processes

#### Organising resources

*I am able to...*

- Form partnerships in order to achieve specific goals
- Network (i.e. create contact and exchange information with others)
- Put together the right team to solve a specific problem

### Entrepreneurial social capital (completely disagree = 1, completely agree = 7)

- I know many people who would be useful if I wanted to start a company.
- Many in my network are interested in entrepreneurship.
- Many in my network have the right contacts, if I wanted to start a company.
- I would be able to borrow a large sum of money from my network.
- I would receive excellent support from my network, if I wanted to start a company.
- I can create a good start-up team with people from my network.

#### Entrepreneurial attitudes

*Generally, starting a company is...*

- 1=Worthless, 7=Valuable
- 1=Disappointing, 7=Enriching
- 1=Negative, 7=Positive

### Entrepreneurial intentions (completely disagree = 1, completely agree = 7)

#### -Primary and upper secondary education level

- I would like to start a company.
- I would rather be self-employed than employed.
- A career as self-employed would suit me.

### Entrepreneurial intentions (completely disagree = 1, completely agree = 7)

#### -Higher education level

- I am seriously considering starting my own company.
- I have prepared to start my own company.
- I will work hard to start my own company.

**Basic self-assessment - Positive****(completely disagree = 1, completely agree = 7)**

- I am certain that I will get the success I deserve in life.
- Whatever I try I usually succeed.
- I complete tasks successfully.
- Overall I am satisfied with myself.
- I decide what happens in my life.
- I can handle most of my own problems.

**Basic self-assessment - Negative****(completely disagree = 1, completely agree = 7)**

- Sometimes I feel depressed.
- Sometimes I feel worthless when I don't succeed.
- Sometimes I don't feel in control of what I'm doing.
- I am full of doubt about my skills.
- I don't feel that I am in control of whether I am successful with my tasks.
- Sometimes I think that life can look fairly bleak and hopeless.

**Teaching with a focus on enterprising skills****(completely disagree = 1, completely agree = 7)**

*In school...*

- I have been taught to think innovatively
- I have been taught to find new ideas
- I have been taught to turn ideas into action
- I have been taught to create new activities.

**Teaching with a focus on business-oriented skills****(completely disagree = 1, completely agree = 7)**

*In school...*

- I have been taught to create a company
- There is a focus on the entrepreneur's role in society
- I have been taught to evaluate a business idea
- I have been taught how to become a self-employed business owner.

**Practice-based teaching****(completely disagree = 1, completely agree = 7)**

*In school...*

- Pupils are encouraged to actively take part in lessons
- There is a focus on learning from your mistakes
- There is a focus on it being more important to do things

rather than tell about them

- There is a focus on using what I have learned for practical tasks
- I have worked with the same task in several subjects
- I have worked with the local business community

**Perceived teacher support****(completely disagree=1, completely agree=7)**

- My teachers give me options during lessons.
- I feel that my teachers understand me.
- My teachers believe that I can do well at school.
- My teachers encourage me to ask questions.
- My teachers listen to how I would like to do things.
- My teachers try to understand how I look at things before they suggest new ways of doing them.

**Inner motivation****(completely disagree=1, completely agree=7)**

- I ask questions in lessons because I want to learn new things.
- I do extra work to learn about things that interest me.
- I read texts in school because I am interested in what they are about.
- I work hard because I really want to learn new things.
- I work on problems/tasks to learn how to solve them.

**Outer motivation****(completely disagree=1, completely agree=7)**

- I read texts because my teacher wants me to.
- I do my homework because the teachers tell me to.
- I solve problems/tasks because I have to.
- I ask questions so that the teacher will notice me.

**School engagement****(completely disagree=1, completely agree=7)**

- I work hard in school.
- I enjoy school.
- I am often bored in school.
- I do well in school.
- I feel good about myself when I am in school.
- It is important for me to do well in school.

**Connectedness to peers****(completely disagree = 1, completely agree = 7)**

- My classmates often annoy me.
- I like pretty much everyone in my class.
- I like working with my classmates.
- I get on well with others in my class.
- My classmates like me.
- I rarely argue or fight with others at school.

**Connectedness to self****(completely disagree = 1, completely agree = 7)**

- I can name 5 things that others like about me.
- There is not much that is unique or special about me.
- I can name 3 things that others like about me.
- I like myself.
- I have special hobbies, skills or talents.
- I have special interests or skills that make me interesting.

**Connectedness to the future****(completely disagree = 1, completely agree = 7)**

- I will have a good future.
- If I do well at school, it will help me in the future.
- I do things outside school to help me prepare for my future.
- I do a lot of things outside school to help me prepare for my future.
- I often think about my future.
- What I do now will affect my future.

**Enterprising behaviour**

- How many different activities do you take part in outside school? For example: sport, culture, politics, outdoor life.
- Have you managed or been the leader of an activity or project outside school?
- Have you started an activity or project outside school?

## Appendix B

### Confirmatory factor analysis (CFA)

*Model fit indices:* According to Hu & Bentler (1998, 1999) CFI and TLI must be >.90 and RMSEA and SRMR < .08 to show a sufficient model fit, but if the model has to have a good model fit, the CFI and TLI must >.95 and RMSEA and SRMR must be <.06.

### Weak and strong factorial invariance

According to Cheung & Rensvold (2002), the CFI should not be changed by >.01, when adding limitations.

A *weak factorial* invariance is tested when you force the indicators to load in the same way for different groups or over time.

A *strong factorial* invariance is tested when you force the indicators' intersection point values to be the same for different groups or over time.

### Fornell & Larcker test

Composite reliability (CR) tests the internal conception for a construct and replaces Cronbach Alpha tests in SEM models.

According to Fornell and Larcker (1981) Composite reliability is achieved if the squared sum of the standardised loadings is divided by the squared sum of the standardised loadings plus the sum of error terms becomes higher than .70.

$$[\text{sum}(A)]^2 / [[\text{sum}(A)]^2 + \text{sum}(B)]$$

A=the standardised loadings for the indicators for a particular latent construct

B=the corresponding error term, where error is 1 minus the square of the indicator loading

*Convergent validity* is a stronger test than composite reliability, as it is not affected by the number of indicators included in the construct. This test is based on average *variance extracted* (AVE), which can be translated using a variance for the indicators, which is explained by a common factor. According to Fornell and Larcker (1981), AVE must be >.50 to show convergent validity, and it must be higher than  $\sqrt{\phantom{x}}$  of the construct's highest co-variant with other constructs in order to show *divergent validity*.

$$\text{AVE} = [\text{sum}(A^2)] / [\text{sum}(A^2) + \text{sum}(B)]$$

A=the standardised loadings for the indicators for a particular latent construct

B=the corresponding error term, where error is 1 minus the square of the indicator loading

### Cross-sectional analysis - CFA

Group:

Year 9 pupils, born 1997 and 1998 (n=1446)

Year 10 pupils, born 1996, 1997 and 1998 (n=1465)

Year 11 and year 12 pupils, born 1997 and 1998 (n=998)

**Tests for weak and strong factorial invariance**

CFA configural: CFI: .982, TLI: .976, RMSEA: .043(.040;.046), SRMR:.031,  $\chi^2=813.49(240)$

CFA weak: CFI: .980, TLI: .976, RMSEA: .043(.040;.046), SRMR:.036,  $\chi^2= 878.17 (260)$ , 'CFI: .002 = passed

CFA strong: CFI: .979, TLI: .976, RMSEA: .043(.040;.046), SRMR:.036,  $\chi^2= 948.34 (280)$ , 'CFI: .001 = passed

*Fornell & Larcker (based on a model with restrictions on strong factorial invariance)*

Year 9 pupils	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.*
Business-oriented skills	.76	.87	.76	.84	.64	.51(.26)
Action-oriented skills	.77	.87	.76	.84	.64	.51(.26)
School engagement**	.64	.71	.74	.74	.49	.62(.38)
Perceived teacher support**	.78	.76	.87	.85	.64	.62(.38)
Entrepreneurial intentions	.79	.90	.93	.91	.77	.09(.008)
Year 10 pupils	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.*
Business-oriented skills	.78	.85	.80	.85	.66	.45(.20)
Action-oriented skills	.82	.91	.78	.88	.70	.46(.21)
School engagement**	.68	.70	.72	.74	.49	.56(.31)
Perceived teacher support**	.80	.76	.72	.80	.58	.56(.31)
Entrepreneurial intentions	.82	.91	.94	.92	.80	.12(.014)
Year 11 and year 12 pupils	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.*
Business-oriented skills	.87	.89	.89	.91	.78	.44(.19)
Action-oriented skills	.86	.94	.81	.90	.76	.46(.21)
School engagement**	.70	.69	.74	.75	.51	.60(.36)
Perceived teacher support**	.78	.77	.86	.85	.65	.60(.36)
Entrepreneurial intentions	.85	.94	.95	.94	.84	.19(.04)

\* Construction's highest co-variant squared.

\*\* The six indicators in school engagement are and perceived teacher support are packaged two and two. The one with the highest loading is packaged together with the one with the lowest loading etc. See Little og kolleger (2002) for a description.

**Longitudinal SEM (n=287)****Tests for weak and strong factorial invariance**

CFA configural: CFI: .968, TLI: .959, RMSEA: .041(.035;.047), SRMR:.044,  $\chi^2=728.48(492)$

CFA weak: CFI: .966, TLI: .958, RMSEA: .041(.035;.047), SRMR:.047,  $\chi^2= 758.25 (508)$ , 'CFI: .002 = passed

CFA strong: CFI: .963, TLI: .955, RMSEA: .043(.037;.049), SRMR:.048,  $\chi^2= 797.67 (524)$ , 'CFI: .03 = passed

Period 1	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.*
Business-oriented skills	.74	.86	.81	.85	.65	.53(.28)
Action-oriented skills	.76	.89	.78	.85	.66	.53(.28)
School engagement**	.70	.74	.81	.80	.57	.34(.12)
Entrepreneurial intentions	.82	.91	.80	.88	.71	.14(.02)
Period 2	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.
Business-oriented skills	.76	.85	.82	.85	.66	.49(.24)
Action-oriented skills	.82	.91	.79	.88	.71	.49(.24)
School engagement**	.69	.76	.73	.77	.53	.15(.02)
Entrepreneurial intentions	.86	.92	.97	.94	.84	.17(.03)
Period 3	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.
Business-oriented skills	.85	.91	.87	.91	.77	.43(.19)
Action-oriented skills	.86	.93	.82	.90	.76	.43(.19)
School engagement**	.70	.65	.73	.74	.48	.15(.02)
Entrepreneurial intentions	.86	.92	.96	.94	.84	.39(.15)

*Fornell & Larcker (based on a model with restrictions on strong factorial invariance)*

\* Construction's highest co-variant squared.

\*\* The six indicators in school engagement are and perceived teacher support are packaged two and two. The one with the highest loading is packaged together with the one with the lowest loading etc. See Little og kolleger (2002) for a description.





### Difference-in-Difference

#### *Internal consistency*

The Cronbach's Alpha value should be  $>.70$  to show internal consistency (Nunnally, 1978)

Years 9-10	CA		
	T1	T2	Total
Connectedness to self	0.802	0.810	0.806
School engagement	0.775	0.797	0.785
Connectedness with classmates	0.709	0.713	0.711
Connectedness to the future	0.727	0.696	0.712
Perceived teacher support	0.824	0.840	0.832
Teaching focus on business-oriented skills	0.836	0.885	0.865
Teaching focus on enterprising skills	0.858	0.877	0.867
Basic self-assessment - positive	0.808	0.796	0.802
Basic self-assessment - negative	0.819	0.840	0.830
Entrepreneurial intentions	0.906	0.924	0.916
General attitudes to entrepreneurship	0.877	0.831	0.853
Inner motivation	0.784	0.788	0.786
Outer motivation	0.645	0.637	0.639
Action-based teaching methods	0.678	0.714	0.698

Years 10. 11. and 11.-12.	CA		CA
	T1	T2	Total
Connectedness to self	0,817	0,815	0,815
School engagement	0,774	0,807	0,793
Connectedness with classmates	0,712	0,643	0,678
Connectedness to the future	0,707	0,721	0,712
Perceived teacher support	0,852	0,855	0,854
Teaching focus on business-oriented skills	0,852	0,919	0,895
Teaching focus on enterprising skills	0,874	0,897	0,886
Basic self-assessment - positive	0,760	0,816	0,791
Basic self-assessment - negative	0,833	0,865	0,851
Entrepreneurial intentions	0,931	0,945	0,938
General attitudes to entrepreneurship	0,823	0,838	0,821
Inner motivation	0,796	0,796	0,796
Outer motivation	0,662	0,657	0,658
Action-based teaching methods	0,737	0,659	0,698





## Appendix C

See Appendix B for a description of the confirmatory factor analysis, tests of factorial invariance and the Fornell and Larcker test.

### Weak and strong factorial invariance

The analysis includes the control groups (n=133), the Instrumental group (n=1-7) and the Method-oriented group (n=236)

CFA configural: CFI: .939, TLI: .923, RMSEA: .055(.049;.060), SRMR:.082,  $\chi^2=1544.22(1047)$

CFA weak group: CFI: .937, TLI: .924, RMSEA: .054(.049;.060), SRMR:.093,  $\chi^2= 1597.41 (1087)$ , 'CFI: .002 = passed

CFA weak group & time: CFI: .936, TLI: .924, RMSEA: .055(.049;.060), SRMR:.095,  $\chi^2= 1615.71 (1097)$ , 'CFI: .003 = passed

CFA strong: CFI: .934, TLI: .924, RMSEA: .054(.049;.060), SRMR:.076,  $\chi^2= 1668.68 (1135)$ , 'CFI: .02 = passed

Control period 1	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant*
Creativity (ESE)	.76	.72	.78	.80	.57	.65(.42)
Business-oriented (ESE)	.80	.69	.75	.79	.56	.65(.42)
Enterprising (ESE)	.84	.81	.78	.85	.66	.62(.38)
Entrepreneurial social capital	.92	.67	.79	.84	.64	.39(.15)
Entrepreneurial intentions	.96	.77	.84	.89	.74	.43(.19)
Control period 2	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.
Creativity (ESE)	.84	.71	.68	.79	.56	.66(.44)
Business-oriented (ESE)	.87	.79	.69	.83	.62	.50(.25)
Enterprising (ESE)	.71	.60	.73	.72	.47	.66(.44)
Entrepreneurial social capital	.89	.81	.69	.84	.64	.36(.13)
Entrepreneurial intentions	.97	.76	.83	.89	.74	.46(.21)
Instrumental period 1	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.
Creativity (ESE)	.90	.74	.73	.84	.63	.52(.27)
Business-oriented (ESE)	.72	.72	.56	.71	.45	.67(.45)
Enterprising (ESE)	.74	.68	.77	.77	.53	.67(.45)
Entrepreneurial social capital	.80	.86	.84	.87	.70	.62(.38)
Entrepreneurial intentions	.99	.84	.84	.92	.80	.32(.10)
Instrumental period 2	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.
Creativity (ESE)	.79	.59	.67	.73	.47	.71(.50)
Business-oriented (ESE)	.93	.72	.62	.81	.59	.52(.27)
Enterprising (ESE)	.74	.75	.82	.81	.59	.71(.50)
Entrepreneurial social capital	.83	.87	.84	.88	.72	.56(.32)
Entrepreneurial intentions	.96	.72	.81	.87	.70	.43(.19)
Method period 1	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.
Creativity (ESE)	.90	.71	.57	.78	.55	.58(.34)
Business-oriented (ESE)	.87	.77	.76	.84	.64	.68(.46)
Enterprising (ESE)	.81	.75	.73	.81	.58	.68(.46)
Entrepreneurial social capital	.81	.78	.74	.82	.60	.50(.25)
Entrepreneurial intentions	.92	.79	.79	.87	.70	.37(.14)
Method period 2	Question 1	Question 2	Question 3	CR	AVE	Highest Co-variant.
Creativity (ESE)	.85	.73	.57	.77	.53	.61(.37)
Business-oriented (ESE)	.88	.69	.72	.81	.59	.70(.49)
Enterprising (ESE)	.75	.68	.73	.76	.52	.70(.49)
Entrepreneurial social capital	.78	.88	.82	.87	.69	.51(.26)
Entrepreneurial intentions	.94	.79	.81	.89	.72	.43(.19)

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