The influence of student characteristics on perceived learning activities and learning environment in the context of entrepreneurship education

Thesis report

R.D. van Hien
901119338080
MSc Thesis (ECS-80424)
Supervisor: Dr. Ir. T. Lans
Co-supervisor: Dr. V. Blok
January 2014

WAGENINGEN UR
For quality of life

Author: Rosaline van Hien
901119-338-080
rosaline.vanhien@wur.nl

Title: The influence of student characteristics on perceived learning activities and learning environment in the context entrepreneurship education

Subtitle: Thesis report

Course: Minor MSc Thesis (ECS-80424)

Supervisor: Dr.ir. T. Lans (Education and Competence Studies)
Thomas.lans@wur.nl

Co-supervisor: Dr. V. Blok (Management Studies)
Vincent.blok@wur.nl

School: Wageningen University

Department: Education and Competence Studies Group

Location: Wageningen

Date: 14 January 2014

WAGENINGEN UR
For quality of life

Preface and acknowledgments

This report is the end product of my minor thesis, conducted at the chair group Education and Competence Studies of Wageningen University. During my Master programme Animal Sciences I wanted to broaden my horizon, so I opted to take courses and perform a minor thesis at the chair group of Education and Competence Studies. I really and truly appreciate many people who helped me with during this project.

By means of previously collected data at Van Hall Larenstein and data collection this year at Van Hall Larenstein through a survey, the relationships between student characteristics and specific learning activities and learning environments within entrepreneurship education was investigated.

During this process, I was assisted and supported by many different people. I would therefore like to thank these people by this route. Without the help and support of these people this rapport would not have been realized and I would not be able to complete this project successfully.

Firstly, I would like to thank my supervisor Thomas Lans of the chair group Education and Competence Studies Group. He assisted me through the process whenever I would get stuck or had questions. With his insight, knowledge and feedback he helped me throughout this project to make it a success. In addition, I was able to partake in a large scale project and conduct the survey, which was conducted at my former university of applied science: Van Hall Larenstein.

Furthermore, I had the opportunity to exchange ideas and thoughts with people who were working on the same kind of research. Therefore, I would like to thank Lisa Ploum, Anne Khaled and Suzanne de Bruijn.

I also really appreciate that I could count on the secretariat of the chair group to make sure I had enough surveys to take along to VHL Leeuwarden and VHL Wageningen. For copying and preparing the survey my thanks go to Nicolette Tauecchio and Jolanda Hendriks-Ruisbroek.

During the data collection at Van Hall Larenstein, I was always warmly received by the contact persons, Jan Hania (VHL Leeuwarden) and Rien van der Velde (VHL Wageningen), and in addition the teachers that allowed me to conduct the survey during their lessons were all enthusiastic and interested in my research.

With this study to the relationships between student characteristics and specific learning activities and specific learning environments within entrepreneurship education, it will increase the insight into which factors can be influenced to improve the effectiveness of entrepreneurship education within higher education.

Rosaline van Hien

Ede, January 2014

Content

Appendices:

Summary

Entrepreneurship education becomes more and more important in The Netherlands and in Europe, where Van Hall Larenstein (VHL), an university of applied science in The Netherlands, has incorporated entrepreneurial learning in their study curriculum. It is meant as a stimuli to think about an entrepreneurial future and to increase the entrepreneurial intentions of the students. However, even though entrepreneurship education is said to be important, little research has been done on the student factors that influence entrepreneurial learning.
Within this study the relations between given student characteristics, specific learning activities and specific learning environments were studied through means of a literature study and a survey amongst students of Van Hall Larenstein. Within this study the theoretical notion of authentic learning environment was used to get insight into the relationships.

The investigation of the relationships has been carried out by means of a literature study and through a structured survey conducted at Van Hall Larenstein. The survey was conducted between 2011 and 2013, where different students were asked to fill out the survey every year. The sample used consist out of 452 students of Van Hall Larenstein, which were not completely randomly sampled, since participation was on the basis of willingness. The survey was conducted at Van Hall Larenstein, where teachers made time during their lessons to increase fill out rate.

The data was prepared for analysis by factor analysis (with the use of varimax analysis) and reliability analysis in order to produce several components for learning activities and learning environments. For learning activities the components “developing an entrepreneurial mindset” and “engaging in business projects” were established from different questions about learning activities. The learning environment components in this study are “a learning environment supporting creativity and new ideas” and “a learning environment supporting entrepreneurial learning process”.

Through descriptive statistics, correlation analysis and regression analysis the gathered data was analysed. The top 4 of learning activities that were indicated the most by students as much and very much present during their study time were guest lectures, company excursions, presenting and performing group work with students from other Van Hall Larenstein studies. On the other hand, the learning activities that were less often stated as most present were networking with entrepreneurs, coaching by entrepreneurs, student companies and interacting with entrepreneurial clubs and societies.
Learning activities that were focused on developing an entrepreneurial mindset were influenced by the student’s study year, the student’s study location and their entrepreneurial self efficacy. Contrary to learning activities focused on developing an entrepreneurial mindset, the learning activities focused on engaging in business projects was not explained by the study location of students. However, learning activities focused on business projects were mostly explained by study programme, next to student’s study year and their self efficacy.

Self efficacy and study year were factors that influence both learning activity components used in this study. Where a first year student might have experienced less entrepreneurial learning activities than a senior student. Furthermore, a higher self efficacy, resulting in a stronger believe in the ability of starting an own business, increases the experience and recognition of certain learning activities.

The top 4 of learning environments experienced most often by students of Van Hall Larenstein according to the survey were that students are stimulated to learn by doing, that new ideas get positive feedback, that there is room for change/ improvement and that students are stimulated to learn from mistakes or crisis. On the other hand, learning environments that were less often

experienced by the student were that teachers stick to safe and approved practices, emotional well-being of students is important and notices, negative reactions can be expected when exact course instructions are not followed and students are stimulated to take (calculated) risks.

It became clear that the learning environment that is related to creativity and new ideas was only being influenced by the study location of the students, where a learning environment supporting the entrepreneurial learning process was being influence by the student's study location, study programme, entrepreneurial parents and their entrepreneurial attitude.
It became apparent that the learning activities that Van Hall Larenstein applies for entrepreneurship education are focused on real-life settings within the safe environment of Van Hall Larenstein itself. These learning environments are mainly initiated by Van Hall Larenstein itself. The learning environments that are mostly present are in line with the strategy of Van Hall Larenstein.

VHL operates through three locations in The Netherlands, where Van Hall Larenstein Wageningen and Van Hall Larenstein Leeuwarden participated in this study. Apparently, differences exist in learning environment according to the students. More insight in these differences can help understand this relationship.

The current findings add to a growing body of literature on entrepreneurship education, especially in the field of presage and process factors within entrepreneurship education. Better insight has been obtained about the relationships and interactions between student characteristics, specific learning activities and specific learning environments, where entrepreneurship education at Van Hall Larenstein can be adapted in order to increase the entrepreneurial outcomes of entrepreneurship education.

Introduction

In The Netherlands, the ministries of Economic Affairs, Education, Culture and Science, and Agriculture, Nature and Food Quality have been favouring entrepreneurship education since 2000. Through different programmes, the Dutch government provides specific subsidies to educational institutions to assist in integrating entrepreneurship into their educational programmes. The Dutch government's objective is to increase students' entrepreneurial mindset and behaviour, and by that raise the number of new business start ups within five years after graduation *(Eurydice network, 2012)*. Similarly, the European Union has set up the 2020 strategy which also shows the importance of creativity, innovation and entrepreneurship within education. It also presents actions to unleash Europe's entrepreneurial and innovative capabilities *(Gibcus, 2012).*

The Dutch government has been promoting entrepreneurship education within educational institutions in The Netherlands. Within Van Hall Larenstein (VHL), a university of applied science in The Netherlands, entrepreneurial learning is part of the study curriculum of the students.
It is meant as a stimuli to think about an entrepreneurial future and to increase the entrepreneurial intentions of the students. VHL in particular focuses its curriculum on fostering sustainable entrepreneurship. The demand for creative and innovative entrepreneurs is rising rapidly, there is a scarcity of young capable entrepreneurs *(European Commission, 2013)*. Sustainable entrepreneurs that create new means of creating environmental, social and financial value are needed to increase sustainable development in the European Union. The European Union also acknowledges the need for these entrepreneurs and promotes entrepreneurial learning in all the EU countries.

Although Europe and the United States consider entrepreneurship learning as important (*von Graevenitz, 2010)*, little research has been done on the educational factors that influence entrepreneurial learning, e.g. student characteristics, learning environment and learning activities *(Biggs, 1993)*.
Different scholars have already studied entrepreneurship education and the effect on the learning outcomes *(Matlay, 2008; Jack et al., 1999; Fayolle et al., 2006 etc.)*, but less research has been done on presage and process factors and the interactions that might happen along the way *(Biggs, 1993)*. *Von Graevenitz (2010)* reported that the effects arising from entrepreneurial learning are still poorly understood.

To improve the effectiveness of entrepreneurship education, insight is needed into the important learning presage factors, process factors and intended outcomes *(Biggs, 1993)*, in particular student characteristics, learning activities and learning environment factors *(Biggs, 1993)*.

This study contributes to the field of entrepreneurship education by investigating the relationships between students characteristics, specific learning activities and specific learning environments. With these insights and a better understanding of entrepreneurship education, the entrepreneurship education within Van Hall Larenstein in The Netherlands can be adapted in order to increase the entrepreneurial outcomes of the programme. Furthermore, it can contribute to the total entrepreneurial education knowledge on how to provide students with a curriculum, which includes entrepreneurial learning, that creates the most efficient outcomes.

This study will give a closer look at those factors, through a survey conducted at a university of applied Sciences in The Netherlands, which is Van Hall Larenstein (VHL). In order to do so, we used *De Corte's (1990)* theoretical notion of powerful learning environments. Powerful learning environments are environments which focus on achieving the development of complex skills and

understanding . From this theory, authenticity is the key concept that was used in this study to gain more insight into the factors that influence entrepreneurial learning.

Within this study the focus will be on the relation between:

- Student characteristics and specific learning activities in entrepreneurship education;
- Student characteristics and specific learning environments in entrepreneurship education.

In order to achieve the set objective, "To identify the relations between student characteristics, learning activities and learning environments in entrepreneurship education, by considering relevant theories, and by using a survey conducted at Van Hall Larenstein (university of applied science in The Netherlands).", the following research questions where drawn up:

1. What is the relation between specific learning activities and student characteristics in entrepreneurship education,
   According to the literature?
   According to student questionnaire?
   a. What kinds of entrepreneurship learning activities does VHL apply in order to facilitate entrepreneurship education/ entrepreneurship thinking?
   b. What is the relation between entrepreneurship student characteristics and specific learning activities they participate in?

2. What is the relation between learning environment and student characteristics in entrepreneurship education,
   According to the literature?
   According to student questionnaire?
   a. To what extent do students of VHL perceive their learning environment as entrepreneurial?
   b. What is the relation between entrepreneurship student characteristics and their perception of specific elements of the learning environment at VHL?

Within this research report, first a literature review is presented, including entrepreneurship education and authentic learning environments. Furthermore, attention is paid to the design and execution of the research, where the analysis of data is explained in more detail.
The results of the research, per research question, will be presented in chapter 3. Hereafter, the results will be discussed in the light of previous studies, shortcomings of the study and interpretation of the results. Eventually, the conclusion of the research can be found in chapter 5. In the final chapter the limitations and recommendations for future research and education are presented.

1. Theory

In order to answer some of the research questions stated previously, a literature review was conducted. Through the use of different scientific articles and journals information is gathered.

1.1 Entrepreneurship education

Within this study the focus is on entrepreneurship education. In recent years the focus on entrepreneurship has risen in the European Union and with that the amount of entrepreneurial activities, courses and classes focussed on entrepreneurship have also increased.

1.1.1 Entrepreneurship education: A definition

There is no strong and precise agreement among researchers, teachers and practitioners what entrepreneurship education entails *(Fayolle et al., 2006[1]).* Within this research the definition of *Fayolle et al. (2006[1])* is used: *"Any pedagogical programme or process of education for entrepreneurial attitudes and skills, which involves developing certain personal qualities".* Entrepreneurship has gotten more important over the last two decades and with that also entrepreneurship education has gotten a boost. Entrepreneurship can be seen as an important economic attribute.

Important to acknowledge is the fact that entrepreneurship is not merely about creating a new business, but is about creativity, innovation, risk-taking and about creating solutions *(Kuratko,2005)*.

The Global Entrepreneurship Monitor (GEM) (2008) concluded that the importance for entrepreneurship is important for economic development. The GEM (2008) states that entrepreneurs increase innovation, advance structural change within the economy and stimulate other businesses to improve.

The perception used to be that entrepreneurs were born and that entrepreneurship couldn't be taught *(Kuratko, 2005)*. Nowadays it is acknowledged that certain parts of entrepreneurship can be taught, when provided with the appropriate learning environment *(Gibb, 2005; Kuratko, 2005)*. *Drucker (1985)* mentioned that entrepreneurship was nothing mysterious or magical and that it all comes down to discipline and like any discipline could be learned. In practice, this means that one should have an eye for opportunities, be proactive, risk-taking, creative and self-directed *(Neck et al., 1999).*
According to *Gorman et al. (1997)*, "most of the empirical studies indicated that entrepreneurship can be taught, or at least encouraged, by entrepreneurship education". Entrepreneurship education can for example stimulate people to think about entrepreneurship and extend their knowledge. Entrepreneurship education can influence behaviour and attitudes of students *(Foyelle et al., 2006)*.

In recent years the number of programmes focused on entrepreneurship has grown *(Katz, 2003)*, but it not always results in active entrepreneurial intentions *(Kuratko, 2005; Matlay et al., 2007)*. According to *Packham et al. (2010)* this is because of the curriculum used to teach entrepreneurship education and the focus on lecturing.

Gibb (1999) presented three main objectives for effective entrepreneurship education. The first is the development of a broad sense and understanding of entrepreneurship. Next is the acquisition of an entrepreneurial attitude. Thirdly, students need to know how to launch and manage a (new) business in an successful way.

Within Van Hall Larenstein entrepreneurship education is included in the study curriculum of the students. It is meant as a stimuli to think about an entrepreneurial future and to increase the

entrepreneurial intentions of the students. In Europe the number of course focused on entrepreneurship education, in all types of study programmes, has increased in recent years *(European Commission, 2008)*.
Within this study the main focus within entrepreneurship education will be on the learning activities and the learning environments within entrepreneurship education.

1.1.2 Presage, Process and Product: Systems model

Entrepreneurship education consists of different elements which are interacting with one another. Many educational factors can affect learning, like teachers, students, teaching contexts etc. *(Biggs, 1993)*. Biggs *(1993)* described a 3P model (presage, process and product factors), based on the systems theory, which gives an overview of the different elements within an educational setting and the possible interaction between them. Within this model there is a distinction between presage elements, process elements and product elements. A linear movement from presage to process to product is present, but along the way each component can interact with the other to reach an equilibrium (see figure 1).

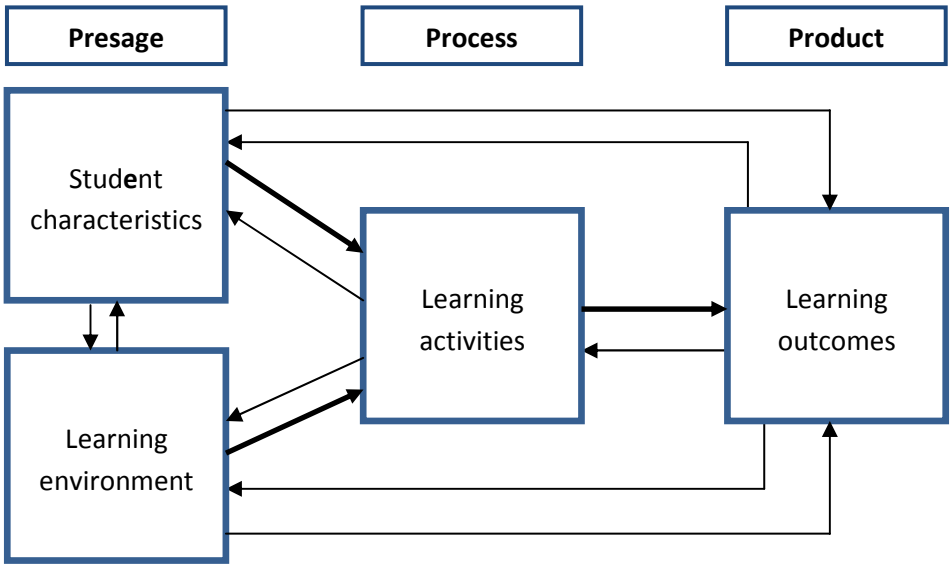

Figure 1. 3P model of classroom learning *(Adapted from Biggs (1993)*

Within this study the main focus is on the first two P's, presage and process, within the model of Biggs *(1993)*. Different scholars have already studied entrepreneurship education and the effects on the learning outcomes *(Matlay, 2008; Jack et al., 1999; Fayolle et al., 2006 etc.)*, but less research has been done on presage and process factors and the interactions that might happen along the way.

Presage: Student characteristics

The first presage factor in the model is student characteristics. It is stated that student characteristics are quite stable and include prior knowledge, abilities, values and expectations with regard to achievement, approaches to learning, motivation, study skills, work habits, perceived self-efficacy, social and cultural factors *(Dart et al., 2000)*.

Presage: Learning environment

The second presage factor within the model is learning environment (teaching context), which includes attitude of learning and teaching, teaching style, teacher personality, classroom climate, curriculum, difficulty of task, assessment procedures, time available, freedom allowed, resource materials and so on *(Dart et al., 2000; Biggs, 1993)*.

Learning environment can be defined as "An individual's socially mediated beliefs about the opportunities to learn and the extent to which the social and physical milieu constrains learning" *(Lorsbach et al., 1999)*. It is the sum of the internal and external circumstances, influences surrounding and affecting a person's learning. Learning environments are personal, but the environment is dictated by actions of others in the social setting and characteristics of the culture in which learning is situated. Learning environments are restricted by past events, what typically happened and what has happened in the past can shape expectations of students with regard to what should happen *(Lorsbach et al., 1999)*.

Wilson *(1996)* states that having an environment where students have the possibility to explore, set goals and plan learning activities is a likeable concept of a learning environment, where guidance and support are likewise important.
Properties of a learning environment include e.g. interpersonal relationships among students, relationships between students and their teacher, relationships between the students and the subject they are studying and the method of learning. Also the perception of students of the class itself is part of the learning environment *(Fraser, 1982).*

An entrepreneurial approach towards learning can be accomplished by creating a learning environment in which individuals can experience the key aspects of the 'way of life' of an entrepreneur *(Gibb, 2002).* Acquiring entrepreneurial skills and attitudes needs to have an active learning environment *(Gibb, 1997).*

Process: Learning activities

The process factor within our model is learning activities. According to Biggs *(1993)* process factors are a result of student and teaching context interactions. The process factors include the way students handle specific learning assignments, which can be divided into deep approach, surface approach and achieving approach *(Biggs, 1987)*, see table 1.

Table 1. Subscales within the learning process (adapted from Biggs, 1987)

Subscale	Description
Surface approach:	
Surface motives	Main aim is to gain qualifications at minimum allowable standard
Surface strategy	Strategy is to reproduce bare essentials using rote learning
Deep approach:	
Deep motive	Motivation is interests in subject and it related areas
Deep strategy	Strategy is to understand what is to be learnt through inter-relating ideas and reading widely
Achievement approach:	
Achievement motive	Motivation is to obtain highest possible grades, ego enhancement
Achievement strategy	Strategy is highly organized and designed to achieve high marks by being a 'model' student, e.g., being punctual, doing readings, etc.

The deep approach is in line with constructivist teaching, where the student finds and constructs knowledge for themselves. Opposite is the surface approach, where there is a traditional student – teacher relationship in which the student assumes a passive role *(Dart et al., 2000)*. The deep and surface approach are the two most basic approaches identified by qualitative studies *(Yuen-Yee, 1994)*. It is acknowledged that the deep approach to learning is associated with higher quality learning outcomes (Trigwell et al., 1991). The achievement approach is more focused on attaining high marks through diligence and well organized study strategies.

Learning activities can be defined as *"Any activity of an individual organized with the intention to improve his/her knowledge, skills and competence" (Litwinska, 2006).* In this case it is aimed at improving knowledge, skills and competencies about entrepreneurship in particular.
The activity must be intentional and the activity has a predetermined purpose. Furthermore, the activity has to be organized in some way, which can occur by the institution (school) or the learner him or herself.

1.2 Authentic learning environment

Entrepreneurship education has a lot of features of authentic learning environments described by the powerful learning environments of *De Corte (1990)*. Within this paragraph more in-depth knowledge about powerful learning environments and authentic learning environments is given to present a theoretical framework that was used in this study.

1.2.1 Powerful learning environments

The theoretical framework that was used in this study is based on powerful learning environments *(De Corte, 1990).* Within this model the focus is on authentic learning environments .
The powerful learning environment is generally attributed to De Corte *(1990)* and is often characterized as environments that aim at achieving the development of complex skills, deep conceptual understanding and meta-cognitive skills (e.g. self-regulated learning) *(De Corte, 1990).* Knowledge is constructed rather than knowledge is transferred, competencies are used instead of explanatory information and social exchange instead of individual learning are components important in powerful learning environments *(Gerjets et al., 2004).*This effective learning can be divided as *(Simons et al., 2000)*:

- Constructive and cumulative
    - Knowledge generated by learners themselves through interaction with environment and by prior knowledge
- Authentic and understanding-based
    - Realistic and context-bound environments that allow meaningful learning and problem solving
- Cooperative
    - Learning together through social interactions and collaboration
- Self-controlled and goal oriented
    - Initiated by the student by the personal goals

This type of learning has similarities with other approaches like situated learning, problem-based learning, cognitive apprenticeship and discovery learning.
In today's society it is important that graduates, besides having specific knowledge, also have the skills to apply this knowledge and solve complex problems in an efficient way *(Engel, 1997,Poikela et al., 1997; Segers, 1996).* Critics mention that within the educational programme there is too much focus on inert knowledge and too little attention on developing skills as problem solving *(Schelfhout, 2004)*. Nowadays, higher education has to focus more on developing and implementing of educational methods that will promote in students the skill to apply knowledge in a practical setting *(Dochy et al., 2003)*. Several scholars have made the reference to powerful learning environment for this matter *(De Corte, 1990; Honebein et al., 1993; Tynjälä, 1999)*.

Within entrepreneurship education, the development of complex skills and attitudes is of importance to reach desirable outcomes. Students need to be self-regulatory and responsible for their own actions, they must be able to work in groups and need to have a mindset towards competent thinking and problem solving *(De Corte et al., 2004).* These features are in line with the concept of powerful learning environments and therefore are suitable as a theoretical framework within this study.
To gain insight into different relationships and interactions, authentic learning environments of powerful learning environments were used. Within entrepreneurship education, competence-based learning is stimulated when the learning environment is functional, realistic, activating, where there

is coaching present and the environments are inviting to learn. When designing such a learning environment, the theory of authentic learning can be used *(Nab et al., 2010).* Authenticity is about real-life setting and the amount of similarity between the assignments within the study programme and the assignments and tasks of a real practitioner.

1.2.2 Authentic learning environment

Authentic learning can be defined as *"Most effective learning processes take place in realistic and context-bound environments that allow for meaningful learning and problem solving" (Gerjets et al., 2004)*. From a constructivist approach, the most effective learning processes are thought to be authentic and on the basis of understanding, which implies that the learning needs to take place in a realistic and contextual environment that allows significant learning and problem solving *(Gerjets et al., 2004)*.

Authentic learning within entrepreneurship education focuses on providing an environment that is similar to the working situation of real entrepreneurs, which entails high levels of uncertainty, innovation, emotion and time-pressure *(Baron, 1998)*. According to Gibb *(1997)*, entrepreneurs of small companies learn from peers, learn by doing, learn from feedback, learn by copying, learn by experiment, learn by problem solving and learn from mistakes. Many of these features that entail entrepreneurship are not present in default educational circumstances *(Nab et al., 2010)*.

For entrepreneurship education it is a challenge to create an authentic learning environment which has similarities to the real work life of an entrepreneur with its complexity and unpredictability that comes with it, to encourage students to gain entrepreneurial intentions *(Nab et al., 2010)*. Authentic learning environments need to be adjusted and reduced, so that students are not exposed to too risky and unsafe conditions which protects student against (financial) risks from which the responsibility is too large *(Nab et al., 2010)*.

Real life setting

Providing a physical and social context that has resemblance with how acquired knowledge is used in day to day life of a entrepreneur. The context within authentic learning needs to be all-embracing, so that the purpose and motivation becomes clear *(Herrington et al., 2006)*. Herrington et al. *(2006)* states that only providing real life examples would not be sufficient to achieve an authentic learning environment. It is important that it covers the way the knowledge is used and it includes examination and exploration from different perspectives *(Brown et al., 1989, Hill et al., 2001, Honebein et al., 1993, Reeves et al., 1997)*. Snowman et al., *(2003)* states that it becomes more meaningful when students learn in an authentic learning environment. Entrepreneurship educators need to create learning environments that characterizes the entrepreneurial workplace-setting. Important is presenting a problem as realistic as possible by preserving the complexity of the real life setting. When students work on real life cases, they gather and construct knowledge themselves instead of reproducing knowledge *(Nab et al., 2010)*. Increased motivation was shown with students working on their own product and company, where they could make their own decisions *(Nab et al., 2010)*.

Authentic activities

Authentic activities can be defined as activities that are poorly defined, have complexity, have an open end and have some relation with real-life *(Herrington et al., 2006)*. Tasks and assignments need to be of substantial size, so that students can work on one single task for a sustained period of time *(Nab et al., submitted, Nab et al., 2011)*. These type of activities are supposed to confront students

with their own abilities and talents, with the industry and it gives students the opportunity to learn from their mistakes *(Nab et al., submitted)*. Furthermore, it helps them search for information and distinguish what information is relevant and irrelevant for the task.
Students should work on assignments that resemble the activities within the professional life of an entrepreneur. It is important that students experience these activities as real and meaningful for them *(Nab et al., 2010)*.When it is impractical or impossible to experience the activity in real life, simulations give the possibility of designing an authentic learning activity that is similar to real life *(Galarneau, 2005)*.
Authentic learning activities have to include:

- Resemblance to activities of real practitioners
- Same complexity as found in real-world tasks
- Ill-defined
- Real-world relevance
- Sustained period of time vs series of shorter disconnected examples
- Simulations

Access to expert performances and the modelling of processes
Providing students with a "role model" like real entrepreneurs who can show the students behaviours and actions in a real situation *(Nab et al., 2011).* This has been derived from the apprenticeship system, where students were trained as a new generation of practitioners of certain skills by an expert. Expert performances are present in today's study curriculum through internships and case studies *(Riesbeck, 1996)*. Examples of authentic activities could be video conference or short clips of experts/entrepreneurs in their natural habitat/ real environment *(Herrington et al., 2006)*. External entrepreneurs can get more involved in entrepreneurship education, e.g. as a coach for the student's during the course. Where entrepreneurs can give consultation with information from the field and can help set up a network of relations *(Nab et al., 2010)*. Encouraging students to get in contact with entrepreneurs and seek their opinion through internet or interview gives students access to various ideas of different entrepreneurs. The ease of internet can help students interact with real entrepreneurs because of e-mailing and social media *(Herrington et al., 2006)*.

Multiple roles and perspectives
In authentic learning environments one single 'correct' interpretation is not false but inadequate according to Spiro et al.*(1991)*, different perspectives on a certain subjects, problems and topics are important. Exploring problems through the eyes of different stakeholders can provide multiple perspectives on the situation and through collaboration and discussion some consensuses may or may not be reached.

Collaborative construction of knowledge
Collaboration: "The mutual engagement of participants in a coordinated effort to solve a problem together" *(Herrington et al., 2006)*. The assignments should be performed in groups rather than as individuals to increase authenticity of the activities *(Nab et al., 2011)*. Within VHL group work and working together are well established parts of the study curriculum. Involving the other study groups of an assignment, so that students can learn from each other, can give each other feedback, learn from feedback and collaborate with each other. They can develop more competition among each other and this might increase the involvement in the work of the others *(Nab et al., 2010)*.

Entrepreneurs in day to day life learn from collaboration with a range of different people within both their private and work life (clients, competitors etc.) *(Nab et al., 2010)*. Learning from others is one of the features of the learning of entrepreneurs.

Articulation

The articulation of ideas in one form or another, where students have to justify their work to their peers and defend their work by means of arguments is meant with articulation *(Herrington, 2006)*. Tasks need to be complex so that articulation is needed in order to complete the task. Collaboration within and outside the groups is important *(Herrington et al., 2000*). Herrington et al. *(2000)* found that students think that a formal presentation in front of the other students can be a valuable chance to articulate and defend what they think they learned.

Coaching and scaffolding

Coaching and scaffolding can be by teachers and by other students. Authentic learning environments need to be adjusted where collaborative learning is provided, so that 'coaches' can assist group work. Teachers have a different role in authentic learning, where interactions with students occur mainly on a meta-cognitive level *(Duffy et al., 1996).* Teachers go from telling students what the knowledge is to coaching students into the right direction to find the knowledge themselves *(Herrington, 2006; Jones-Evans et al., 2000)*. In the end, the teacher provides feedback and support in periods of need, teacher can provide skills, strategies and links to students that are unable to complete the task.

An authentic learning environment within entrepreneurship education consist out of:

- Real life setting which has similarities to the real work life of an entrepreneur
- Presenting problems as realistic as possible by preserving the complexity of real life setting
- Poorly defined learning activities, with enough complexity and has relation to real life
- Confront students with own abilities and talents, with the industry and let them learn from their mistakes
- Simulations are a good alternative for real life
- Provide expert performance, like real entrepreneurs who have experience with being an entrepreneur
- Try to find entrepreneurs who are willing to coach some students or give an interview
- Students can have different interpretations on a subject or problem
- Explore the problems through the eyes of different stakeholders
- Collaboration and learning from others in important in the work of an entrepreneur and should be incorporated into the learning of students
- Articulation of ideas and justifying their work by means of arguments
- The role of the teacher is more a coach than teacher within authentic learning environments

2. Materials and methods

The materials and methods of this study will be explained in this chapter. In order to reach the set objectives for this study, a structured survey and a literature review were used. The literature review can be found in chapter 1 and is based on available manuscripts and articles about entrepreneurial learning and authentic learning environments within an educational setting.

2.1 Research strategy: Setting and participants

For this study, a research design was used based on a structured survey. Students from the educational institution Van Hall Larenstein in The Netherlands have filled out this survey.

2.1.1 Research design

The strategy used for this research is a survey research, in more detail a time-series research, where multiple measurements were conducted. The structured survey (see Appendix I) was conducted at a higher education institution in The Netherlands, Van Hall Larenstein. The survey was conducted in English at Van Hall Larenstein in Wageningen. For the students at Van Hall Larenstein in Leeuwarden the structured survey was conducted partly in English and partly in Dutch because of the main language of the study programme.
The time span of the data collection was between 2011 and 2013, where every year students were asked to fill out the survey.

Van Hall Larenstein (VHL) is an university of applied science in The Netherlands. The university is the largest 'green' university of applied science in The Netherlands and it offers students a variety of Bachelor, Master and Postgraduate programmes, which focus on nature, environment, human and animal health, nutrition, food production and responsible entrepreneurship. This last component is subject of interest for this study. Since 2005, entrepreneurship education became important and today it is a compulsory part in entrepreneurship education within bachelor programmes of VHL.

2.1.2 Research population

The research units in this study consisted of students that attend Van Hall Larenstein at the two locations Leeuwarden and Wageningen. The study consists out of a sample of 452 students of Van Hall Larenstein. Through several contacts within Van Hall Larenstein, multiple measuring moments were planned, which were conducted during different courses and different classes.

The research population contains students from all study years that have filled out the survey. The research units were not completely randomly sampled because participation was on the basis of willingness.
Because of the longitudinal character of the study, some students might fill out the survey multiple times at different moments in their study programme. This because of the use of different groups and classes. These students were not included in this study.

Furthermore, there has been no discrimination on study programme. Teachers have been asked to make time during their lessons, so the survey could be filled out during the lesson and by that increase the fill-in-rate in comparison to an online survey. The students also had the opportunity to ask questions or uncertainties, so that the survey could be filled out better and easier. All students received the same instructions prior to filling out the survey by means of the development of a protocol. The base of this research is quantitative, where the respondents were not allocated to the group at random.

The survey has been conducted over the last three years at Van Hall Larenstein. In table 2 the number of participants and the distribution between the different locations and gender is shown.

Table 2. Number of participants over three years

	2011	2012	2013	Total
Number of participants	193	147	87	427
Van Hall Wageningen	102	98	47	192
Van Hall Leeuwarden	90	47	61	87
Males	99	85	53	237
Females	93	59	34	186

2.1.3 The survey

The structured survey was established by Lans, Blok and Wesselink *(2013)* (see Appendix I). The survey was divided into different subjects:

- General information student
- Learning outcomes (i.e. competencies)
- Entrepreneurial intentions
- Social capital
- Learning activities
- Learning environment

Within this study the general information of the student (gender, study programme, study year, entrepreneurial parents), the specific student characteristics (attitude, social norm and self efficacy), specific learning activities ("developing entrepreneurial mindset" and "engaging in business projects") and specific learning environment ("a learning environment supporting creativity and new ideas" and "a learning environment supporting entrepreneurial learning process") were used to reach the objective of gaining more insight into the relationships between learning activities or learning environment with student characteristics. See figure 2. for more detailed overview of components used and the relationships investigated.

2.1.4 Literature review

The literature review was conducted in order to identify and organize the knowledge that is already available about entrepreneurial learning and the different relations between the elements within entrepreneurial learning. Also the theory of authentic learning environments has been studied in relation to entrepreneurship education.
The execution of the literature review has been done by means of desk research, which gives a fundamental basis regarding authentic learning environments, entrepreneurship learning activities and entrepreneurship learning environments.

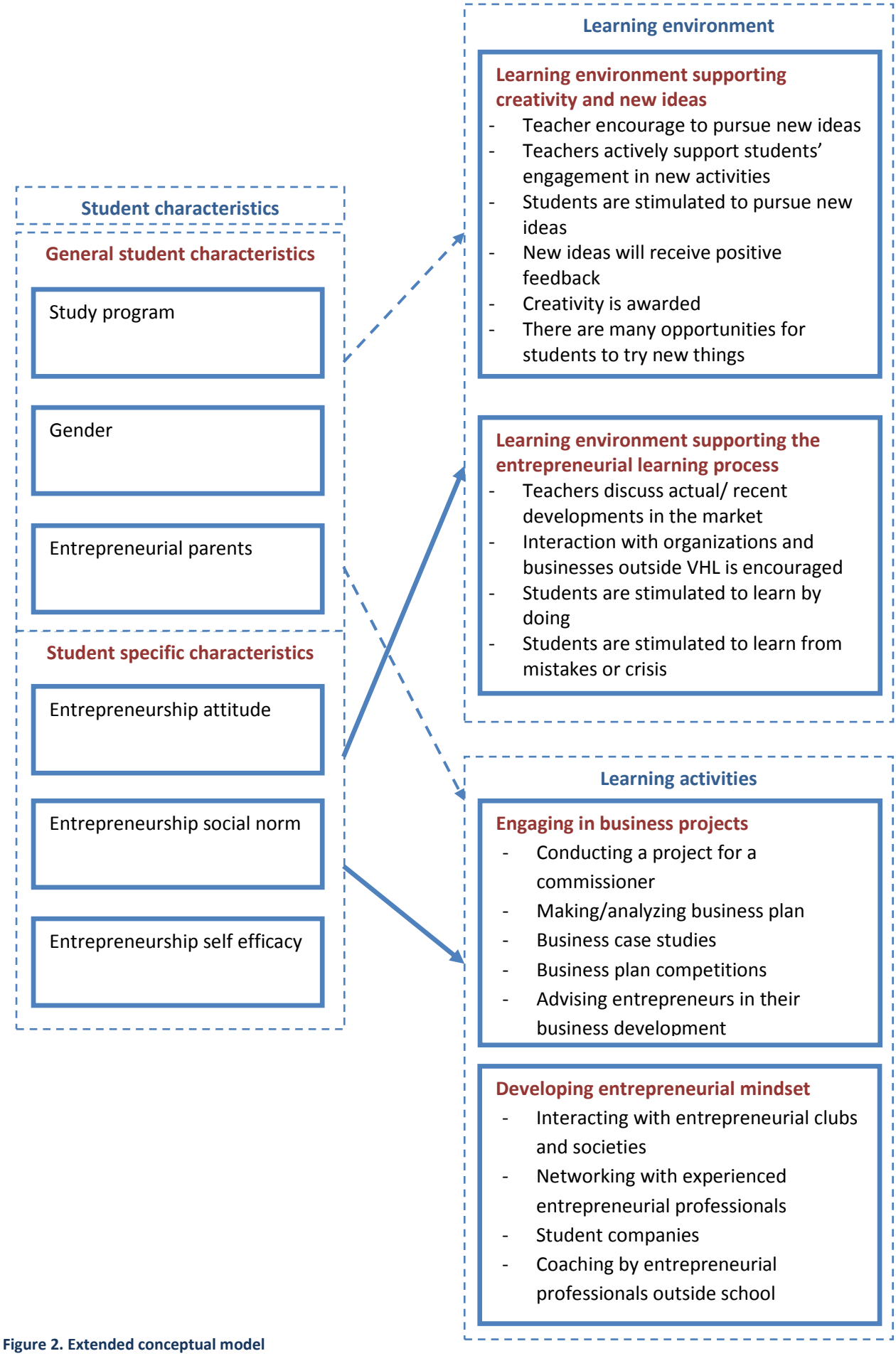

Figure 2. Extended conceptual model

2.2 Research materials

Materials used in this study are described in this paragraph. The main product is the survey, established by Lans, Blok and Wesseling (2013) (see appendix I). This survey has two versions: one English version and one partly Dutch and partly English version.
From the survey following questions were used in this study to reach the set objectives:

- Question 1
- Question 2
- Question 12 a – o
- Question 15 b, h, k, m, n, m, p, r, s and t
- Question 16 a, b, j, i, c, f, m, n, o, l and k

Questions 1 and 2 are about the general information of the student, like study programme and gender. Question 12 can be divided into three components of the theory of planned behaviour *(Ajzen, 1991)*. The questions within question 12 were based on a study of Liñán et al. *(2011)*. Question 15 dealt with the entrepreneurial learning activities within VHL that were offered to the students. These questions were based on research of Gibb *(2002)*. Question 16 dealt with the entrepreneurial learning environment that might or might not be present at VHL. These questions were based on a study of Van Dam et al. *(2010)*.

The collected data of the survey has been collected in the statistical program SPSS, version 19. SPSS has also been used for the statistical analysis.
For the literature review, scientific articles and journals have been used to answer the theoretical research questions. Important search engines within this process were Scopus and Google Scholar.

2.3 Data collection and analysis

To answer the research questions of this study, several means of data collection and data analysis were used. In this paragraph the data collection and data analysis are presented in more detail.

2.3.1 Data collection

The data collection in this study has been done through the previously mentioned survey among students of Van Hall Larenstein, in Leeuwarden and Wageningen, and through a literature review. Part of the survey has already been conducted before the start of the research (years 2011 and 2012). The data of 2013 has been collected during the course of this study.

Within the survey, different rating scales and open questions were used. The components used in this study were measured by one open question and a Likert scale was used. A Likert response scale is a psychometric scale, commonly involved in research that uses questionnaires. A five-point and a two-point Likert scale were used within this survey.
Within SPSS the components of the survey that were used in this study were coded as shown in the appendix.

2.3.2 Data preparation

The data that was collected from the survey was entered into a SPSS data file. Within this program, the data needs to be prepared in such a way that it is suitable for statistical analysis. Consideration has been given to the conversion of data into numeric variables and the clustering of data by means of main subjects.
The question about the study programme of the students resulted in 14 different study programmes. These were reduced into 5 different components, namely management and business, animal husbandry management, developmental studies, water, energy and environment and food.

Data of question 12, 15 and 16 were clustered to reduce the amount of variables. Within question 12 the students were asked to give their opinion regarding several statements. These statements could be divided into three aspects of the theory of planned behaviour: self efficacy, social norm and attitude regarding entrepreneurship. The fifteen statements within this question could be divided into these three components, where three new variables were computed. Reliability and factor analysis were performed and variability between the elements in the clusters. A Cronbach's Alpha of 0.7 *(Field, 2009)* was desirable and a percentage of explained variance of 50% *(Dunteman, 1989)*. Questions 12a, 12c and 12i were asked in the opposite way (negative view instead as positive view) as the other questions of question 12. Therefore those answers needed to be transformed so that e.g. a score of 5 (agree) was in fact a score of 1 (disagree). This was done by computing the three old variable into three new variables.

Table 3. Reliability of components of question 12

	Cronbach's α	% of variance
Attitude	,765	59,617
Social norm	,924	86,791
Self efficacy	,782	48,538

For Questions 15 and 16 it was also planned to cluster some of the sub-questions in order to achieve a better overview. All sub-questions were analyzed by a factor analysis with a varimax rotation to generate the different components that were present in the two different questions.

Table 4. Learning activities factor (varimax) analysis

Sub questions question 15	Rotated factor loadings				
	1	2	3	4	5
Interacting with entrepreneurial clubs	,807				
Networking	,745				
Student companies	,625				
Coaching by entrepreneurs	,491				
Project for commissioner		,698			
Making business plan		,682			
Business case studies		,651			
Business plan competition		,587			
Group work		,478			
Advising entrepreneurs	,401	,472			
Interviewing entrepreneurial people			,639		
Pitching entrepreneurial idea			,625		
Guest lectures			,620		
Reading about entrepreneurs			,537		
Role plays				,737	
Debates				,664	
Simulations				,663	
Company excursions					,673
Competence assessment					,646
Teaching each other	,425				,498
Eigen values	5,793	1,698	1,389	1,277	1,028
% of variance	13,774	13,345	10,498	10,489	7,816
α	,772	,735	,675	,616	,503

A principal component analysis (PCA) was conducted on the 20 elements of question 15 with orthogonal rotation (varimax). The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = 0,869 ('great' according to *Hutcheson et al., 1999*).
Bartlett's test of sphericity χ^2 (190) = 1910,675, p <0,001, indicated that correlations between items were sufficiently large for PCA.
An initial analysis was run to obtain eigenvalues for each component in the data. Five components had eigenvalues over Kaiser's criterion of 1 and in combination explained 55,924% of the variance. Given the large sample size, all these components were candidates for this study.
Table 4 shows the factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents developing an entrepreneurial mindset and component 2 engaging in business projects. Component 3 are activities promoting learning from and about entrepreneurs, where these activities consider more the entrepreneur as a role model in comparison to students being "entrepreneurs", component 4 "mimic entrepreneurial" learning activities and component 5 "watch and put into practice" learning activities.
Components 1 and 2 had good reliabilities with Cronbach's α above ,7. Component 3 has an alpha just under ,7 and components 4 and 5 had a low reliability, Cronbach's α = ,616 and ,503.
After this initial analysis, the components were analysed separately to determine the Cronbach's α and the percentage of explained variance. Within the Cronbach's α analysis the box 'scale if item deleted' was used.

Table 5. Reliability of different components of learning activities

	Cronbach's α	% of variance explained
Component 1	,772	59,544
Component 2	,735	45,376
Component 3	,675	50,967
Component 4	,616	56,758
Component 5	,503	50,447

In table 5 the components are presented with their individual α and % of explained variance. Only components 1 and 2 are interesting for this study due to their Cronbach's α above ,70. Only component 2 has a % of explained variance that is lower than the proposed 50% *(Dunteman, 1989)*.
By using the 'scale if item deleted' option, if sub-question 'group work' was deleted, the Cronbach's α would become ,776. Group work probably does not fit within the other five questions because in all components group work is already present and the group work was asked as group work with other institutions and may not be present often. After running the factor analysis, the % of variance explained for component 2 without 'group work' was 52,983. Therefore the new component 2 consists out of:

- Project for commissioner
- Making business plan
- Business case studies
- Business plan competition
- Advising entrepreneurs

Components 1 and 2 are used in this study and are named "developing entrepreneurial mindset" and "engaging in business projects".

Table 6. Learning environment factor (varimax) analysis

Sub questions question 16	Rotated factor loadings		
	1	2	3
Teachers encourage me to pursue new ideas	,783		
Students are stimulated to pursue new ideas	,730		
Teachers actively support students' engagement in new activities	,711		
If you come up with a new idea you will receive positive feedback	,701		
Creativity is awarded	,632		
There are many opportunities for students to try out new things	,574		
There is room for change/ improvement	,535		
Emotional well-being of students is important and noticed	,476		
Students are stimulated to learn by doing		,716	
Teachers discuss actual/ recent developments in the market		,703	
Interaction with organizations and businesses outside VHL is encouraged		,687	
Students are stimulated to learn from mistakes or crisis		,637	
Students are stimulated to take (calculated) risks		,561	
Students are expected to handle problems in a standardized way			,748
Negative reactions can be expected when the exact course instructions are not followed			,732
Teachers stick to safe and proved practices			,620
Eigenvalues	5,445	1,559	1,153
% of variance	23,774	17,493	9,714
α	,845	,755	,515

A principal component analysis (PCA) was conducted on the 16 elements of question 16 with orthogonal rotation (varimax). The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = 0,886 ('great' according to Hutcheson et al., 1999).
Bartlett's test of sphericity χ^2 (120) = 1848,878, p <0,001, indicated that correlations between items were sufficiently large for PCA.
An initial analysis was run to obtain eigenvalues for each component in the data. Three components had eigenvalues over Kaiser's criterion of 1 and in combination explained 50,981% of the variance. Given the large sample size, all these components were candidates for this study.
Table 6 shows the factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents a learning environment supporting creativity and new ideas, component 2 a supporting learning environment for the entrepreneurial learning process and component 3 a standardized learning environment.
Components 1 and 2 have good reliabilities with Cronbach's α above ,7. Component 3 has a low reliability, with Cronbach's α = ,515.
After this initial analysis, the components were analysed separately to determine the Cronbach's α and the percentage of explained variance. Within the Cronbach's α analysis the box 'scale if item deleted' was used.

Table 7. Reliability of different components of learning environments

	Cronbach's α	% of variance explained
Component 1	,845	48,499
Component 2	,755	50,624
Component 3	,515	50,881

In table 7 the components are presented with their individual α and % of explained variance. Only components 1 and 2 are interesting for this study due to their Cronbach's α above ,70. Component 1 has a % of explained variance that is lower than 50% *(Dunteman, 1989)*. By removing parts of the component that logically didn't seem to relate to the other factors in the component. These were 'there is room for improvement' and 'emotional well-being of the students'. All other parts within this component are related to new ideas and creativity, where the previously mentioned parts do not seem to fit in this category. After the removal of these two factors from the component, Cronbach's α = ,838 and % of explained variance 55,574. Therefore the new component 1 consists out of:

- Teachers encourage me to pursue new ideas
- Students are stimulated to pursue new ideas
- Teachers actively support students' engagement in new activities
- If you come up with a new idea you will receive positive feedback
- Creativity is awarded
- There are many opportunities for students to try out new things

Components 1 and 2 are used in this study and arm name 'a learning environment supporting creativity and new ideas' and 'a supporting learning environment for the entrepreneurial learning process'.

Through these analysis two components for questions 15 and two components for question 16 were formed:
Question 15: Learning activities

- Developing an entrepreneurial mindset
- Engaging in business projects

Question 16: Learning environment

- A learning environment supporting creativity and new ideas
- A learning environment supporting entrepreneurial learning process

All variables within this study were also checked for normality by the Shapiro-Wilk test in SPSS. None of the variables were normally distributed according to this test.

2.3.3 Data analysis

A general picture of the data was generated by the use of descriptive statistics as frequencies distributions and descriptive analyses.
To check if any of the factors used in this study was being influenced by another, non parametric tests (e.g. no normality) were preformed. The Mann-Whitney U test and the Kruskal Wallis test were used with the grouping variables location, study year, study programme, gender and year of data collection. The test variables were entrepreneurial parents, attitude, social norm, self efficacy, entrepreneurial lifestyle learning activities, authentic learning activities, creativity and new ideas and authentic learning environment.

In table 8 the results of the Pearson correlation are presented. Many different correlations are present between the different variables.
To explore the possible relationships between the factors previously stated, first a general correlation analysis was preformed, by means of a bivariate correlation, without correcting for other factors. Furthermore, a regression analysis was performed, by use of linear regression in SPSS, to determine the factors that statistically significantly influenced the learning activity or learning environment component. With this regression analysis a model was build to give insight into the different variables that influence the appreciation of specific learning activities and learning environments.

Table 8. Pearson correlation between all variables used in this study

		Mean	St. Dev.	1	2	3	4	5	6	7	8	9	10	11	12
1	**Trance**														
2	**Study year**			,390**											
3	**Gender**			-,081	,061										
4	**Location**			,096*	,034	-,347**									
5	**Study programme**			-,120*	-,098	,046	,009								
6	**Entrepreneurial parents**	1,51	0,501	,064	-,049	,120*	-,264**	,193**							
7	**Attitude**	3,5250	0,8582	,082	,088	-,027	-,200**	-,288**	-,121*						
8	**Social norm**	3,0146	1,1880	,148**	,056	-,148**	,120*	-,229**	-,249**	,510**					
9	**Self efficacy**	3,0152	0,6736	,067	,116*	-,220**	,117*	-,280**	-,220**	,451**	,564**				
10	**Entrepreneurial mindset**	2,3560	0,8767	,082	,190**	-,148**	,343**	-,088	-,212**	,074	,213**	,302**			
11	**Engaging in business projects**	2,9215	0,8320	,048	,265**	-,048	,078	-,257**	-,182**	,175**	,234**	,292**	,447**		
12	**Supporting learning environment for creativity and new ideas**	3,3987	0,6976	,054	-,002	,034	-,188**	-,053	,090	,244**	,139**	,105*	,092	,122*	
13	**Supporting learning environment for the entrepreneurial learning process**	3,4337	0,6583	,045	-,021	,086	-,330**	,059	,154**	,252**	,029	,052	,055	,143**	,560**

*Spearman correlation: ** p < ,01 , * p < ,05*

3. Results

After the collection of all data of the survey within SPSS, the analysis of the data started. Within this chapter the main results of the study are displayed and explained.

3.1 Overview

To give a general overview of the respondents and their characteristics some descriptive are presented in this paragraph.
Within this study 237 males and 186 females participated over the last three years. Of these students, 197 have parents that have their own business and 205 have parents that do not have their own business.

3.1.1 General information respondents

The students were asked to fill out some general information about themselves at the beginning of the survey to get a view of the distribution of students within the sample.

Table 9. Distribution of students in different study programmes

Study programme	# students	%
Management and Business	**95**	**23,4**
Bedrijfskunde en Agribusiness (Business and Agribusiness)	67	*16,5*
International Business and Management Studies	3	*0,7*
Master of Agricultural Production Chain Management	21	*5,2*
Associate degree Ondernemerschap (Associate degree entrepreneurship)	4	*1,0*
Animal Husbandry Management	**161**	***39,7***
Associate degree Melkveehouderij (Associate degree dairy farming)	1	*0,2*
Dier- en Veehouderij (Animal Husbandry)	159	*39,2*
Dier management (Animal Management)	1	*0,2*
Developmental studies	**47**	***11,6***
International Development Management	25	*6,2*
Master of Management of Development	22	*5,4*
Water, energy and environment	**66**	***16,3***
Kust- en Zeemanagement (Coastal and Sea management)	24	*5,9*
Milieukunde (Environmental Science)	1	*0,2*
Plattelandsvernieuwing (Rural Innovation)	24	*5,9*
Tuinbouw en Akkerbouw (Horticulture and Agriculture)	17	*4,2*
Food	**37**	***9,1***
Voedingsmiddelentechnologie (Food Technology)	37	*9,1*
Total	406	100

In table 9 the distribution is shown of the number of students in the different study programmes. It is apparent that most of the students that participated in this survey over the last three years, attend the study programmes “Animal Husbandry” and “Business and Agribusiness”. The study programmes are divided into five different components to reduce the amount of variables. This has been done by means of the main topic within the studies.

Table 10. Descriptives on the components within survey

	Mean	Standard deviation
Entrepreneurial Attitude	3,5250	0,85823
Entrepreneurial Social norm	3,0146	1,18798
Entrepreneurial Self efficacy	3,0152	0,67357
Developing entrepreneurial mindset	2,3560	0,87678
Engaging in business projects	2,9215	0,83200
Learning environment creativity and new ideas	3,3987	0,69760
Learning environment entrepreneurial learning process	3,4337	0,65834

Within table 10 the distributions of the different components of this study are presented. For the components social norm, self efficacy and authentic learning activities, the mean is very close to 3, which is the middle answer within the Likert scale that was used.
Developing entrepreneurial mindset is one of the components that shows a lower mean in comparison to the other components. On the other hand, creativity and new ideas and authentic learning environment show a higher mean than the other components.
The standard deviation that stands out is of social norm with a standard deviation of 1,18798, which is higher than all the standard deviations of the other components.

3.1.2 Learning activities offered, according to VHL students

Students could indicate if certain learning activities were present or not in their study curriculum at VHL. In table 11 the mean, standard deviation and the percentage of students that gave a score of 4 or 5 to the specific learning activities are presented.

Table 11. Mean, standard deviation and distribution of question about learning activities

	Mean	Std. Dev.	Total score 4 + 5%
Guest lectures	3.48	1.159	57,3
Company excursions	3.405	1.1678	52,2
Presenting (i.e. pitching an entrepreneurial idea)	3.35	1.151	48,0
Performing group work with students from other VHL studies	3.16	1.389	46,7
Competence assessments	3.39	1.027	46,5
Making/analysing business plans	3.263	1.1154	43,9
Teaching each other	3.06	1.127	36,7
Interviewing entrepreneurial people outside school	2.92	1.161	34,4
Simulations/Management games	2.94	1.179	34,0
Role plays	2.90	1.189	33,7
Business case studies	3.00	1.100	33,0
Conducting a project for a commissioner	2.92	1.182	32,6
Business plan competitions	2.70	1.181	28,3
Reading stories about entrepreneurial people	2.762	1.0628	26,5
Advising entrepreneurs in their business development	2.71	1.170	24,8
Debates	2.66	1.126	23,0
Networking with experienced entrepreneurial professionals	2.49	1.170	21,7
Coaching/mentoring by entrepreneurial professionals outside school	2.50	1.143	20,7
Student companies	2.29	1.124	15,3
Interacting with entrepreneurial clubs and societies	2.133	1.1186	13,8

The kind of entrepreneurship learning activities that VHL applies according to the survey are presented in table 11. The students were asked to what extent the stated learning activities were present in the courses that they had followed at VHL. They could rate these questions from 1 (not at all present) to 5 (very much present). Scores 4 and 5 therefore were positive for the learning activities and are presented in this table.
The learning activities used in this research show low percentages of total score 4 and score 5 answered within the survey, except for making and analysing a business plan. Apparently, the learning activities used in this study are not very present within VHL.

3.1.3 Perception of VHL students of entrepreneurial learning environment

Students could indicate how they experience the learning environment at VHL. In table... the mean, standard deviation and the percentage of students that gave a score of 4 or 5 to the specific learning environment situations are presented.

Table 12. Mean, standard deviation and distribution of question about learning environments

	Mean	Std. Dev.	Total score 4 -5 %
Students are stimulated to learn by doing	3.81	0.915	66,5
If you come up with a new idea you will receive positive feedback	3.56	0.893	54,6
There is room for change/improvement	3.545	0.893	55,0
Students are stimulated to learn from mistakes or crisis	3.48	0.914	51,2
Students are stimulated to pursue new ideas	3.43	0.933	49,2
Teachers encourage me to pursue new ideas	3.36	0.951	46,0
Teachers discuss actual/recent developments in the market	3.406	0.9818	47,8
Creativity is awarded	3.38	0.964	47,4
Interaction with organizations and businesses outside VHL is encouraged	3.40	0.952	46,6
Teachers actively support students' engagement in new activities	3.36	0.964	44,5
There are many opportunities for students to try out new things	3.32	0.984	43,2
Students are expected to handle problems in a standardized way	3.20	0.944	37,6
Teachers stick to safe and proved practices	3.20	0.912	36,1
Emotional well-being of students is important and noticed	3.205	0.9360	35,3
Negative reactions can be expected when the exact course instructions are not followed	3.106	0.9846	33,9
Students are stimulated to take (calculated) risks	3.07	0.894	31,1

The extent to how students of VHL perceive their learning environment as entrepreneurial is presented in table 12. The students were asked to indicate to what extent the stated learning environment situations were present at VHL. They could rate these questions from 1 (not at all) to 5 (very much). Scores 4 and 5 therefore were positive for the learning environment and are used in the table.
The learning environments used in this research show high total percentages of score 4 and score 5 together, except for ´students are stimulated to take (calculated) risks'. Apparently, the learning environments used in this study are very present within VHL.

3.2 Student characteristics and learning activities

Within this study the relationships between the student characteristics and learning activities are investigated through correlation analysis and regression analysis.

The student characteristics are divided into general student characteristics (gender, study programme and entrepreneurial parents) and specific student characteristics (entrepreneurial attitude, social norm and self efficacy) (see conceptual model, figure 2).

For the learning activities two components were computed, namely “developing entrepreneurial mindset” and “engaging in business projects”. In this paragraph the results of the correlation analysis and the regression analysis are presented.

3.2.1 Correlations

The previously mentioned student characteristics and learning activities were analysed by the use of correlation analysis within SPSS.

Table 13. Correlation coefficients entrepreneurial learning activities

	Gender	Study	Parents	Attitude	Social norm	Self efficacy	1	2
Gender	x	,046	,120**	-,027	-,148**	-,220*	-.148**	-,048
Study programme	,046	x	,193*	-,288*	-,299*	-,280*	-,088	-,257*
Entrepreneurial parents	,120**	,193*	x	-,121**	-,249*	-,220*	-,212*	-,182*
Attitude	-,027	-,288*	-,121**	x	,510*	,451*	,074	,175*
Social norm	-,148**	-,299*	-,249*	,510*		,564*	,213*	,234*
Self efficacy	-,220*	-,280*	-,220*	,451*	,564*	x	,302*	,292*
Entrepreneurial mindset(1)	-,148**	-,088	-,212*	,074	,213*	,302*	x	,447*
Engaging in business proje cts (2)	-,048	-,257*	-,182*	,175*	,234*	,292*	,447*	x

*Spearman correlation coefficients, * p <,001, ** p <,05*

1 = “ Developing entrepreneurial mindset”

2 = “Engaging in business projects’”

Correlation analysis was conducted to examine the relationships between one of the two learning activities components “developing entrepreneurial mindset” and ‘engaging in business projects’ and the student general and specific student characteristics. Table 13 summarizes the results of the correlation analysis.

As can be seen, gender and entrepreneurial parents are negatively and significantly correlated with developing entrepreneurial mindset. Indicating that female students tend to give a lower appreciation to the component “developing entrepreneurial mindset”. Furthermore, the correlations indicate that students without entrepreneurial parents tend to score their appreciation for the component “developing entrepreneurial mindset” lower.

Two positive and statistically significantly correlations can be seen between developing entrepreneurial mindset and social norm and self efficacy. Indicating that students that give a higher score on social norm or on self efficacy, also give a higher appreciation to the component “developing entrepreneurial mindset”.

Furthermore, engaging in business projects shows statistically significant correlations with study program, entrepreneurial parents, attitude, social norm and self efficacy. Study programme and entrepreneurial parents show statistically significantly negative correlations, indicating that differences occur among study programmes in regards to the appreciation of the component “engaging in business projects”. Furthermore, students without parents with a company of their own tend to score their appreciation for the learning activities component “engaging in business projects” lower.

As can be seen in table 13 each of the specific student characteristics is positively and significantly correlated with engaging in business projects, indicating that those with higher score on the specific

student characteristics tend to have a higher appreciation for the component "engaging in business projects".

The variable gender was positively and statistically significantly correlated with entrepreneurial parents, indicating that male students have more often entrepreneurial parents. Social norm, self efficacy and student initiated learning activities have a negatively and statistically significantly correlation with gender. The negative correlation of gender with social norm and self efficacy indicates that female students give a lower score to entrepreneurial social norm and self efficacy than male students.

The variable study programme appears to have negative and statistically significantly correlations with attitude, social norm, self efficacy and the two learning activities components. Study programme presents a positive and significant correlation with the variable entrepreneurial parents. All of which indicates that study programme has correlations with most of the variables used in this study.

The variable entrepreneurial parents has positively and significant correlations with gender and study programme as mentioned before. Attitude, social norm and self efficacy and the two learning activities components show a negative and significant correlations with entrepreneurial parents. Indicating that students without entrepreneurial parents tend to score attitude, social norm and self efficacy lower.

Entrepreneurial attitude shows negative and significant correlations with study programme and entrepreneurial parents. Furthermore, positive and significant correlations can be seen between entrepreneurial attitude and self efficacy and engaging in business projects.

Entrepreneurial social norm seems to correlate with all variables shown in table 13. Gender, study programme and entrepreneurial parents are negatively correlated with social norm as presented previously.
The other specific student characteristics both show a positive and significant correlation with social norm. Entrepreneurial self efficacy seems to significantly correlate with all other variables in table 13.

3.2.2 Regressions

After correlation analysis without correcting for other factors that might influence the variables, regression analysis was performed to determine which factor explain parts of the score of specific learning activities.

Table 14. Regression analysis: developing entrepreneurial mindset

	B	SE B	β
Step 1			
Constant	1,129	,162	
Year of data collection	-,086	,065	-,075
Year of study	,276	,063	,244*
Location	,652	,091	,369*
Step 2			
Constant	1,581	,293	
Year of data collection	-,089	,066	-,078
Year of study	,266	,063	,235*
Location	,633	,101	,358*
Gender	-,044	,094	-,025
Study programme	-,066	,036	-,095
Entrepreneurial parents	-,109	,093	-,062
Step 3			
Constant	,257	,409	
Year of data collection	-,104	,065	-,092
Year of study	,240	,061	,212*
Location	,637	,101	,361*
Gender	,031	,092	,018
Study programme	-,022	,036	-,032
Entrepreneurial parents	-,023	,092	-,013
Attitude	-,008	,062	-,008
Social norm	,031	,047	,043
Self efficacy	,322	,078	,250*

Note: R^2 = ,176 for step 1, ΔR^2 = ,016 for step 2 (p = 0,092), ΔR^2 = ,063 for step 3 (p = 0,000), * p <,001

A multiple regression was run to predict the appreciation of the component “developing entrepreneurial mindset” from year of data collection, year of study, location, gender, study programme, entrepreneurial parents, attitude, social norm and self efficacy. The variables study year, location and self efficacy statistically significantly predicted the appreciation of the component “developing entrepreneurial mindset”, F (9, 329) = 12,533, p < ,001, R^2 = ,255. All three variables added statistically significantly to the prediction, p < ,001.

Table 15. Regression analysis: engaging in business projects

	B	SE B	β
Step 1			
Constant	2,404	,162	
Year of data collection	-,058	,065	-,054
Year of study	,307	,063	,287*
Location	,089	,090	,053
Step 2			
Constant	3,044	,286	
Year of data collection	-,062	,064	-,058
Year of study	,284	,062	,266
Location	,090	,098	,054
Gender	,017	,091	,010*
Study programme	-,123	,035	-,188
Entrepreneurial parents	-,198	,090	-,120
Step 3			
Constant	2,171	,408	
Year of data collection	-,080	,064	-,074
Year of study	,271	,061	,254*
Location	,089	,101	,053
Gender	,065	,091	,039
Study programme	-,091	,036	-,139**
Entrepreneurial parents	-,128	,092	-,077
Attitude	-,017	,062	-,018
Social norm	,054	,047	,079
Self efficacy	,189	,077	,156**

Note: R^2 = ,074 for step 1, ΔR^2 = ,057 for step 2 (p = 0,000), ΔR^2 = ,033 for step 3 (p = 0,005), * p <,001, ** p <,05

A multiple regression was run to predict the appreciation of "engaging in business projects" from year of data collection (trance), year of study, location, gender, study programme, entrepreneurial parents, attitude, social norm and self efficacy. The variables year of study, study programme and self efficacy statistically significantly predicted the appreciation of engaging in business projects, F(9, 330) = 7,241, p <,001, R^2 = ,165. All three variables added significantly to the predication, year of study p < ,001 and p < ,005 for study programme and self efficacy.

3.3 Student characteristics and learning environments

Besides the relationships between student characteristics and learning activities, attention was also paid to the relationships between student characteristics and learning environments through correlation analysis and regression analysis. The student characteristics are also for this analysis divided into general and specific student characteristics.

The learning environments are divided into two components, namely “A learning environment supporting creativity and new ideas” and “A learning environment supporting entrepreneurial learning process”. In this paragraph the relationships between student characteristics and learning environments are presented.

3.3.1 Correlation

The previously mentioned student characteristics and learning environments were analysed by the use of correlation within SPSS.

Table 16. coefficients entrepreneurial learning environments

	Gender	Study	Parents	Attitude	Social norm	Self efficacy	1	2
Gender	x	,046	,120**	-,027	-,148**	-,220*	,034	,086
Study programme	,046	x	,193*	-,288*	-,299*	-,280*	-,053	,059
Entrepreneurial parents	,120**	,193*	x	-,121**	-,249*	-,220*	,090	,154**
Attitude	-,027	-,288*	-,121**	x	,510*	,451*	,244*	,252*
Social norm	-,148**	-,299*	-,249*	,510*		,564*	,139**	,029
Self efficacy	-,220*	-,280*	-,220*	,451*	,564*	x	,105**	,052
Learning environment creativity and new ideas (1)	,034	-,053	,090	,244*	,139**	,105**	x	,560*
Learning environment for learning process (2)	,086	,059	,154**	,252*	,029	,052	,560*	x

*Spearman correlation coefficients, * p <,001, ** p <,05*

1 = “A learning environment supporting creativity and new ideas”

2 = “A learning environment supporting entrepreneurial learning process”

Correlation analysis was conducted to examine the relationships between one of the two learning environment components ‘a learning environment supporting creativity and new ideas’ and ‘a learning environment supporting the learning process’ and the student general and specific characteristics. Table 16 summarizes the results of the correlation analysis.
As can be seen each of the specific student characteristics is positively and significantly correlated with a learning environment supporting creativity and new ideas, indicating that those with higher scores on the specific student characteristics tend to have a higher appreciation for the presence of a learning environment supporting creativity and new ideas.
Two positive and significantly correlations can be seen between a learning environment supportin the entrepreneurial learning process and entrepreneurial parents on one hand and attitude on the

other. Indicating that those that not have entrepreneurial parents tend to have a higher appreciation for the presence of a learning environment supporting entrepreneurial learning process.
Furthermore, students which give a higher score to attitude tend to give a higher appreciation to the presence of a learning environment supporting entrepreneurial learning process.
The variable a learning environment supporting creativity and new ideas show a positive and significant correlation with the other learning environment component a learning environment supporting entrepreneurial learning process. This indicates students that score the first component high, probably will score the second component high as well.

3.3.2 Regression

After correlation analysis without correcting for other factors that might influence the variables, regression analysis was performed to determine which factor explain parts of the score of specific learning environments.

Table 17. Regression analysis: a learning environment supporting creativity and new ideas

	B	SE B	β
Step 1			
Constant	3,793	,139	
Year of data collection	,073	,056	,080
Year of study	-,002	,054	-,003
Location	-,371	,078	-,260*
Step 2			
Constant	3,841	,251	
Year of data collection	,060	,057	,065
Year of study	,009	,055	,009
Location	-,372	,087	-,260*
Gender	-,083	,081	-,059
Study programme	-,019	,031	-,034
Entrepreneurial parents	,084	,080	,060
Step 3			
Constant	3,086	,362	
Year of data collection	,024	,057	,026
Year of study	,009	,054	,010
Location	-,326	,089	-,228*
Gender	-,054	,081	-,038
Study programme	,010	,032	,018
Entrepreneurial parents	,152	,081	,107
Attitude	,092	,055	,112
Social norm	,082	,042	,140
Self efficacy	-,010	,069	-,010

Note: R^2 = ,056 for step 1, ΔR^2 = ,006 for step 2 (p = 0,524), ΔR^2 = ,039 for step 3 (p = 0,003), * p <,001

A multiple regression was run to predict the appreciation of a learning environment supporting creativity and new ideas from year of data collection (trance), year of study, location, gender, study programme, entrepreneurial parents, attitude, social norm and self efficacy. Only the variable location statistically significantly predicted the appreciation of a learning environment supporting creativity and new ideas, F (9, 331) = 4,502, p <,001, R^2 = ,109. This variable added statically

significantly to the prediction, p ,001. Social norm is a variable with *p* ,051, so it just not significant according to the rule of *p* <,05.

Table 18. Regression analysis: a learning environment supporting the entrepreneurial learning process

	B	SE B	β
Step 1			
Constant	3,971	,128	
Year of data collection	,081	,052	,093
Year of study	,008	,050	,010
Location	-,471	,072	-,346*
Step 2			
Constant	3,717	,232	
Year of data collection	,079	,053	,090
Year of study	,019	,051	,022
Location	-,462	,080	-,341*
Gender	-,017	,075	-,013
Study programme	,036	,029	,067
Entrepreneurial parents	,107	,074	,079
Step 3			
Constant	2,660	,330	
Year of data collection	,048	,052	,055
Year of study	,009	,050	,010
Location	-,377	,082	-,278*
Gender	,025	,074	,019
Study programme	,067	,029	,125**
Entrepreneurial parents	,165	,074	,122**
Attitude	,170	,050	,219**
Social norm	,012	,038	,021
Self efficacy	,049	,063	,049

Note: R^2 = ,106 for step 1, ΔR^2 = ,012 for step 2 (*p* = 0,191), ΔR^2 = ,056 for step 3 (*p* = 0,000), * *p* <,001 ** p<,05

A multiple regression was run to predict the appreciation of a learning environment supporting the learning process from year of data collection, year of study, location, gender, study programme, entrepreneurial parents, attitude, social norm and self efficacy. The variables location, study programme, entrepreneurial parents and attitude statistically significantly predicted the appreciation of a learning environment supporting entrepreneurial learning process, F (9, 331) = 8,182, *p*<0,001, R^2 = ,182. All four variables added statistically significantly to the prediction, location *p*<,001 and for study programme, entrepreneurial parents and attitude *p* <,05.

3.4 Overview of results

Within table 19 the results are summarized, where the different variables are presented that affect each component. As can be seen, study year and self efficacy is an important variable for learning activities and study location for learning environments.

Table 19. Overview of variables affecting the four components

Developing entrepreneurial mindset	Study year	Study location	Self efficacy	
Engaging in business projects	Study year	Study programme	Self efficacy	
A learning environment supporting creativity and new ideas	Location			
A learning environment supporting entrepreneurial learning process	Location	Study programme	Entrepreneurial parents	Attitude

4. Discussion

This chapter reflects on the main findings and the validity of this study. The chapter is divided according to the research questions presented in the introduction and begins with the discussion and interpretation of the results obtained and is continued by some reflection on the general data obtained through the survey and some limitations within the survey.

4.1 Research questions

At the start of this study the main objective was introduced as: "To identify the relations between student characteristics, learning activities and learning environments in entrepreneurship education, by considering relevant theories, and by using a survey conducted at Van Hall Larenstein (university of applied science in The Netherlands)".
Within these paragraphs the research questions are described successively with the interpretation of the results and the relation with previous work.

4.1.1 Student characteristics and learning activities

The first research question within this study was about the relation between specific learning activities and student characteristics in entrepreneurship education. Through a conducted survey the answers were sought.

Within this study the relationships were investigated between specific student characteristics (general and specific) and certain entrepreneurship related learning activities as stated in previous chapters. Furthermore, the learning activities offered to students of VHL in order to facilitate entrepreneurship education were analysed through answers given by the students.
Within this paragraph the interpretation of the results are presented, including the relation with previous work and the relation to the stated objective of this study.

Learning activities offered, according to VHL students

One of the sub questions dealt with the kind of entrepreneurship learning activities that VHL applies in order to facilitate entrepreneurship education and entrepreneurship thinking according to the students. The answers were sought through a survey conducted at VHL, where the students were asked to answer several questions about learning activities and indicate which were present during their study and which were less present.

The learning activities that were most present according to the students of VHL were:

- Making/analysing business plans
- Performing group work with students from other VHL studies
- Presenting (i.e. pitching an entrepreneurial idea)
- Guest lectures
- Company excursions
- Competence assessments

From this list only making/ analysing business plans is part of one of the components within this study. The learning activities all have a relation with real-life situations, where guest lecturers can provide the students with a role model. The company excursions give students a picture of a company and their activities and has a relation to the professional field. Furthermore, according to Nab et al. *(2010)* entrepreneurs learn from collaboration with a range of different people, so performing group work with students from other VHL studies provides the students with an authentic learning environment.

Most of the students within this study attend a study programme that has some form of management element. Therefore the learning activities mentioned above as most frequent can be logically explained. Within the courses at VHL, different studies can participate and therefore it is not unusual to work together with students from different study programmes within the same course.

On the other hand, the learning activities that were not that much present at VHL, according to the students, are related to the learning activities chosen for the learning activities components within this study.

- Interacting with entrepreneurial clubs and societies
- Networking with experienced entrepreneurial professionals
- Student companies
- Coaching/mentoring by entrepreneurial professionals outside school
- Advising entrepreneurs in their business development
- Reading stories about entrepreneurial people
- Debates

Apparent in this list is that most of these learning activities are related to activities that are mainly initiated by students themselves, like interacting with clubs, networking and starting own company with other students. Coaching by entrepreneurial professionals will probably be less likely to occur within VHL because of busy schedules of entrepreneurs. Advising entrepreneurs in their business development is probably difficult to introduce within the curriculum, because of the fact that the students are not yet graduated and still have to learn before they can really advise entrepreneurs. Advising entrepreneurs on business operation will be better suited, where the students have knowledge about operations occurring.
What is remarkable, is that the learning activities that occur less often, according to the students, are the learning activities that have quite a strong relations to the real-life setting, which is part of an authentic learning environment.
Furthermore, the learning activities that occur often according to the students have a real-life setting in the safe environment of VHL itself. There is also the use of role modelling, like guest lectures and company excursions, which increases the authentic learning environment according to Nab et al. *(2011)*. Entrepreneurs tend to learn from others and working together in groups is equally important, where performing group work is an authentic learning activity that occurs often at VHL according to the students.

Student characteristics and developing entrepreneurial mindset
At first, developing entrepreneurial mindset seemed to be correlated with gender, entrepreneurial parents, social norm and self efficacy after correlation analysis. Female students tend to give a lower appreciation to developing entrepreneurial mindset. Furthermore, students without entrepreneurial parents tend to score their appreciation for developing entrepreneurial mindset lower than students with entrepreneurial parents. Of the specific student characteristics, social norm and self efficacy give a higher appreciation to developing entrepreneurial mindset. This was however without correcting for any other factor that might influence the variable as well, indicating that results found have less importance than it appears.
After modelling of the possible factors influencing developing entrepreneurial mindset, it became apparent that study year, location and self efficacy are significantly responsible for some of the variance within the component “developing entrepreneurial mindset”.

The question about learning activities was formulated as: “To what extent were the various learning activities present in the courses you have followed so far at VHL?”, where the students could score these from 1 (not at all present) to 5 (very much present). Therefore, students who just entered the study programme at VHL shall automatically have experienced less learning activities mentioned in the question than students who already have been at VHL for several years. Hence that study year is one of the variables that is responsible for some of the variance within developing entrepreneurial mindset.

Location is another variable that is responsible for some of the variance within “developing an entrepreneurial mindset”, according to regression analysis. Apparently, students at VHL Leeuwarden recognize the learning activities related to developing an entrepreneurial mindset more than the students of VHL Wageningen. The component “developing an entrepreneurial mindset” is related to learning activities that are mostly initiated by students themselves, where the students at VHL Leeuwarden apparently experience more freedom to undertake these activities.

For the component “developing entrepreneurial mindset” it is important that the students show initiative to be involved in these specific learning activities. Furthermore, to be involved in these learning activities it is important that the student is interested in entrepreneurial activities, otherwise the student would be less likely to participate. This was investigated in this study through questions about the entrepreneurial attitude of the students. This was however mainly focused on a future as a real entrepreneur and not at entrepreneurial learning activities when in school. The results of these questions is presented in table 20, classified according to location.

Table 20. Entrepreneurial attitude results of survey, classified for location

Score	Wageningen	%	Leeuwarden	%
1-2	8	3,54	7	3,80
2-3	35	15,49	36	19,57
3-4	77	34,07	96	52,17
4-5	106	46,90	45	24,46
Total	226	100,00	184	100,00

Table 20 shows that students at VHL Wageningen in general have a higher entrepreneurial attitude when we consider the score 4 – 5 the highest.
Furthermore, differences exist between the two locations in regards to:

- Different study programmes
- Different culture (VHL Leeuwarden in the North of The Netherlands, where VHL Wageningen is more in the south of The Netherlands)
- Language (VHL Leeuwarden has Dutch as the main language, VHL Wageningen has English as main language)
- International students among Dutch students

There are multitude differences between the two locations and these might altogether are responsible for the fact that students from VHL Leeuwarden identify learning activities offered different than the students from VHL Wageningen. These differences might be taken into consideration when students are choosing their university.

The last variable that was responsible for some of the variance within developing entrepreneurial mindset was self efficacy. Entrepreneurial self efficacy was about the believe of the student in his or her own abilities to start a new company within this survey. The component ”developing entrepreneurial mindset” contains the learning activities where the student initiate the activities and

therefore a high self efficacy seems to be important in order to facilitate the initiation of the learning activities.

Self efficacy has been employed in literature regarding career options, preferences, choices and career oriented behaviours*(Betz et al., 1981, 1983; Eccles, 1994; Hackett et al., 1981)*. Several studies have been conducted towards entrepreneurial self efficacy and entrepreneurial intentions. Apparently, individuals that indicate a higher self efficacy towards entrepreneurship have higher entrepreneurial intentions *(Chen et al., 1998; DeNoble et al., 1999; Krueger et al., 2000; Scott et al.,1988; Segal, Borgia et al., 2002; Wang et al., 2002).* People who show high entrepreneurial self efficacy are more likely to believe they also have an actionable idea to work on *(Wilson et al., 2007)*.

In that perspective, self efficacy as one of the variables explaining some of the variance in developing entrepreneurial mindset is quite logic. Where the learning activities, especially in this component are student initiated, a positive self efficacy is necessary to be involved in these activities. Self efficacy as part of models of entrepreneurial career intentions have been investigated and have shown to have a strong predictive ability *(Wilson et al., 2007)*.

Important to acknowledge is that several studies have found that gender is a significant variable that explains some of the differences in career self efficacy *(Lent et al., 1987; Nevill et al., 1988)*, where woman tend to have a lower entrepreneurial self efficacy *(Chen et al., 1998, Chowdhury et al., 2005; Gatewood et al., 2002; Kourilsky et al., 1998)*. Within this study there was also a negative and significant correlation found between self efficacy and gender, indicating that self efficacy depends partly on gender.

The component “developing entrepreneurial mindset” contains a high level of authentic learning activities, where the activities within this component have a lot of real-life relevance. The student is able to experience entrepreneurial activities in the real world and interact with entrepreneurial people. Furthermore, the activities within this component have high levels of uncertainty, innovation and emotion, which according to Baron *(1998)* is where entrepreneurship education should be focused on in order to be authentic. Working with entrepreneurs in the field can give students opportunities to network, which can make the activities more authentic *(Nab et al., 2010)*. According to Nab et al. *(2010)* it is important that even though a realistic environment needs to be created through authentic activities, students need to be protected against too risky and unsafe conditions which protects them against (financial) risks. Therefore, it is favourable that the students can practice these activities when they are still in school.

Student characteristics and engaging in business projects

Initially, “engaging in business projects” seemed to be correlated with study programme, entrepreneurial parents, attitude, social norm and self efficacy after correlation analysis. This indicates that differences occur among study programmes in regard to the appreciation of engaging in business projects. Also, students without entrepreneurial parents tend to rate the component “engaging in business projects” lower than students with entrepreneurial parents. Furthermore, students who give a higher score to specific student characteristics tend to have a higher appreciation for the component “engaging in business projects”. This was however without correcting for any other factor that might influence the variable as well, indicating that results found have less importance than it appears.

After modelling of the possible factors that could influence engaging in business projects, it became apparent that study year, study programme and self efficacy are factors that significantly predict part of the variation in engaging in business projects.

As previously mentioned with the component “developing entrepreneurial mindset”, study year is a variable that probably predicts part of the variation within engaging in business projects due to the fact that first year students would not have experienced a lot of learning activities compared to students that are already several years at VHL.

Study programme is one of the variables that predicts part of the variance within the engaging in business projects component. The results suggest that the study programmes that have less to do with businesses like food technology, water, energy and environment, do seem to recognize learning activities regarding engaging in business projects less often than students which attend study programmes related to management and business, e.g. animal husbandry, agribusiness etc. Therefore, it seems that business related learning activities are more likely to be recognized more often by students that focus on business within their study programme. Furthermore, the non-business related study programme might receive different learning activities than business related study programmes.

The last variable that was responsible for some of the variance within engaging in business projects was self efficacy. Entrepreneurial self efficacy was about the believe of the student in his or her abilities to start a new company within this survey. Engaging in business projects are the learning activities where the school initiates the learning activities and therefore a high self efficacy did not seem important. However, most of the activities within this component are related to set up a business (e.g. making business plan, business case studies, business plan competition) and with dealing with businesses (e.g. project for commissioner, advising entrepreneurs). A high self efficacy might be important in order to have confidence in one’s self that the task could be finished.

Self efficacy is about a person’s belief in his or her own capabilities to perform a given task and whether or not certain set goals may be attained *(Boyd et al., 1994)*. People who have a high level of self efficacy will set themselves more challenging goals and will feel a stronger commitment. Through experience, self efficacy is gradually developed *(Bandura, 1982; Gist, 1987)*.
According to Boyd et al. *(1994)* people select activities and environments based on their own judgements or perceptions of personal self efficacy. People would rather choose activities and situations where they judge themselves capable than activities that are exceeding their abilities in their own view *(Wood et al., 1989)*. Self efficacy can also influence other aspects, like developing skills, increase commitment and increase perseverance when faced with difficulties *(Bandura, 1982, Gist 1987)*. Within engaging in business projects self efficacy can influence the goals that are set for the tasks, e.g. wanting to win the business plan competition or are satisfied with a pass mark.
According to *Herrington et al. (2006)* authentic learning activities need to be poorly defined, have complexity, have an open end and some relations with real-life. Engaging in business projects has real-life association, do have complexity and are poorly defined. The purpose of these learning activities is to confront students with their own abilities and talents *(Nab et al., submitted)*, and with that increase self efficacy.

Competent role models can communicate effective strategies to tackle situations and these role models can affect self efficacy by social comparison *(Wood et al., 1989)*. Furthermore, self efficacy can mediate the perceived learning from entrepreneurial courses *(Zhao et al., 2005)*.
Providing students with a role model like real entrepreneurs can show students behaviours and actions in a real situation. For engaging in business projects, presenting a role model by means of projects for a commissioner, business case studies and advising entrepreneurs can assist in creating authentic learning environments and increase the entrepreneurial self efficacy.

Increasing meaningfulness of learning can be achieved by offering an authentic learning environment, according to *Snowman (2003).* When students can work on their own product or company, where they could make their own decisions, their motivation increases (Nab et al., 2010). Therefore their self efficacy might also increase and have an effect on engaging in business projects.

Similarities and differences between learning activities components

From the results it became apparent that both components are influenced by both study year and entrepreneurial self efficacy. The study year of the students logically relates to the types and amounts of learning activities that the students have experienced, where a first year student has not experienced as many learning activities than a student in a higher study year.
Entrepreneurial self efficacy has also been described in the previous paragraphs. Recognition of learning activities increases when students possess higher entrepreneurial self efficacy.

For the learning activities component “developing an entrepreneurial mindset”, also the study location of the student predicts part of the variance within this component. Apparently, for this learning activities component the study location influences the recognition of the learning activities, as such that students at Leeuwarden score the learning activities higher. The component “developing an entrepreneurial mindset” is related to learning activities that are mostly initiated by students themselves, where the students at VHL Leeuwarden apparently experience more freedom to undertake these activities.

For the learning activities component “engaging in business projects”, also the study programme was responsible for part of the variance within this component. Apparently, this component contains learning activities that are mainly taught within study programmes that are focused on certain subjects like business or management.

Study programme is not a variable seen with the learning activities component “developing an entrepreneurial mindset”, since these learning activities are mainly student initiated and the component “engaging in business projects” is mainly school initiated. Therefore, the difference that occurs is based on the fact if teachers initiate the learning activities or the student.

4.1.2 Student characteristics and learning environments

The second research question within this study was about the relation between specific learning environments and student characteristics in entrepreneurship education. The answers were sought through a survey conducted at VHL.
Besides the learning activities within this study, attention was paid to the learning environment. The relationships between student characteristics and specific learning environments as stated in previous chapters, were investigated. Furthermore, the study investigated to what extent the students of VHL perceived their learning environment as entrepreneurial.
Within this paragraph the interpretation of the results are presented, including the relation with previous work and the relation to the stated objective of this study.

Perception of VHL students of entrepreneurial learning environment

One of the sub questions dealt with the extent to which students of VHL perceive their learning environment as entrepreneurial. Through a survey at VHL, the answers were sought, where the students were asked to answer several questions about learning environments and indicate how they experience the VHL learning environment.
The following learning environments were indicated with positive feedback most often by the students of VHL:

- Teachers encourage me to pursue new ideas
- Students are stimulated to pursue new ideas
- If you come up with a new idea you will receive positive feedback
- Creativity is awarded
- Students are stimulated to learn by doing
- Teachers discuss actual/recent developments in the market
- Interaction with organizations and businesses outside VHL is encouraged
- Students are stimulated to learn from mistakes or crisis
- There is room for change/improvement

From this list almost all questions are part of one of the components of learning environment, except for there is room for change/improvement.
This last one is difficult to interpret, as it can be interpreted that the learning environment is open to receive change/improvement. It could also be interpreted that the learning environment at VHL can use some change/improvement.
In the annual report of VHL *(2012)* it becomes apparent that VHL finds it important that there is a connection between the professional industry and the students. Therefore, the question about interaction with businesses outside of VHL is a good representative of this goal. The connection with the sector is integrated within an authentic learning environment and by using a lot of real-life cases.

Furthermore, VHL states in the annual report that it wants to stimulate his students in creativity and innovation, which is the main subject of several of the questions mentioned above (e.g. pursuing new ideas, positive feedback, creativity awarded, learning by doing, learning from mistakes).

On the other hand, the learning environments that were less often rated with a score of 4 or 5, according to the students, are:

- Students are stimulated to take (calculated) risks
- Negative reactions can be expected when the exact course instructions are not followed
- Students are expected to handle problems in a standardized way
- Teachers stick to safe and proved practices
- Emotional well-being of students is important and noticed

Apparent in this list is that most of these questions are not entrepreneurial focused (e.g. negative reactions, handle problems in standardized way, teachers stick to safe van proved practices). It is a sign of how the environment is experienced by the students of VHL, where the goal is to achieve an inspiring learning environment where creativity and innovation are important to guide students to become young proactive professionals.

“Students are stimulated to take risks” is one of the questions that receives less of a high score than for example “students are stimulated to learn by doing” or “Students are stimulated to learn from mistakes or crisis”. Apparently VHL students do feel that they have a safe learning environment, where they can express their creativity and work on innovations.

Student characteristics and a learning environment supporting creativity and new ideas

At first, “a supporting learning environment for creativity and new ideas” seemed to be positively correlated with all three of the student specific characteristics, attitude, social norm and self efficacy after correlation analysis. Students which give higher scores to these components tend to have a give a higher appreciation for the presence of a learning environment supporting creativity and new ideas. This was however without correcting for any other factor that might influence the variable as well, indicating that results found have less importance than it appears.

After modelling of the possible factors that could influence the appreciation of “a learning environment supporting creativity and new ideas”, it became apparent that only the variable location is a factor that significantly predicts part of the variation in the appreciation of a learning environment supporting creativity and new ideas. Entrepreneurial social norm was a variable that was not significant at p=0.051, however it is interesting to mention that experiencing the learning environment as creative and new ideas might depend on how the surrounding of the student reacts. As mentioned previously, the variable location can have different reasons behind it and a multitude of differences exist between VHL Leeuwarden and VHL Wageningen.

One of the differences between VHL Leeuwarden and VHL Wageningen which can be related to learning environments is the fact that VHL Leeuwarden has around 2150 *(reference date October 2012)* students and VHL only 500 students *(reference date October 2012)*. Furthermore, the ratio between male and female at VHL is about 50/50, where the ratio at VHL Wageningen is around 33% male and 67% female.

One other thing to keep in mind is that VHL Wageningen has its location within the main building of the University of Wageningen and therefore has more facilities in regard to options of following courses at the University and using resources of the University.

Incorporating an environment where creativity and new ideas are encouraged, means working with authentic learning environments. Within authentic learning environments one single ‘correct’ interpretation is not false but inadequate according to Spiro et al. *(1991)*. Innovative thinking and being creative would fit with this mindset. Scaffolding by teachers towards students to let them pursue new ideas and give positive feedback fits within the idea of an authentic learning environment. Within VHL Wageningen there might be some influence from the fact that students are in the near proximity of the University and take up some of the scientific manner of thinking that way.

In table 21 the differences in mean are presented between the different locations, where it can be seen that students of VHL Wageningen experience their learning environment more as creative and open for new ideas than students of VHL Leeuwarden.

Table 21. Distribution of scores on a learning environment supporting creativity and new ideas

		95% Confidence interval	
	Mean	Lower bound	Upper bound
VHL Wageningen	3,5279	3,4327	3,6231
VHL Leeuwarden	3,2368	3,1431	3,3306

Student characteristics and a learning environment supporting entrepreneurial learning process
Initially, a learning environment supporting the entrepreneurial learning process seemed to be positively correlated with entrepreneurial parents and attitude after correlation analysis. Indicating that students without entrepreneurial parents tend to give a higher appreciation for the presence of a learning environment supporting entrepreneurial learning process. Furthermore, students which give a higher score to attitude tend to give a higher appreciation to the presence of a learning environment supporting entrepreneurial learning process. This was however without correcting for any other factor that might influence the variable as well, indicating that results found have less importance than it appears.
After modelling of the possible factors that could influence the appreciation of a learning environment supporting entrepreneurial learning process, it became apparent that location, study programme, entrepreneurial parents and attitude are factors that predict part of the variation in the appreciation of a learning environment supporting entrepreneurial learning process.

Location is one of the variables that predicts part of the variation within the appreciation of a learning environment supporting entrepreneurial learning process, which previously has been discussed as a variable that can be influenced by several other factors. Apparently, there is a difference between the two locations within the learning environment supporting the learning process. From the regression analysis it becomes clear that students at VHL Wageningen appreciate the supporting learning environment for entrepreneurial learning process higher than students at VHL Leeuwarden, as can be seen in table 22.

Table 22. Distribution of scores on a learning environment supporting entrepreneurial learning process

		95% Confidence interval	
	Mean	Lower bound	Upper bound
VHL Wageningen	3,6223	3,5375	3,7072
VHL Leeuwarden	3,1984	3,1098	3,2869

Study programme is one of the variables that predicts part of the variance within “a learning environment supporting entrepreneurial learning process”. Within this learning environment component the parts are focused on supporting the student in the learning process by the teachers. There might exist differences in the way teachers approach the students between the different study programmes. Furthermore, students and teachers from management study programmes might focus more on stimulating students to learn themselves by trying than study programmes where this is more difficult like with food technology.

The third variable that predicts part of the variation in the appreciation of “a learning environment supporting entrepreneurial learning process” is if students have self-employed parents or not. Students with self-employed parents tend to score this learning environment lower than students without self-employed parents. When we look at entrepreneurial intentions for students with self-

employed parents, there are different outcomes of several researches. In some studies significant correlation could be found, but not always *(Kolvereid, 1996, Wang et al., 2004)*. Parents as a role model for students has been reported several times to have a relationship with the choice for an entrepreneurial career (*Scott et al., 1988, Matthews and Moser, 1995)*. Within an authentic learning environment, exposing students to a role model like real entrepreneurs can show students behaviours and actions in real situations. Herrington et al. *(2006)* suggest observing entrepreneurs in their natural habitat, where observing self-employed parents fits with this proposition.
Student with self-employed parents might be exposed more to other entrepreneurial persons within the network of their parents and therefore have a different view on entrepreneurial learning *(Lans et al., 2010)*. A study conducted by Scherer et al. *(1989)* concluded that the presence of a self-employed parent as a role model was associated with raised aim in education, increased self efficacy and the spirit towards an entrepreneurial future career. Indicating that students with self-employed parents might have a different view on the way teachers handle the learning environment than students who do not. According to Kolvereid *(2006*) parents with an own business only influence entrepreneurial intentions through the effect on attitude, subjective norm and perceived behavioural control.

The final variable that predicts part of the variance within the learning environment component "a learning environment supporting entrepreneurial learning process" is attitude. Within the survey the students were asked to answer some statements about their attitude towards an entrepreneurial future. Attitude depends on the person and on the situation. According to Krueger et al. *(2000)* suggests that attitude can explain over 50% of the variance within intentions. The attitude of students towards entrepreneurship can be influenced through the prior lessons and the amount of role models presented through life *(Shapero, 1975)*.
Students who have a positive attitude towards an entrepreneurial future can have a different view on learning environments like a learning environment supporting entrepreneurial learning process. According to the regression analysis, students with a higher attitude towards entrepreneurship tend to experience the learning environment supporting the learning process more often than students with a lower attitude. According to Curran *(1996)*, the attitude of students is mainly derived from previous experiences from attitude of parents, fellow students and teachers. Furthermore, when the social environment of students is positive towards entrepreneurship by means of a supportive learning environment which encourages students to explore for example, the attitude could also be increased *(Henderson et al., 2000)*.

Similarities and differences between learning environment components
From the results it became apparent that the variable location explains part of the variance for both "the learning environment supporting creativity and new ideas" and for "the learning environment supporting the learning process".

The component "a learning environment supporting the learning process" was further explained by the variables student's study programme, self employed parents and entrepreneurial attitude of students.

The fact that study programme is one of the variables predicting the assessment of students of the learning environment supporting the entrepreneurial learning process and not for the supporting learning environment for creativity and new ideas can be found in the nature of the parts that the components contain. A learning environment supporting creativity and new ideas is more related to the main vision of VHL as an university, where a learning environment supporting entrepreneurial learning process is more related to how teachers approach the students which can be different for each study programme.

Entrepreneurial parents is a variable that predicts part of the variance in “a learning environment supporting entrepreneurial learning process”, but not in “a learning environment supporting creativity and new ideas”. Apparently, students at VHL experience their learning environment regarding the possibilities of being creative and innovative equally, independent of having self-employed parents or not. As mentioned previously, VHL’s statement is to create an inspiring learning environment where students can utilize their talents at best to be creative and innovative. Because this is so highly present within the believes of VHL, most students will probably experience this kind of learning activity.

What is surprising is that attitude is not a variable that predicts parts of the variance within “a learning environment supporting creativity and new ideas”. Where entrepreneurship is about creating a new idea in the first place, followed by starting up a new business. According to the Commission of European Communities *(2006)*, entrepreneurship is about the ability of an individual to turn ideas into action which includes creativity, innovation and risk taking.
Students with an entrepreneurial attitude might consider the freedom to act towards other businesses and engage in new activities more important than their peers who have a lower entrepreneurial attitude. In regards to a supporting learning environment for creativity and new ideas, attitude seems less important, because students probably choose VHL because of the open culture and the innovative nature of the school.

4.2 Limitations

Within this study a survey was used where some limitations were present that are described in this chapter.

4.2.1 Dispersion respondents

It became apparent that most of the respondents over the last three years attended the study programmes regarding management and business or animal husbandry management. Generalization is that students from these programs might have already a different mindset than students from other study programmes like food technology or developmental studies.

Empirical research however has shown that the presence of an entrepreneurial curriculum and a positive setting towards new business developers within the educational setting are a stimulus for students to follow an entrepreneurial future *(Fayolle et al., 2006)*. The fact that entrepreneurship education is present, according to the researchers, has a positive impact on enhancing entrepreneurial characteristics and the more likely the students are to take action at some point in their future career. Studies have shown that there are significant differences between students who followed entrepreneurship courses and those who didn't *(Fayolle et al., 2006)*.

Apparently, according to *Noel (2001)*, students who graduated in entrepreneurship scored higher on the tendency to act as an entrepreneur and have higher entrepreneurial intentions in comparison to students who graduated in management and those graduated in other disciplines that also attended entrepreneurial education. Entrepreneurial self efficacy on the contrary was not different for entrepreneurship graduates. There seemed to be some differences in study programme background, but the presence of entrepreneurial education has influence on all students participating regardless their study programme.

4.2.2 Learning activities and learning environments: item non response error

Within the questions about learning activity and learning environment the amount of missing values was slightly higher than in other parts of the survey. Missing values in this case are considered blank answers, students who ticked two boxes and answers that were obviously not seriously filled out, e.g. only answer 3. This may be due to several reasons. First, the questions about learning activities and learning environment are relatively large and may look unattractive. Second, these two questions clusters are positioned at the end of the survey and due to the fact that the survey is experienced as long, students might lose interest and fill out the easy answer (only 3) or just skip the questions. In some situations, there was some time pressure on the students due to the fact that the survey was conducted during the normal lessons. For students that ticked more than one box, it was probably not clear that only one answer was required.

Non response error is a problem regarding the survey quality, since it always introduces systematic bias into the collected data *(Miller, 2013)*.
This phenomenon is called non-response error, to be more precise, item non response error. Item non response error is when only individual questions remain unanswered. Most of the time, item non response error exists with sensitive questions about salary or criminal past. Within this study however there are no indications that the unanswered questions were due to this.

4.2.3 Common method bias

Campbell et al. *(1959)* were one of the first researchers who expressed concern about biasing effects that methods of measurement can have on the validity of measurements.
"The test, or rating scale, or other device, almost inevitably elicits systematic variance due to both groups of features. To the extent that irrelevant method variance contributes to the scores obtained, these scores are invalid" (Campell et al., 1959).

After this, other researchers investigated a similar problem, which is the biasing effects that measuring two or more concepts with the same method can have on estimates of the relationships between them *(Podsakoff et al., 2012)*. The main issue with this is, that some of the co-variation between concepts may be because of the fact that they were measured by the same method.

Responses can be more affected by method bias when respondents find it difficult to formulate an accurate response because of their ability of because of the difficulty of the question, but also when they are lacking motivation to provide accurate response *(Podsakoff, 2012)*. Within this study the difficulty is that the questionnaire is offered in English to students from English study programs (but who do not have English as a first language) and partly in Dutch to students from Dutch study programs, which can make the questionnaire difficult. By means of a supervisor who can be addressed for questions, it has been tried to reduce the common method bias due to difficulty in the questionnaire.

One of the things that is important according to several researchers *(Podsakoff et al., 2012)* is the avoidance of common scale properties. Feldman et al. *(1988)* mentioned that method bias "will occur to the extent that the question formats are perceived to be similar by respondents, because the similarity of the response format enhances the probability that cognitions generated in answering one question will be retrieved to answer subsequent questions" *(Feldman et al., 1988)*. Within the questionnaire different types of question formats were used, e.g. giving marks, using a scale from 1 to 5 to indicate the level of agreement, open questions and multiple choice questions. Several studies confirm the effectiveness of this way of preventing method bias.

Also the avoidance of ambiguity is important to reduce common method bias. Ambiguity is about elements that are difficult to interpret and people have to come up with their own definition. Respondents are likely to give answers that are or extreme or midpoint answers, when respondents are not feeling sure about the question or statement. Avoiding statements and words which are difficult, can mean different things and the use of words like many and sometimes can reduce the amount of ambiguity *(Podsakoff et al., 2012)*. Within this study the questionnaire used has explanation about new or difficult words and reference is made to difficult concepts.

4.2.4 Response bias

One of the things to keep in mind when conducting a survey is the possibility of response bias. Response bias is one of the types of cognitive bias that can influence statistical surveys when the respondents answers the questions in the way they think the researcher wants them answered rather than answering according to their own view. Respondents are concealing the truth by giving different answers.

Response bias is a general term for all sorts of responses to interviews, surveys or questionnaires which can bias the result from the correct and honest result you would like. It can include answers that are thought to be socially desirable or the opposite where bad answers are faked, agreeing with questions, extremity response sets (always choosing extreme opposites) or the opposite where mid-

point answers are given *(Furnham, 1986)*. Reasons for this phenomenon can be due to the nature of the question, but also because of the motives of the respondents *(Kalton et al., 1982)*.
One of the reasons for response bias is social desirability, a definition has been given by Nederhof (1985): “tendency to deny socially undesirable traits and to claim socially desirable ones, and the tendency to say things which place the speaker in a favourable light”. Faking answers on purpose and dissimulation can be referred to on the other hand to a dishonest response.

One of the issues within this study is the fact that students need to fill out some personal information as name, student number and study programme in order for the research to match respondents that have filled out the survey at a previous data collection moment. The lack of anonymity could contribute to response bias, according to Becker *(1976)*. When respondents know someone would evaluate their response, more biasing can take place. Therefore some form of anonymity should be taken into consideration.
Within this study, the students were given a short presentation in advance to inform them about the study and the way the data would be handled. Some students choose to not fill out their name or their student number, this was allowed.
Surveys that were obviously not seriously filled out were removed from the data collection. Signs for this were all same answers at questions (e.g. all score 3 or all mark 10).

5. Conclusions

The study was designed to determine the relationships between student characteristics, learning activities and learning environments in entrepreneurship education, by considering relevant theories, and by using a survey conducted at Van Hall Larenstein. The literature on entrepreneurial education focus mainly on the effect of entrepreneurship education on learning outcomes. Little research however has been done on presage and process factors and the interactions that might happen along the way. This study was set up to answer two questions to get more insight into these interactions:

1. What is the relation between specific learning activities and student characteristics in entrepreneurship education,
   According to the literature?
   According to student questionnaire?
   a. What kinds of entrepreneurship learning activities does VHL apply in order to facilitate entrepreneurship education/ entrepreneurship thinking?
   b. What is the relation between entrepreneurship student characteristics and specific learning activities they participate in?

2. What is the relation between learning environment and student characteristics in entrepreneurship education,
   According to the literature?
   According to student questionnaire?
   a. To what extent do students of VHL perceive their learning environment as entrepreneurial?
   b. What is the relation between entrepreneurship student characteristics and their perception of specific elements of the learning environment at VHL?

Relationships specific learning activities and student characteristics

This study has shown that students of Van Hall Larenstein indicate in the survey that the top 4 of learning activities most present during their study was:

1. Guest lecturers
2. Company excursions
3. Presenting (i.e. pitching an entrepreneurial idea)
4. Performing group work with students from other VHL studies

The learning activities that VHL applies according to the students to facilitate entrepreneurship education and thinking are focused on a real-life setting within the safe environment of VHL itself. These learning activities are mainly initiated by VHL itself and exposes the students to different activities. The top 4 learning activities all have a form of authentic learning, where we can distinguish real-life learning settings and role modelling.

The relation between entrepreneurship student characteristics and the specific learning activities was focused for both components on both the study year of the students and the entrepreneurial self efficacy of the students. Furthermore, the results of this study indicate that the relationship between student characteristics and learning activities focused on developing an entrepreneurial mindset, was influenced by the study location of the student besides the study year and self efficacy. For the learning activities focused on engaging in business projects, the variable that explained part of the variance besides study year and self efficacy was study programme.

Study year as an explanatory variable shows that students experience different learning activities when they proceed in their studies.
Entrepreneurial self efficacy is the variable that influences both learning activity components, where self efficacy is about a person's belief in his or her own capabilities. A stronger believe in the ability of starting an own business increases the experience and recognition of certain learning activities.
Location as an explanatory variable for the learning activities component developing an entrepreneurial mindset and not for the component engaging in business projects might indicate that for student initiated learning activities, students experience more freedom at VHL Leeuwarden.
Study programme was an explanatory variable for the learning activities component engaging in business projects, but not for the component developing an entrepreneurial mindset. This difference might be in the nature of the learning activities, where engaging in business projects is mainly initiated by VHL and developing an entrepreneurial mindset more by the students themselves.

Relationships specific learning environments and student characteristics
This study has shown that the extent to which the students of VHL perceive their learning environment as entrepreneurial relatively high. The learning environments that receive high counts of students regarding it as present are as top 4:

1. Students are stimulated to learn by doing
2. If students come up with a new ideas they will receive positive feedback
3. There is room for change/ improvement
4. Students are stimulated to learn from mistakes or crisis

The learning environments presented above are in line with the strategy of VHL, according to the annual report of VHL. VHL entails an entrepreneurial learning environment that has a strong connection with the professional industry and stimulates creativity and innovation.

Many of learning environments are indicated by students as much (score 4) and very much (score 5) present. It is positive that the learning environments that had less scores 4 and 5 are related to non entrepreneurial and authentic learning environments.

Multiple regression analysis revealed that the relationship between student characteristics and specific learning environments was focused for both learning environment components on the study location of the students. The study location of the students influences their experience of their learning environments. This might indicate that there are differences between the two location regarding the level of freedom the students experience to be creative and innovative and the amount of support they received during their learning process. Several possible reasons for this have been suggested in this report.

For the learning environment component supporting entrepreneurial learning process also the variables study programme, entrepreneurial parents and entrepreneurial attitude of students was explanatory. Study programme probably explained part of the variance within this component through the fact that a learning environment supporting entrepreneurial learning process is more related to how teachers approach the students, which can be different for each study programme. Where the learning environment focused on creativity and new ideas probably is more related to the main vision of VHL as an university. This might also be the case for the absence of the explanatory variable 'entrepreneurial parents' in the component of a learning environment supporting creativity and new ideas, where the environment has been set up within VHL to support students to be creative and come up with new ideas. The last variable, student's entrepreneurial attitude, that explained part of the variance within the component a learning environment supporting the learning

process, might be that students that have a higher entrepreneurial attitude recognize and appreciate support in the learning process more due to their already positive attitude towards entrepreneurial activities.

Contribution

The current findings add to a growing body of literature on entrepreneurship education, especially in the field of presage and process factors within entrepreneurship education. Better insight has been obtained about the relationships and interactions between student characteristics, specific learning activities and specific learning environments, where entrepreneurship education at Van Hall Larenstein can be adapted in order to increase the entrepreneurial outcomes of entrepreneurship education.

6. Limitations and recommendations for future research and education

Results from this study answers questions, but furthermore raise questions. As well, limitations are present within the current study that are important to note. The limitations of this study and the recommendations for future research as well as for future entrepreneurship education are presented in this chapter.

6.1 Limitations and recommendations for future research

Within this study several components were not measured or analyzed. Within this paragraph these will be mentioned. Furthermore, recommendations for future research are made.

The present study did not examine the background of students with entrepreneurial parents and to what extent these students witnessed their parents in an entrepreneurial environment (e.g. home business) or if parents encouraged these students to follow their parents by taking over the business or starting their own business. A lot is unknown in this study about the background of students with entrepreneurial parents.

Furthermore, the study did not look further at differences between the two locations of VHL. Locations seems to be an important factor when dealing with some learning activities and learning environments, so knowing the background of this would be useful.

Self efficacy is one of the variables that influences the learning activities within this study. Apparently there are differences between people with a high entrepreneurial self efficacy and those with a lower self efficacy for entrepreneurship. It would be interesting to find why self efficacy matters within this context and how entrepreneurial self efficacy is developed.

Study year as a variable that has influence on the learning activities experienced is logic, but in this study we did not look at where the turning point is. Therefore, it would be interesting to see if the experience of learning activities is only low in the first year or that it gradually develops.

Survey used in this study was received by the students as too long. Therefore it would be suggested that using a shorter survey would be better, or conduct the survey in two sittings. Furthermore, students with Dutch as their first language should receive the complete survey in Dutch to increase the fill out rate and the reliability of the survey.

6.2 Recommendations for education

With the results of this study, different recommendations can be made towards the entrepreneurship education in order to attempt to improve the outcomes.

Even though almost 50% of the students indicate that they work together with other VHL studies, study programme is still a variable that influences the view of students on learning activities related to engaging in business projects and on the supportiveness of the learning environment for the entrepreneurial learning process. Therefore, working together more within an entrepreneurial setting, where ideas and views can be exchanged and where students can motivate one another.

Location influences three of the four components used in the present study. Apparently differences exist between the two locations of VHL. Therefore it is wise to investigate further why these differences exist. By interacting with students from the other location, students might develop different views, attitudes and perceptions about entrepreneurship education. Working more together, students and teachers, in order to benefit from the differences that are present between the two locations.

Most of the learning activities that were most present according to the students were more real-life based within the safe environment of VHL and initiated by VHL, but the learning activities that are more real-life based and initiated through the students were less present. Therefore, investigating in what way these learning activities can be incorporated more in the curriculum in a safe way would be interesting in order to stimulate the entrepreneurial mindset.

Entrepreneurial parents was the variable that only affected a learning environment supporting the entrepreneurial learning process, where students with entrepreneurial parents tended to score this learning environment lower than their fellow students. It became clear that almost 50% of the students at VHL have self-employed parents. Visiting the businesses of the parents could give more insight into why these students feel that there learning environment is less supportive for the entrepreneurial learning process than those that do not have self-employed parents. The other students could learn from these experiences and it also increases the level of real-life activities within the study activities.

A higher entrepreneurial attitude resulted in a higher experience of a learning environment supporting entrepreneurial learning process. Apparently, students with higher entrepreneurial attitude are quicker in saying that their environment is supportive for the entrepreneurial learning process. To let the students with a lower entrepreneurial attitude see that their learning environment is supportive for the entrepreneurial learning process of them interacting with other businesses and to learn by doing might increase their entrepreneurial attitude.

Increasing the confidence of students that they are capable of starting their own business would have a positive effect on the initiative of students to partake in entrepreneurial activities.

References

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. British journal of social psychology, 40(4), 471-499.

Bandura. A. (1982). Self-efficacy mechanism in human agency. American Psychologist, i7(2). 122-147 Gist, M.E. (1987). Self efficacy: Implications for organizational behavior and human resource management. Academy of Management Review, 12(3), 472-485.

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

Becker, W. M. (1976). Biasing effect of respondents "identification on responses to a social desirability scale: a warning to researchers". Psychological Reports, 39(3), 756-758.

Betz, N. *&* Hackett, G. *(*1981*).* The relationship of career-related self-efficacy expectations to perceived career options in college men and women*.* Journal of Counseling Psychology*,* 28*,* 399–410*.*

Betz, N. *&* Hackett, G. *(*1983*).* The relationship of mathematics self-efficacy expectations to the selection of science-based college majors*.* Journal of Vocational Behavior*,* 23*,* 329–345*.*

Biggs, J.B. (1987). Student Approaches to Learning and Studying. Hawthorn: Australian Council for Educational Research.

Biggs, J. B. (1993). From theory to practice: A cognitive systems approach. Higher education research and development, 12(1), 73-85.

Boyd, N. G., & Vozikis, G. S. (1994). The influence of self-efficacy on the development of entrepreneurial intentions and actions. Entrepreneurship Theory and Practice, 18, 63-63.

Brown, J.S., Collins, A., Duguid, P. (1989). Situated cognition and the culture of learning. Educational Researcher, 18(1), 32-42.

Chen, C., Greene, P., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? Journal of Business Venturing, 13, 295–316.

Chowdhury, S. & Endres, M. (2005). Gender difference and the formation of entrepreneurial self-efficacy. Presented at the United States Association of Small Business (USASBE) Annual Conference, Indian Wells, CA.

Commission of the European Communities (2006). Implementing the Community Lisbon Programme: Fostering entrepreneurial mindsets through education and learning. Communication from the commission to the council, the European parliament, the European economic and social Committee and the committee of the regions.

Dart, B. C., Burnett, P. C., Purdie, N., Boulton-Lewis, G., Campbell, J., & Smith, D. (2000). Students' conceptions of learning, the classroom environment, and approaches to learning. The Journal of Educational Research, 93(4), 262-270.

De Corte, E., (1990). Towards powerful learning environments for the acquisition of problem-solving skills. European Journal of Psychology of Education, 5 (1), 5-19.

De Corte, E., Verschaffel, L., Masui, C. (2004). The CLIA-model: A framework for designing powerful learning environments for thinking and problem solving.European Journal of Psychology of Education, 19(4), 365-384.

DeNoble, A., Jung, D., & Ehrlich, S. (1999). Entrepreneurial self-efficacy: The development of a measure and its relationship to entrepreneurship.

Do Paço, A., Ferreira, J. M., Raposo, M., Rodrigues, R. G., & Dinis, A. (2013). Entrepreneurial intentions: is education enough?. International Entrepreneurship and Management Journal, 1-19.

Dochy, F., Segers, M., Van den Bossche, P., Gijbels, D. (2003). Effects of problem-based learning: A meta-analysis. Learning and instruction, 13(5), 533-568.

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

Duffy, T.M., Savery, J.R., (1996). Problem based learning: An instructional model and its constructivist framework. In B.G. Wilson (Ed.), Constructivist learning environments: Case studies in instructional design (pp. 135-148). Englewood Cliffs, NJ: Educational Technology.

Dunteman, G.,H. (1989). Principal components analysis. Thousand Oaks, CA: Sage Publications, Quantitative Applications in the Social Sciences Series, No. 69.

Engel, C. E. (1997). Not just a method but a way of learning. The challenge of problem-based learning, 2, 17-27.

European Commission (2008). Entrepreneurship in higher education, especially within non-business studies. Final report of the expert group.

European Commission (2013). Entrepreneurship Education: A Guide for Educators, Entrepreneurship and Social Economy Unit, Directorate-General for Enterprise and Industry

Eurydice network, (2012). Entrepreneurship Education at School in Europe National Strategies, Curricula and Learning Outcomes, Education, Audiovisual and Culture Executive Agency (EACEA P9 Eurydice and Policy Support).

Eccles, J. (1994). Understanding women's educational and occupational choices. Psychology of Women Quarterly, 18, 585–609.

Fayolle, A., Klandt, H. (2006)[1]. Issues and newness in the field of entrepreneurship education; new lenses for new practical and academic questions, International Entrepreneurship Education, Edward Elgar publishing, Aldershot, pp. 1-17.

Fayolle, A., Gailly, B., & Lassas-Clerc, N. (2006)[2]. Assessing the impact of entrepreneurship education programmes: a new methodology. Journal of European Industrial Training, 30(9), 701-720.

Field, A. (2009). Discovering statistics using SPSS. Sage publications.

Fraser, B. J. (1982). Assessment of Learning Environments: Manual for Learning Environment Inventory (LEI) and My Class Inventory (MCI). Third Version.

Furnham, A. (1986). Response bias, social desirability and dissimulation. Personality and individual differences, 7(3), 385-400.

Galarneau, L. (2005). Authentic learning experiences through play: Games, simulations and the construction of knowledge.

Gatewood, E., Shaver, K., Powers, J., & Gartner, W. (2002). Entrepreneurial expectancy, task, effort and performance.Entrepreneurship Theory and Practice, 27(Winter), 187–206.

GEM (2008). Global Entrepreneurship Monitor - Executive Report 2008. GEM.

Gibb, A. (1999), "Can we build effective entrepreneurship through management development?", Journal of General Management, Vol. 24 No.4, pp.1-21.

Gibb, A. (2002). Creating conducive environments for learning and entrepreneurship: living with, dealing with, creating and enjoying uncertainty and complexity. Industry and Higher Education, 16(3), 135-148.

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

Gibb, A. (1997). Small firms’ training and competitiveness. Building upon small business as a learning organisation, International Small Business Journal, 15(3), 13-29.

Gibb, A. (2005), "Towards the entrepreneurial university: entrepreneurship education as a lever for change", National Council for Graduate Entrepreneurship, Birmingham, 3 May.

Gibcus,P., de Kok, J., Snijders, J, Smit, L., van der Linden, B., (2012). Effects and impact of entrepreneurship programmes in higher education, European Commission, DG Enterprise and Industry.

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

Hackett, G. & Betz, N. (1981). A self-efficacy approach to the career development of women. Journal of Vocational Behavior, 18,326–339.

Henderson, R., & Robertson, M. (2000). Who wants to be an entrepreneur? Young adult attitudes to entrepreneurship as a career. Career Development International, 5(6), 279-287.

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. Educational technology research and development, 48(3), 23-48.

Herrington, A., Herrington, J., (2006). Chapter 1.8 What is an Authentic Learning Environment?, Authentic Learning Environments in Higher Education, pp. 1-14, copyright 2006 by Information Science Publishing.

Hill, J.R., & Hannafin, M.J. (2001). Teaching and learning in digital environments: The resurgence of resource-based learning environments. Educational Technology Research and Development, 49(3), 37-52.

Honebein, P.C., Duffy, T.M., & Fishman, B.J. (1993). Constructivism and the design of learning environments: Context and authentic activities for learning. In T.M. Duffy, J. Lowyck & D.H. Jonassen (Eds.), Designing environments for constructive learning (pp. 87-108). Heidelberg: Springer-Verlag.

Hutcheson, G. D., & Sofroniou, N. (1999). The multivariate social scientist: Introductory statistics using generalized linear models. Sage.

Jack, S. L., & Anderson, A. R. (1999). Entrepreneurship education within the enterprise culture: producing reflective practitioners. International Journal of Entrepreneurial Behaviour & Research, 5(3), 110-125.

Jones-Evans, D., Williams, W., & Deacon, J. (2000). Developing entrepreneurial graduates: an action-learning approach. Education+ Training, 42(4/5), 282-288.

Kaiser, H. F. (1974). An index of factorial simplicity. Psychometrika, 39(1), 31-36.

Kalton, G., & Schuman, H. (1982). The effect of the question on survey responses: A review. Journal of the Royal Statistical Society. Series A (General), 42-73.

Katz, J. A. (2003). The chronology and intellectual trajectory of American entrepreneurship education: 1876–1999. Journal of business venturing, 18(2), 283-300.

Kuratko, D. F. (2005). The emergence of entrepreneurship education: development, trends, and challenges. Entrepreneurship Theory and Practice, 29(5), 577-598.

Kolvereid, L. 1996. Prediction of employment status choice intentions. Entrepreneurship Theory and Practice 21: 47–57.

Kolvereid, L., & Isaksen, E. (2006). New business start-up and subsequent entry into self-employment. Journal of Business Venturing, 21(6), 866-885.

Kourilsky, M. & Walstad, M. (1998). Entrepreneurship and female youth: Knowledge, attitudes, gender differences and educational practices. Journal of Business Venturing, 13, 77–88.

Krueger Jr, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. Journal of business venturing, 15(5), 411-432.

Lans, T., Gulikers, J., & Batterink, M. (2010). Moving beyond traditional measures of entrepreneurial intentions in a study among life-sciences students in the Netherlands. Research in Post-Compulsory Education, 15(3), 259-274.

Lans, T., Blok, V., & Wesselink, R. (2013). Learning apart and together: Towards an integrated competence framework for sustainable entrepreneurship in higher education. Journal of Cleaner Production.

Lent, R. & Hackett, G. (1987). Career self-efficacy: Empirical status and future directions. Journal of Vocational Behavior, 30,347–383.

Liñán, F., Rodríguez-Cohard, J. C., & Rueda-Cantuche, J. M. (2011). Factors affecting entrepreneurial intention levels: a role for education. International Entrepreneurship and Management Journal, 7(2), 195-218.

Litwinska, A., European Commission, (2006). Classification of learning activities – Manual, ISSN 1725-0056, ISBN 92-79-01806-X.

Lorsbach, A., & Jinks, J. (1999). Self-efficacy theory and learning environment research. Learning environments research, 2(2), 157-167.

Matlay, H., Carey, C. (2007), "Entrepreneurship education in the UK: a longitudinal perspective", Journal of Small Business Enterprise and Development, Vol. 14 No.2, pp.252-63.

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

Matthews, C.H., Moster, S.B., (1995) Family background and gender: Implications for interest in small firm ownership, Entrepreneurship and Regional Development, 7: 365 – 377.

Miller, P.R., retrieved at 2013 from: http://www.dism.ssri.duke.edu/pdfs/Tipsheet%20-%20Nonresponse%20Error.pdf DISM Survey Research Associate TIPSHEET – NONRESPONSE ERROR DISM: Duke Initiative on Survey Methodology.

Nab, J., Pilot, A., Brinkkemper, S., & Ten Berge, H. (2010). Authentic competence-based learning in university education in entrepreneurship.International Journal of Entrepreneurship and Small Business, 9(1), 20-35.

Nab, J., Lans, T., Keulen, van, H., Pilot, A., (Submitted). Practice what you preach? Pedagogical competences for the entrepreneurship teacher, Academy of Management Learning and Education (journal).

Nab, J., Jansen, S., van Keulen, H., & Pilot, A. (2011). Authentic learning in fostering informatics students' competence in identifying business opportunities.

Neck, C. P., Neck, H. M., Manz, C. C., & Godwin, J. (1999). "I think I can; I think I can": A self-leadership perspective toward enhancing entrepreneur thought patterns, self-efficacy, and performance. Journal of Managerial Psychology, 14(6), 477-501.

Nederhof, A. J. (1985). Methods of coping with social desirability bias: A review. European Journal of Social Psychology, 15(3), 263-280.

Nevill, D. & Schleckler, D. (1988). The relation of self-efficacy to willingness to engage in traditional/non-traditional career activities. Psychology of Women Quarterly, 12, 91–98.

Noel, T.W. (2001), "Effects of entrepreneurial education on intent to open a business", Frontiers of Entrepreneurship Research, Babson Conference Proceedings.

Packham, G., Miller, C., Jones, P., Jones, A. (2007), "Enterprise education and entrepreneurial attitude: a European perspective", paper presented at the 30th ISBE Conference, Glasgow.

Poikela, E., & Poikela, S. (1997). Conceptions of learning and knowledge-impacts on the implementation of problem-based learning. Zeitschrift fur Hochschuldidactik, 1, 8-21.

Reeves, T.C., & Reeves, P.M. (1997). Effective dimensions of interactive learning on the World Wide Web. In B.H. Khan (Ed.), Web-based instruction (pp. 59-66). Englewood Cliffs, NJ: Educational Technology.

In P.D.Reynolds, W.D.Bygrave, S.Manigart, C.M.Mason, G.D.Meyer, H.J.Sapienza & K.G.Shaver (Eds.), Frontiers of entrepreneurship research (pp. 73–87). Wellesley, MA: Babson College.

Riesbeck, C.K. (1996). Case-based teaching and constructivism: Carpenters and tools. In B.G. Wilson. (Ed.), Constructivist learning environments: Case studies in instructional design (pp. 49-61). Englewood Cliffs, NJ: Educational Technology.

Schelfhout, W. , Dochy, F., Janssens, S., (2004) The use of self, peer and teacher assessment as a feedback system in a learning environment aimed at fostering skills of cooperation in an entrepreneurial context, Assessment & Evaluation in Higher Education, 29:2, 177-201, DOI: 10.1080/0260293042000188465.

Scherer, R. F., Adams, J. S., Carley, S., & Wiebe, F. A. (1989). Role model performance effects on development of entrepreneurial career preference.

Scott, M. & Twomey, D. (1988). The long-term supply of entrepreneurs: Students' career aspirations in relation to entrepreneurship.Journal of Small Business Management, 26(4), 5–13.

Segal, G., Borgia, D., & Schoenfeld, J. (2002). Using social cognitive career theory to predict self-employment goals. New England Journal of Entrepreneurship, 5(2), 47–56.

Segers, M. S. (1996). Assessment in a problem-based economics curriculum. In Alternatives in assessment of achievements, learning processes and prior knowledge (pp. 201-224). Springer Netherlands.

Shapero, A. (1975). The displaced, uncomfortable entrepreneur. Psychology Today, November 9, 83–88.

Simons, J., Van der Linden, J., Duffy, T., (2000). New learning, Dordrecht Kluwer.

Snowman, J., & Biehler, R. (2003). Psychology applied to teaching. Boston/ New York: Houghton Mifflin Company.

Spiro, R.J., Feltovich, P.J., Jacobson, M.J., & Coulson, R.L. (1991b). Knowledge representation, content specification, and the development of skill in situation-specific knowledge assembly: Some constructivist issues as they relate to cognitive flexibility theory and hypertext. Educational Technology, 31(9), 22-25.

Trigwell, K. & Prosser, M. (1991). Improving the quality of student learning: the influence of learning context and student approaches to learning on learning outcomes. Higher Education 22:251-266.

Tynjälä, P. (1999). Towards expert knowledge? A comparison between a constructivist and a traditional learning environment in the university. International journal of educational research, 31(5), 357-442.

Van Dam, K., Schipper, M., & Runhaar, P. (2010). Developing a competency-based framework for teachers' entrepreneurial behaviour. Teaching and Teacher Education, 26(4), 965-971.

von Graevenitz, G., Harhoff, D., Weber, R. (2010). The effects of entrepreneurship education. Journal of Economic Behavior & Organization, 76, 90-112.

Wang, C.K., and P.–K. Wong. 2004. Entrepreneurial interest of university students in singapore. Technovation 24, no. 2: 163–72.

Wang, C., Wong, P., & Lu, Q. (2002). Tertiary education and entrepreneurial intentions. In P.Phan (Ed.), Technological entrepreneurship (pp. 55–82). Greenwich, CT: Information Age Publishing.

Wilson, B. G. (Ed.). (1996). Constructivist learning environments: Case studies in instructional design. Educational Technology.

Wilson, F., Kickul, J., & Marlino, D. (2007). Gender, entrepreneurial Self-Efficacy, and entrepreneurial career intentions: Implications for entrepreneurship Education1. Entrepreneurship theory and practice, 31(3), 387-406.

Wood. R., & Bandura. A. (1989). Social cognitive theory of organizational management. Academy of Managemenl Review, 14(3), 361-384.

Yuen-Yee, G. C., & Watkins, D. (1994). Classroom environment and approaches to learning: An investigation of the actual and preferred perceptions of Hong Kong secondary school students. Instructional Science, 22(3), 233-246.

Zhao, H., Seibert, S. E., & Hills, G. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. Journal of applied psychology,90(6), 1265.

Appendices

Appendix I Survey (UK version)

Introduction

1. Please indicate your name, student number, current study and year of entrance

- ❑ Name:_____
- ❑ Student number: _____
- ❑ Current Study:_____
- ❑ Year of entrance:_____
- ❑ Study year:_____

2. Gender

- ❑ Male
- ❑ Female

Learning outcomes

On the next page you will find a list of 7 competencies and related performance criteria. All these competencies focus on sustainable entrepreneurship: activities and processes to discover, evaluate and exploit opportunities in order to enhance sustainability. This can for instance be done by creating new activities, but also by managing or organizing existing processes in a new, innovative manner. ***With sustainability (issues) we mean challenges, such as energy saving, waste management, labour conditions, maintaining biodiversity, carbon foot print reduction and social responsibility.***

The performance criteria can more or less be applied to yourself. Rate yourself according to your own opinion about your performance for a criterion at this moment by giving yourself a mark between 1 and 10 (1 = low and 10 = high) for every criterion. Important is that you give yourself a honest mark for every performance criterion.

It could be that some of the criteria haven't been trained in your study program yet or didn't get the chance to be trained in any other situation in your life (e.g. internship, work at home, holiday job). Show this by giving a low score for these criteria.

3. Diversity competence

I realise that sustainability issues are per definition issues that concern more disciplines (e.g. maths, biology, science, social science) to solve the problem or minimize the impact of the problem. I cannot solve challenges such as energy saving, waste management, labour conditions or reducing carbon footprints on my own.

Performance criteria	MARK (1-10)
a. I am able to bring together economic, social and environmental conflicts of interest	
b. I use the experiences, activities and values of various relevant stakeholders in addressing sustainability issues	
c. I am able to actively involve stakeholders and experts from other disciplines in addressing sustainability issues.	
d. I am able to explain the importance of involving local stakeholders (e.g. in recruitment) for a company	

4. Foresighted thinking competence

I realise that dealing with sustainability issues in my future job means that I have to be able to deal with uncertainty, I can make future prognoses, I am aware of others' expectations and am able to make, and when necessary change, plans.

Performance criteria	MARK (1-10)
a. I am able to deal with uncertainty.	
b. I am able to construct and consider different directions for sustainability in the future	
c. I am able to identify risks and opportunities inherent in present and future developments	
d. In analysing and evaluating scenario's for action, I take the impact on the short as well as the long term into consideration	
e. In analysing and evaluating scenario's for action, I take both the impact on the local and the global scale into consideration	
f. I have creative skills.	

5. Systems thinking competence

In my daily routines I apply a systems-thinking approach, meaning that before I start working on a sustainability issue I first identify the system(s) it may concern by examining the linkages and interactions between the elements that compose the system.

Performance criteria	MARK (1-10)
a. I am able to identify key aspects of production chains and agricultural eco-systems	
b. I am able to identify the key operations of a company that have a negative impact on the environment or society	
c. I am able to evaluate and assess all parts of the life cycle of a product, from extracting basic resources, through production and transportation, to use and disposal of the product.	
d. I am able to analyse strengths and weaknesses of production chains and propose improvements to reduce the negative effects on the environment or society	
e. I am able to integrate social, environmental and societal issues into future plans of a company	
f. I am able to formulate sustainability criteria for purchasing products or services	

6. Normative competence

I understand that sustainability issues are surrounded with lack of clarity. I know what trustworthy sources are and realise that facts and figures need translation to my own practice, because they cannot be applied on a one-to-one basis. The decisions I make or the initiatives I take are based on these insights.

Performance criteria	MARK (1-10)
a. I am able to select trustworthy sources that inform me about what is sustainable and what is not	
b. I am able to acquire the latest facts and figures about sustainability	
c. I am willing to take initiative to make improvements in my own practice based on norms, values, targets and principles of sustainability	
d. I know what is seen as 'good sustainable practice' in my field of study	
e. I am able to apply norms, values, targets and principles of sustainability to my own practice	
f. I know how to explain the decisions a company has made concerning sustainability	
g. I will refuse to 'do business' when social, environmental or societal issues are clearly at stake	

7. Action competence

I realise that in the end, dealing effectively with sustainability issues also requires taking action and initiative.

Performance criteria	MARK (1-10)
a. I am constantly on the lookout for new ways to live my life more sustainable	
b. I am driven to make a difference in my community and the world	
c. I tend to let others take the initiative to start new sustainability related projects	
d. I challenge not sustainable ways of working in a company	
e. I am very good at identifying opportunities for sustainable development	
f. I am always looking for opportunities to improve the social-ecological efficiency and/or effectivity of systems	
g. I know how social, environmental or societal challenges can be turned into opportunities for an organization/company	
h. I am able to motivate higher management in a company to invest in sustainability	

8. Interpersonal competence

I see that working on complex issues like sustainability is in most cases not something you do alone, it demands working with people who have very different backgrounds (e.g. entrepreneurs, government officials, activists, scientists).

Performance criteria	MARK (1-10)
a. I am able to introduce myself very easily to someone I don't know	
b. I let others know how much I appreciate cooperating with him or her in solving complex issues.	
c. I stand up for my rights if someone is overlooking (forgetting) one or more aspects of sustainability	
d. I am patiently and sensitively to someone who "lets off steam" in complex issues	
e. In a personal conflict, I am able to take the others' perspective and really understand his or her point of view.	
f. I am able to feel to what extent stakeholders are willing to cooperate in a project	

9. Strategic management competence

I realise that working on sustainability related issues involves the design and implementation of my intervention. More specifically it involves arranging tasks, people and other resources, inspiring and motivating others and an evaluation of my project.

Performance criteria	MARK (1-10)
a. When it comes to achieving particular goals in relation to sustainability I know whom to involve.	
b. If I want to reach goals in relation to sustainability, I know which steps should be taken to be successful.	
c. I am able to apply the latest knowledge about sustainability in projects I am working on	
d. I am able to use a strategic way of working in sustainability related projects (designing, testing, implementing, evaluating).	
e. I am able to monitor the sustainability performance of a company	

10. If you have participated in any type of internship experience could you give a short description of the internship task? *(if not you can leave this question unanswered).*

- ❑ And secondly, to what extent were the above mentioned competencies important/addressed in carrying out your work in the internship? (1 = not important at all...5= of great importance)

a. Short description of you internship task _____					
b. *Competence important / addressed?*	1	2	3	4	5
Systems thinking competence	❑	❑	❑	❑	❑
Diversity and interdisciplinarity competence	❑	❑	❑	❑	❑
Foresighted thinking competence	❑	❑	❑	❑	❑
Normative competence	❑	❑	❑	❑	❑
Action competence	❑	❑	❑	❑	❑
Interpersonal competence	❑	❑	❑	❑	❑
Strategic management competence	❑	❑	❑	❑	❑

Entrepreneurial intentions

11. Do you have your own company?

- ❑ Yes
- ❑ No

If not, in which type of entrepreneurial activities are you **most** interested in the next 5 to 10 years? 1(*very little)*….5 (*very much)*

Entrepreneurial activity	1	2	3	4	5
a. Becoming an entrepreneurial individual as employee within an existing company	❑	❑	❑	❑	❑
b. Starting up my own company	❑	❑	❑	❑	❑
c. Starting up and building a high growth company	❑	❑	❑	❑	❑
d. Acquiring or inheriting a small company	❑	❑	❑	❑	❑
e. Acquiring or inheriting a company and turn it into a high growth company	❑	❑	❑	❑	❑

12. Please indicate **to what extent** you agree with the following statements? 1*(disagree)…5 (agree)*

	1	2	3	4	5
a. A career as an entrepreneur is totally unattractive to me	❑	❑	❑	❑	❑
b. If I had the opportunity and resources, I would love to start a new company	❑	❑	❑	❑	❑
c. Amongst various options, I would rather be anything but an entrepreneur	❑	❑	❑	❑	❑
d. Being an entrepreneur would give me great satisfaction	❑	❑	❑	❑	❑
e. Being an entrepreneur implies more advantages than disadvantages to me	❑	❑	❑	❑	❑
f. I believe that my closest family thinks I should start my own company.	❑	❑	❑	❑	❑
g. I believe that my closest friends think I should start my own company.	❑	❑	❑	❑	❑
h. I believe that people, who are important to me, think I should start my own company.	❑	❑	❑	❑	❑
i. It would be difficult for me to start a new company after my education.	❑	❑	❑	❑	❑
j. I believe I would be completely competent to start a new company	❑	❑	❑	❑	❑
k. I am able to control the creation process of a new company	❑	❑	❑	❑	❑
l. I know all about the practical details needed to start a company	❑	❑	❑	❑	❑
m. If I start a company, full-time, the chances of success would be very high	❑	❑	❑	❑	❑
n. The number of events outside my control which could prevent me from starting a new company are limited	❑	❑	❑	❑	❑
o. For me, developing an idea for a company would be easy	❑	❑	❑	❑	❑

Social capital

13. How many people do you know in any of the following jobs? (see table below)

As a criteria of 'knowing' imagine when accidently meeting a person on the street, he or she would know the (first) name of that person, and both of them could start a conversation with each other.

14. If you know people in these professions, please indicate <u>how many</u> of these people you would label as relatives, friends or acquaintances (*in Dutch: kennissen*)?

	Q. 13	Q. 14 Distribution		
	How many?	# Relatives	# Friends	# Acquaintances
a. Academic/professor				
b. Bank loan officer				
c. Lawyer				
d. Accountant/book keeper				
e. Sales or marketing manager				
f. Entrepreneur / small business owner				
g. Physician or other health worker				
h. Truck driver				
i. Waiter or waitress				
j. Policeman or policewoman				
k. High-rank official in ministry (*hoge ambtenaar op het ministerie)*				
l. Construction worker				
m. Cleaner				
n. Electrician				
o. Owner/manager of large firm				

Learning actvities

15. To what extent were the various learning activities present in the courses you have followed so far at VHL ? *(1=not at all present....5=very much present)*

	1	2	3	4	5
a. Performing group work with students from <u>other</u> VHL studies	❑	❑	❑	❑	❑
b. Conducting a project for a commissioner	❑	❑	❑	❑	❑
c. Interviewing entrepreneurial people outside school	❑	❑	❑	❑	❑
d. Reading stories about entrepreneurial people	❑	❑	❑	❑	❑
e. Presenting (i.e. pitching an entrepreneurial idea	❑	❑	❑	❑	❑
f. Guest lectures	❑	❑	❑	❑	❑
g. Simulations/Management games	❑	❑	❑	❑	❑
h. Coaching/mentoring by entrepreneurial professionals outside school	❑	❑	❑	❑	❑
i. Role plays	❑	❑	❑	❑	❑
j. Debates	❑	❑	❑	❑	❑
k. Business plan competitions/contests	❑	❑	❑	❑	❑
l. Teaching each other	❑	❑	❑	❑	❑
m. Networking with experienced entrepreneurial professionals (e.g. business café)	❑	❑	❑	❑	❑
n. Interacting with entrepreneurial clubs and societies (e.g. NAJK, SIFE,StartLife)	❑	❑	❑	❑	❑
o. Company excursions/visits	❑	❑	❑	❑	❑
p. Student companies	❑	❑	❑	❑	❑
q. Competence assessments	❑	❑	❑	❑	❑
r. Making/analysing business plans	❑	❑	❑	❑	❑
s. Business case studies	❑	❑	❑	❑	❑
t. Advising entrepreneurs in their business development	❑	❑	❑	❑	❑

Learning environment

16. I experience the VHL school environment as a place where: *(1=not at all....5=very much)*

	1	2	3	4	5
a. teachers actively support students' engagement in new activities	❑	❑	❑	❑	❑
b. teachers encourage me to pursue new ideas	❑	❑	❑	❑	❑
c. creativity is awarded	❑	❑	❑	❑	❑
d. negative reactions can be expected when the exact course instructions are not followed	❑	❑	❑	❑	❑
e. students are expected to handle problems in a standardized way	❑	❑	❑	❑	❑
f. there are many opportunities for students to try out new things	❑	❑	❑	❑	❑
g. there is room for change/improvement	❑	❑	❑	❑	❑
h. teachers stick to safe and proved practices	❑	❑	❑	❑	❑
i. if you come up with a new idea you will receive positive feedback	❑	❑	❑	❑	❑
j. students are stimulated to pursue new ideas	❑	❑	❑	❑	❑
k. students are stimulated to take (calculated) risks	❑	❑	❑	❑	❑
l. teachers discuss actual/recent developments in the market	❑	❑	❑	❑	❑
m. interaction with organizations and businesses outside VHL is encouraged	❑	❑	❑	❑	❑
n. students are stimulated to learn by doing	❑	❑	❑	❑	❑
o. students are stimulated to learn from mistakes or crisis	❑	❑	❑	❑	❑
p. emotional well-being of students is important and noticed	❑	❑	❑	❑	❑

Learning outcomes

17. Please indicate prior working experience (more than one answer possible)

- ❑ No prior working experience
- ❑ Prior working experience as an employee
- ❑ Prior working experience as an entrepreneur (e.g. owner/founder of company)

18. Do you have entrepreneurial parents (e.g. parents with their own company)?

- ❑ Yes
- ❑ No

Appendix II Encoding of survey components used in this study

Student factors					
Study program	Open question				
Gender	1 = male	2 = female			
Location	1 = Wageningen	2 = Leeuwarden			
Study year	1 = 1st years	2 = 2nd years	3 = 3rd years	4 = 4th years	5 = 5th years
Entrepreneurial parents	1 = yes	2 = no			
Entrepreneurship attitude	1 = strongly disagree	2 = disagree	3 = Neither agree nor disagree	4 = agree	5 = strongly agree
Entrepreneurship social norm	1 = strongly disagree	2 = disagree	3 = Neither agree nor disagree	4 = agree	5 = agree
Entrepreneurship self efficacy	1 = strongly disagree	2 = disagree	3 = Neither agree nor disagree	4 = agree	5 = strongly agree
Entrepreneurship learning environment					
Teachers actively support student's engagement in new activities	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
Interaction with organizations and businesses outside VHL is encouraged	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
Students are stimulated to learn by doing	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
Students are stimulated to learn from mistakes or crisis	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
Teacher encourage to pursue new ideas	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
Teachers actively support students' engagement in new activities	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much

Students are stimulated to pursue new ideas	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
New ideas will receive positive feedback	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
Creativity is awarded	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
There are many opportunities for students to try new things	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
Entrepreneurship learning activities	1 = not at all	2 = not	3 = neutral	4 = much	5 = very much
Interacting with entrepreneurial clubs and societies	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present
Networking with experienced entrepreneurial professionals	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present
Student companies	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present
Coaching by entrepreneurial professionals outside school	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present
Conducting a project for a commissioner	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present
Making/analyzing business plan	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present
Business case studies	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present
Business plan competitions	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present
Advising entrepreneurs in their business development	1 = not at all present	2 = not present	3 = neither present nor not present	4 =	5 = very much present