ENTREPRENEURIAL SCHOOLS

ENTREPRENEURIAL LEARNING ENVIRONMENTS AND A CHANGED ROLE FOR TEACHERS

ENTREPRENEURSHIP360
THEMATIC PAPER

European Commission

LEED
BUILDING MORE AND BETTER JOBS
POUR PLUS D'EMPLOIS DE QUALITÉ

OECD
BETTER POLICIES FOR BETTER LIVES

Acknowledgements

THEMATIC PAPER ON
ENTREPRENEURIAL SCHOOLS

PART 2

ENTREPRENEURIAL LEARNING ENVIRONMENTS AND A CHANGED ROLE FOR TEACHERS

OECD
BETTER POLICIES FOR BETTER LIVES

European Commission

TABLE OF CONTENTS

INTRODUCTION

1.	The introduction of entrepreneurial education in primary and secondary school levels and in vocational education and training is frequently associated with changes in educational design, teaching practices, continuous professional training for teachers, and the ways how schools are organised and connected to their surrounding world. Changes always cause a sense of uncertainty and disturbance among those concerned by the changes and the change agents. This is a natural reaction. Appropriation to any change, whether imposed or volunteered, creates issues – in other words change enablers and barriers – which need to be identified and dealt with timely and effectively.

2.	This is also the case for the proposed and needed changes emerging from the political demands for (more) entrepreneurial schools. Worldwide, we see a rapidly growing and intense interest – from public policy, research and education actors – in introducing entrepreneurial education at all levels of formal education as a contrast to traditional teaching practice which is being criticised for having "taught young people to obey, reproduce facts and to engage in wage employment after finishing their education", as criticised by Kuip and Verheul (2003).

3.	The arguments for entrepreneurial education vary from reasons related to economic growth and unemployment to the personal growth of learners into curious, responsible, creative and innovative individuals, life-long learners and active citizens in democratic societies. Even though the arguments and perspectives vary, they emerge from a common ground, that is, the aim to effectively counteract the lack of motivation to learn and engage in school work and to enhance the students' capacity for deeper learning. The increasing rate of change in our globalised and highly technological world has caused a profound shift – one could say a paradigm shift – in the types of knowledge and competences students should gain from formal education in order to be prepared for their future professional and personal lives and to fulfil the requirements of active citizenship.

4.	In higher education, the emphasis on economy and employment has worked rather well as justification for the introducing of entrepreneurial education (see also Lakeus, 2015). In lower education levels, the same argument may, however, cause resistance from teachers and students. Here, the aims of entrepreneurial education are to increase student motivation, interest and engagement to enhance creative thinking and deep learning.

5.	In this paper, we will review the constituting elements of entrepreneurial education, in particular, learning environments, the changed role for teachers and the importance of continuous professional development which includes multiple levels of the system, that is, the teacher, the school, and its collaborations with the surrounding world.

Objectives and elements of "the entrepreneurial school"

6.	We will start with a description of the entrepreneurial school, which draws from research in the fields of education, organisational development and entrepreneurship and case studies that were collected in the framework of the Entrepreneurship360 initiative of the European Commission and the

Organisation for Economic Co-operation and Development.[1] It includes a description of entrepreneurial education, the roles of students and teachers, and the support available to teachers.

Entrepreneurial education

7.   Entrepreneurial education is understood as an alternative learning environment, which includes a physical as well as a mental room. The goals and approaches for entrepreneurial education are well aligned with the curricular goals.

- The discussion about what is included in teaching approaches which reflect the narrow and the wide interpretation of entrepreneurial education, i.e. learning *through*, *for* and *about* entrepreneurial education, is kept alive and active in the whole school organisation.

- Role models of entrepreneurs, advantageously from "next-door", are regularly included and discussed in the education. The role models represent not only economic entrepreneurs, but also environmental, social, cultural and personal entrepreneurs. Diverse entrepreneurial narratives are used as a tool for smaller children.

- The entire education includes collaborations with the surrounding world integrated as a natural part of the implemented curriculum, in the purpose of offering the students opportunities to create value to themselves as well as to others in their learning process.

Students

8.   Students are central actors in entrepreneurial education. They are encouraged to have influence on different aspects of the education and their own learning process. Their own learning processes are regularly investigated, discussed and improved. Students are co-designing, co-educating and co-assessing entrepreneurial education activities. In collaboration with the students different approaches and tools for formative assessment, including student peer assessment, are actively discussed and experimented. Student interest, motivation and achievement are regularly evaluated in relation to entrepreneurial education interventions.

9.   Study assignments in entrepreneurial education trigger the students' interest, motivation and inner drive by making possible a sense of value creation for the students in their required learning process. Contexts are authentic, complex and interdisciplinary. They are open-ended and encourage student creativity, initiative, innovation, critical reflection and different ways of solving them. And, they focus on using facts rather than re-producing facts. Students are able to relate to the negotiated content and methods.

Teachers

10.   Teachers are generally considered to be the most influential actors in education. Which role a teacher takes in the classroom and in shaping the students' learning environment heavily depends on his/her views on knowledge and learning theories, which, in turn, are associated with his/her professionally related perceptions and attitudes.

---

[1]   See   http://www.oecd.org/site/entrepreneurship360/home/   for   further   information   about   the Entrepreneurship360 initiative of the European Commission and the Organisation for Economic Co-operation and Development.

11.   In an entrepreneurial school, teachers have access knowledge on entrepreneurial education, they reflect on entrepreneurial education and approaches individually as well as in small groups, and jointly plan interdisciplinary education with other teachers. Teachers network with partners in the surrounding world and exchange ideas with teachers from other entrepreneurial schools.

Support for teachers

12.   In shaping effective learning environments, teachers support and inspiration from school management, other school personnel and external partners are of crucial importance. Open and continuing debates, involving students, teachers, parents and partners, are organised on the concept of entrepreneurial education and its different interpretations and applications. The aim is to build a common understanding of what constitutes entrepreneurial education and how it can be enhanced through adequate learning environments.

13.   The school management takes active part, in a variety of measures, in the advancement of entrepreneurial education at the school. Innovativeness is encouraged at all levels in the school organisation. In particular, teachers feel trust in and experience support from the school management to dare being innovative. Extra time is provided for the teachers, by the school management, to realise these points in the initiation of process of advancing entrepreneurial education.

14.   The whole school organisation looks into the surrounding world and other areas of expertise in relation to making organisational changes or finding solutions to issues which need to be solved in purpose of making the education more effective. School text books are complemented to a high degree and on a regular basis by other sources of information, such as expert presentations, newspaper articles, information from trade and non-profit organisations as well as authorities, the Internet, social media etc. In-depth critical review of these sources is an obvious requirement for students as well as teachers.

15.   There is an understanding that the teachers' professionally related perceptions and attitudes are strong determining factors for how learning environments gets shaped in practice. In light of this, the composition of the teacher teams/learning communities is based not only on the teachers' subject matter competence but also on mind-set towards entrepreneurial education as well as factors included in their personal domain.

16.   Identifying change enablers and barriers for entrepreneurial schools, requires looking into what constitutes entrepreneurial schools, why do we need them, and how can they be established. We will start with a closer look at what entrepreneurial education is and what are commonalities and differences with other non-traditional approaches to education.

**REFERENCES TO ENTREPRENEURIAL EDUCATION IN GENERAL EDUCATION
RESEARCH**

17.   General education research does not say much about entrepreneurial education at primary and secondary school levels or in vocational education and training, but there are related research questions, for example, what stimulates interest or causes disinterest of students in school science and technology (e.g., Schreiner, 2006), how to organise contextualised education (e.g., Vos et al., 2011), and how to enhance the understanding of newspaper articles with science content (e.g., Jarman and McClune, 2002). Given the author's area of expertise, the research examples on students' disinterest and interest in school subjects derive mainly from science and technology education. Since most of the findings are of a general character, it is reasonable to assume that they may be of guidance to other school subjects as well.

Making science education relevant

18.   Science teachers and their students rarely see scientists at work. They lack the situational dimension of learning, as pointed out by Brown et al., (1989) "[s]ituations [...] co-produce knowledge through activity. Learning and cognition [...] are fundamentally situated". School science is adjusted to fit into the school organisation and the demands on assessment rather than being shaped into a simplified version of science resembling science for scientists, including true inquiries, deliberations, and critical thinking. In this, the role of teachers is crucial. According to Sharma and Anderson (2007), their task is to translate and remodel scientific knowledge, which is developed in laboratories "to cohere with the different space, time and power relationships that exist within school boundaries".

19.   A large-scale comparative research project on the learning of science and technology is ROSE, "Relevance of Science Education"[2]. Focusing on 15-year old students, the project concluded that the lack of relevance of the science and technology curriculum is one of the greatest barriers for good learning and for interest in the subject. Schreiner (2016: 57) analysed data from more than 26 000 students in 25 countries in Europe, Africa, Asia and South America and found that an explanation for students' dissatisfaction with school science is that it is perceived as too "theoretical, fact-oriented and fact overloaded, with little room for fantasy, creativity, enjoyment and curiosity. The school curriculum seldom addresses contemporary issues of [science and technology] in society. The subject is abstract and theoretical, and it contradicts common sense. It is perceived to be difficult and hard to understand, and consequently to demand much concentration and sustained hard work countries".

20.   Several of the school activities related to science and technology do not make sense if transferred to "real-life" practices. Gilbert's (2006) study on the determinants for context-based learning in chemistry education confirms this. He underlines the overload of isolated facts and concepts for students to learn, the lack of relevance and context and the overall low ability of students to transfer learning to everyday life beyond mirroring the "ways in which they were taught". The overall result is that students do not get introduced to science as it is shaped in its authentic context.

---

[2] http://roseproject.no/. The ROSE project is supported by the Research Council of Norway, the Ministry of Education in Norway, the University of Oslo and the Norwegian Centre for Science Education.

This lack of authentic context at compulsory school levels also explains the stereotyped images which students hold of professionals in science and technology sectors.

21.		At the same time there are plenty of science links outside school, as Schreiner (2016: 16) argues, "popular science magazines, books, and radio and television programs do attract an audience, and science museums and science centres report lots of visitors". This suggests a worrying discrepancy between interest in science and technology generally speaking and in what is taught about science and technology in schools. Education research confirms that changes in teaching practice result in an increased student interest in school science. Students are more interested and motivated to learn when offered opportunities to work with societal issues related to science and technology (see for example Aikenhead, 2004; Krogh and Thomsen, 2005; Osborne and Collins, 2001; Sadler, 2009).

22.		Societal issues are situated in the surrounding world and become the context as well as an extra resource in students' learning processes. Jarman and McClune (2002) found an increased student motivation to learn science from an activity based on reading and reflecting on newspaper articles; the students needed knowledge of science content to understand the articles. They explained the observed increase by the fact that the activity helped the students recognise the need to learn the science content. Being able to read and understand science related newspaper articles is one example of a task framed in an authentic or real-life context. It mimics a situation in which the student in his/her role of a citizen of a democratic society, may need scientific knowledge to take and maintain a standpoint on factual ground and thus to be able to actively participate in debates.

23.		Debates on issues to which the students can relate provide a motivating, authentic context for learning. This was also confirmed by the ROSE-project, which showed that students, who perceive content to be more personally relevant, are more motivated to learn. This also extends to the immediate environment of the learner, as the National Research Council (2000: 61) concludes "learners of all ages are more motivated when they can see the usefulness of what they are learning and when they can use that information to do something that has an impact on others – especially their local community".

Authentic learning

24.		To better understand the student perspective and how this could help transform teaching, Nicaise et al., (2000) examined an authentic learning environment experiment that was created in a large high school in the US. 59 students in the age group 16-18 years from a mix of college-bound and vocational-bound study tracks, participated for eight months in one of three elective courses: Principles of Engineering, Aerospace, and Advanced Aerospace. The common course objective was to teach the principles of aeronautic engineering through situating learning, which culminated in a weeklong mock space shuttle mission. Students were for example tasked to use the orbiter to learn how to create a network of computers for data management. For several hours or even a full day, groups of 5-12 students positions common to space shuttle missions: space station commander, communications expert, medical or science officer, shuttle pilot etc. Two teachers and three external mentors worked with the students on specific projects. A biological research specialist assisted students, for example, with the design, conducting and analysis of research experiments.

25.		Most of the participating students described the classroom as "fun and exciting with real-world relevance". Not all students worked in teams. Some worked alone because they did not know other students or they were unable to explain and get other students interesting in joining their projects. Hence, more research is needed on how students manage their own learning and what makes a learning situation authentic for students. All of the students provided suggestions on how to improve

learning environments. Priorities were increase teamwork and student-student mentoring, smaller class size and more access to teachers.

26.   Students who benefit from authentic learning persevere to a higher degree even though they may initially feel confused and frustrated. They continue a course of action even in the face of difficulty granted that there is a proper balance between the challenge and its appropriateness. Perseverance and motivation are even larger when the assignment and learning resembles real-life situations, which really count in the context (Lombardi, 2007; Otterborg, 2011; Surlemont, 2007). In authentic learning students develop "the judgment to distinguish reliable from unreliable information; the patience to follow longer arguments; the synthetic ability to recognize relevant patterns in unfamiliar contexts; [and] the flexibility to work across disciplinary and cultural boundaries to generate innovative solutions", which Lombardi (2007) summarises as "portable skills". Acquiring these skills on their own, that is, without assistance, is for newcomers to any discipline almost impossible.

Developing creativity

27.   Educational design and teaching practices play a significant role for the development of creativity, especially in early levels of formal education. Besançon and Lubart (2008) report findings from a study of 211 first and second year students in urban areas in France. Half of the students attended a school which made use of traditional pedagogic approaches in the learning environment, while the other half was exposed to alternative pedagogic approaches. The alternative approaches included components which may be attributed to entrepreneurial education even though this was not specified in the study.

28.   Findings from two consecutive years of study suggest a difference in the creative performance of the two student groups: the alternative pedagogic approaches had positive influence on the creative development from year 1 to year 2. In particular, creative performance was influenced by (i) pedagogy – alternative pedagogies such as Montessori and Freinet develop divergent thinking, which is an important component of creative thinking – (ii) the teacher, in particular the prevalence of intrinsic over extrinsic motivation, and (iii) the type of task that students were exposed to. The study confirms prior evidence on the large influence which the teacher has on the learning environment (Aikenhead 2004; Anderson, 2007; Hattie, 2009; Leffler, 2006; Watters and Ginns, 2000). One of the groups at the school which used alternative pedagogic approaches got a new teacher after the first year. The new teacher shaped the alternative learning environment as per her definition of what alternative pedagogic approaches may be represented by.

29.   Heilbrunn (2010: 178) in a study of an elementary school in Israel reports that students "rated significantly higher on proactive disposition, preference for innovation and achievement motivation" than students from a traditional school. In a subsequent study at secondary school level, Helibrunn and Almor (2014) add valuable findings with regard to the role of the school and teacher support. Students after having participated in a Junior Achievement[3] programme were assessed on their entrepreneurial intentions. The programme was more effective, in terms of students wishing to become entrepreneurs, for middle and upper class youth, whereas for students from lower socio-economic backgrounds starting a business considered less desirable and feasible. The study partly explains this by the differences in learning environments in the schools, in particular the commitment and resources invested by the school management and teachers. In the case of the disadvantaged

---

[3] https://www.juniorachievement.org/web/ja-usa/home: Provides students with experiential learning to enable them to develop the skills they need to experience the realities and opportunities of work and entrepreneurship.

youth, schools and teachers were less committed to the programme and invested fewer resources. Also of relevance were the differences in the students' self-perception and the degree to which parents were involved in the programme. We will come back to this later in this paper when we report similar observations made by teachers from England.

Key objectives of an entrepreneurial school

30.   The findings from general education research are relevant for the discussion in this paper as they shed light on the key objectives of an entrepreneurial school which are to:

- **Provide the framework** for learning environments and assignments in such a way that students can see the practical sides of school knowledge, illustrating ways in which students can develop from school knowledge and skills that can become tools for life as well business.

- **Recognise the substantial impact which entrepreneurial education** can have on students' academic achievement and professional careers if it is conducted towards promoting the personal attributes of students, also when the students do not plan to start a business.

- **Introduce entrepreneurial education progressively from an early student age o**n to stimulate the development of entrepreneurial attitudes, skills and knowledge.

WHAT IS ENTREPRENEURIAL EDUCATION?

31.   Entrepreneurial education is a contrast to "traditional" or "conventional" teaching. As a background note, here a reminder that teaching and education are somewhat different concepts. Vaidya (2014, p. 7-8) pointed out "to 'teach' means to instruct, impart knowledge and skills for a certain action or a frame of mind. 'Educating', on the other hand, develops the inherent capacity and abilities for mental and moral growth of learners. Thus, 'teaching' and 'educating' have different meanings and do not serve the same objectives. The notion of 'education' is more suitable for developing learners' minds, personal growth and encouraging them to act in an entrepreneurial way. 'Teaching' is more appropriate for the transfer of facts and theories about entrepreneurship".

32.   Entrepreneurial education is process- and student-oriented, and assignments and assessments are designed in such a way that students have to reflect on and understand the content to be able to apply it in relevant contexts. The focus is on answers which require the students to use the knowledge with understanding and in an appropriate manner. Understanding the relevance of the knowledge and to whom it is relevant is an important aspect of the tasks.

33.   Gibb and Cotton (1998) emphasise that the students should "feel" and experience entrepreneurship in their learning environment rather than just learn about in a conventional manner. Table 1 provides a dichotomous overview of the different approaches to education, based on Gibb and Cotton's study and examples, which the author of this paper has taken the liberty to provide as per her interpretation. Table 1 also presents aspects which may be used as indicators of "traditional" versus "alternative/entrepreneurial" approaches to education and teaching, in the purpose of clarification. This is not to say, however, that the alternative approach, here entrepreneurial education, is the most effective approach at all times and occasions. It may be better looked upon as an urge and argument to *increase the degree of* entrepreneurial approaches in education for the purpose of deeper learning.

34.   The learning environment and the role of the teacher in shaping it are crucial aspects in this. Both will be discussed later in this paper. Here it can already be pointed out that an entrepreneurial learning environment is very demanding for the students. It is therefore reasonable to assume that for many teachers a balanced "mixed methods" approach is desirable.

Table 1.   Conventional versus entrepreneurial approaches to teaching and education

Conventional approach	Entrepreneurial approach
CONTENT-ORIENTED	**PROCESS-ORIENTED**
Know "what" • Tasks and examinations are designed for students to re-/produce de-contextualised content. • Tasks and examinations focus on answers which explain/re-produce the concepts.	*Know "how and who"* • Tasks and examinations are designed such that the students have to reflect on and understand the content to be able to use it in relevant contexts. • Tasks and examinations focus on answers which require the students to use the knowledge with understanding and in an appropriate manner. Understanding the relevance of the knowledge and to whom it is relevant is an important aspect of the tasks.

Concept theory emphasis
Subject/functional focus
- Focus is on learning theoretical concepts and this is done in a de-contextual manner.

Practical relevance of theory
Problem/multi-disciplinary focus
- The students are presented with the real-life context, which is multidisciplinary, in which the theoretical concepts are valuable and used. This may be done by collaboration with a relevant actor in the surrounding world.

Fear mistakes
- The learning activities and examinations are such that the students have to explain certain concepts without context, for example in a conventional written test.

Learn from mistakes
- The learning activities include student debates in which students have to take standpoints based on the concepts which they are studying. The examination is to actually write a debate article which is to be submitted for publication in a local newspaper. As in real life, there are several ways in which to write an article of a high quality. The article may include several different perspectives on the issue which relates to the content to be learned.

TEACHER-ORIENTED

Teacher is the expert
- The teachers instructs in a direct manner guided by his/her lesson plan.

STUDENT-ORIENTED

Teacher is the facilitator
- The teacher allows for and encourages student directed learning, based in their curiosity and in what seems relevant and valuable to them.

Teacher is infallible (one-sided learning)
- The teacher presents facts and know-how and does so in a 'right-or-wrong' manner.

Teacher learns (two-sided learning)
- The teacher encourages the student to find facts from a variety of sources, to reflect on how to use it and also provides support and appropriate challenge in the student's process of learning the new knowledge and skills. The teacher is open to the students' novel solutions and recognizes his/her own learning from this.

Passive student (receiving knowledge)
- The teacher presents knowledge and know-how to what he/she perceives as passive learners.

Active student (generating knowledge)
- The teacher expects the students to have to work with the new knowledge for deep-learning and concept change to occur. The teacher tries to find out about each individual student's 'alternative' conceptions.

Imposed learning objectives
- The teacher decides what knowledge and skills which need to be learned. This is justified by the teacher's interpretation of the curriculum and national tests.

Negotiated learning objectives
- To some extent, the teacher engages the students in defining the learning objectives (what) and how, when, where and with whom this is to be learned. The discussion is focused on the creation of value for the student in the learning process.

Emotional detachment
- The content and methods for learning are such that the students have difficulties relating to them; hence the students do not get emotionally involved in the learning.

Emotional involvement
- The content and methods for learning are such that the students easily can relate to them and the students get emotionally involved in solving the task.

Limited exchange
- The teacher has rigid lesson plans and focuses on executing them on time.

Interactive learning
- The teacher has a flexible lesson plan which allows him/her to be guided by the students' curiosity, motivation and needs, also on individual levels. The focus is on deep-learning rather making sure that there is time to go through everything in the plan.

Programmed sessions
- The teacher sticks to his/her lesson plans, which are constructed in alignment with the content of a school text-book and national tests.

Flexible sessions
- The teacher proposes lesson plans, on which the students' interest, needs, suggestions and 'alternative' conceptions have influence. The teacher makes use of regular formative assessment to guide his/her lesson plans. The teacher recognize the students as resources

in their own and their class-mates' learning. The students may work with different assignments and in different ways to reach the learning objectives.

Source: Adapted from Gibb and Cotton (1998). Examples are provided by the author.

Similarities of concepts

35.   Entrepreneurial education is related to many other non-conventional educational concepts which have as a common aim to initiate and increase the schools' collaboration with the surrounding world (CSS). This is based on the need for schools to create more authentic learning environments in which the learning objectives are more aligned with the requirements of today's societies. In general, schools' collaboration with the surrounding world can be a source of additional resources such as costly engineering tools apart from the expertise knowledge and openings to authentic contexts for the school assignments. Table 2 provides an overview of the collaboration school-surrounding-world in different forms of learning.

36.   In the Scandinavian context entrepreneurial learning[4] is the generally used terminology when referring to entrepreneurial education. This underlines the "learning", that is, the student's learning process and the relevance of the learning *environment*[5], in which the students get an opportunity to learn new knowledge and skills (Sagar, 2013; van der Kuip and Verheul, 2003). This also applies for other related concepts like authentic, inquiry, situated forms of learning.

Table 2.   Collaboration school-surrounding-world (CSS) in different forms of learning

Concept	Aim/Focus	Reference
Authentic/ entrepreneurial learning	School assignments and contexts are authentic as in or from "real life". Facilitated by CSS.	Bencze and Hodson, 1999; Braund and Reiss, 2006; Herrington, 2013; Herrington and Oliver; 2000, Lombardi, 2007; Rule, 2006
Meaningful learning	School assignments are perceived as meaningful and useful by students. This is in contrast to rote learning (i.e., memorisation based on repetition). Facilitated by CSS.	Ausubel, 1968; Bruner, 1997; Dewey, 1997; Doppelt, 2005
Situated learning	School assignments should be similar to 'ordinary practices of the culture' for the discipline. Facilitated by CSS.	Brown et al., 1989; Collins, 1988; Greeno, 1998
Cognitive apprenticeship	Cognitive learning occurs in an apprenticeship context. Requires CSS.	Brown et al., 1989
Legitimate peripheral participation	Learning of skills, competence and the culture of the relevant practice occurs in an apprenticeship context. Learner starts as an observer and grows into true participation in the culture. Requires CSS.	Lave & Wenger, 1991
Community-referenced learning	School assignments use the community as a reference. Requires CSS.	Kluth, 2000

---

[4] EU, 2006; Falk-Lundqvist, Å., Hallberg, P-G., Leffler, E., & Svedberg, G, 2012; Jones & Iredale, 2006; Leffler & Svedberg, 2010; Leffler, 2009; Mbebeb, 2009

[5]

Community service learning	Learning occurs in community service contexts. Requires CSS.	Roakes and Norris-Tirrell, 2000
Service learning	See Community service learning.	Bonnette, 2006
Inquiry learning	The learning environment encourages student inquiry and activity and is framed in problem-based learning to resemble a scientist's work culture. Facilitated by CSS.	Anderson, 2007, Crawford, 2007; Dewey, 1910; Minner et al., 2010; Linn et al., 2004; S-TEAM, 2012
Out-of-school learning	Learning occurs in out-of-school settings and contexts. Requires CSS.	Braund and Reiss, 2006; Caleon and Subramaniam, 2007; Rennie et al., 2003; Rennie, 2007
Context-based learning	Assignments are presented in authentic contexts for the discipline. Facilitated by CSS.	Bulte et al., 2006; Gilbert, 2006; Vos et al., 2011

Source: Author.

37.   As the informed reader may have already guessed, there is a striking similarity between entrepreneurial learning and authentic learning. Sagar (2013) concluded based on an in-depth comparison of definitions and descriptions in research and public policy documents that the components and issues are almost identical. The only difference is that descriptions of entrepreneurial learning emphasise more the aim of triggering the student's inner drive and motivation, for which the students' sense of meaningfulness and instant value from the learning assignments, in turn, is the strongest trigger. Table 2 presents components and issues of authentic learning.

38.   Table 3. Components and issues of authentic learning

Components	Issues
Students' process of learning	• Student's pro-activity, inner drive, creativity, initiatives, innovation and inclination to see possibilities and take calculated risks are the motor for the process of learning and stimulated. • Builds upon and develops the student's self-confidence and self-efficacy. • Stimulates student's ability to plan and manage projects to achieve an objective. • Orientation towards the process of finding solutions to problems and assignments. • Focus on using content knowledge. • Student inquiry and exploration is encouraged; the student is a self-directed learner. • Strong element of cooperative learning situations and practice of communicative skills. • Student is encouraged to take responsibility for his/her learning and practices self-assessments.
Authentic context	• Content and activities are embedded in authentic/real-life contexts which reflect the way knowledge and skills will be used in real life. • Collaboration with the surrounding world is beneficial for creating the authentic/real-life context. It provides access to expert performances and allows usage of a variety of resources in the learning process and the authenticity is grounded in relations among actors within a real-life system. • The students' work targets an audience outside of the classroom. • Contexts are relevant to the student and create sense of meaning and usefulness to learn new knowledge and skills. The relevant contexts may be personal, social, cultural or environmental. • Textbooks are complemented by a variety of external sources.
Authentic assignment	• Assignments and projects are based in the curriculum but flexible enough to resemble real-life situations and commissions. • They are interdisciplinary and may be provided through collaborations with the

surrounding world.
- They are open-ended problems with different possible solutions, which may be complex.
- Reflection, analysis, critical thinking and ethical considerations are required to solve the problems.
- Tasks challenge and encourage student's creativity, innovative competence, ability to take initiative, willingness to try own ideas and to recognize possibilities.
- The tasks have personal relevance, hence meaningful, purposeful and valuable, to the student.
- Result from assignment has a value in itself and not merely for future purposes. The result may be a product.
- They are integrated with assessment in a manner which reflects real world assessment.

Source: Author.

39. The abundance of terms to describe similar and related concepts and teaching practice can be confusing for teachers. When a so-called new concept is introduced as a novelty in teaching practice, it may not be perceived as new by the teachers, who may recognise some or all elements of the "new" concept. This, in turn, may result in negative associations to the concept, here entrepreneurial education, particularly, when teachers perceive the new approach merely as a "popular". To avoid this sensation of "no-novelty", it is important to find a way to meaningfully distinguish entrepreneurial education from other concepts.

Learning-by-creating-value as a distinctive feature for entrepreneurial learning

40. Entrepreneurial learning can be distinguished from authentic learning and other related concepts by stressing the purpose of "learning-by-creating-value" (Lackéus 2013, Sagar 2013). School assignments, including the knowledge and skills, which students are supposed to learn from them, need to be perceived by the student as creating value in personal, social, ecological, cultural or economic contexts. The student's perceptions of working with meaningful assignments have a positive impact on the student's inner drive and motivation to learn. Making students perceive learning as meaningful and a value-creating process is more easily achieved in a learning environment which follows the principles of authenticity as outlined in Table 3.

41. Value can be associated to one-self and/or to others. Lackéus (2013) proposes creation of value-to-others as the aim of school assignments in entrepreneurial education and work is supported by education research (e.g., NRC, 2000). "Learning-by-creating-value" is one of the most rewarding and motivating factors which can be introduced into education and a student's learning process. Value-to-others may be a feasible focus in VET schools and higher education. However, in primary and secondary schools it may be cumbersome for teachers to create school assignments aiming that create "value-to-others" on a regular basis. At these education levels the ordeal of making the students feel "value-to-themselves" in the learning process, on a regular basis may be challenging enough.

42. By making "learning-by-creating-value" the ultimate goal for entrepreneurial education, teachers and schools will have come a long and greatly rewarding way if students feel joy, motivation and interest to learn. Then, students can relate to the learning goals and that the learning required by them seems meaningful, hence valuable to themselves as individuals. Also, if the goal of "value-to-themselves" is integrated in the overall education as first step, the ultimate goal of creating "value-to-

others" may be more easily reached. It is a starting point for students to acquire entrepreneurial qualities and skills (Jaen et al., 2014).[6]

Narrow and wide understandings of entrepreneurship

43.   Narrow and wide understandings of entrepreneurship co-exist and typically individual school managers and teachers hold their own understanding of entrepreneurship and consequently of the aims of entrepreneurial education. The narrow understanding of entrepreneurship refers to the creation of new firms, whereas the wider understanding refers to taking initiative and the ability to turn ideas into action.

44.   The narrow understanding is mainly relevant at the higher levels of education and in elective secondary school courses which focus on learning about business start-up and management. This corresponds with education *about* entrepreneurship as well as *for* entrepreneurship. The wide understanding focuses on general entrepreneurship skills which any citizen needs in a rapidly changing world, that is, "life skills". This corresponds to education *through* entrepreneurship, which is the most relevant and the only understanding of entrepreneurship for primary and secondary school levels[7]. This is also the only appropriate understanding for lower levels of primary education. The wide understanding of entrepreneurship also social competencies, which in absence of a commonly agreed definition, are often proxied by peer popularity, social skills, and behaviours such as leadership (Obschonka et al., 2012). Additionally, in primary school, education *for* entrepreneurship is relevant with an understanding that the students need to be "entrepreneurs in their own personal lives" as well as in society in general.

45.   Finding and establishing a common understanding of entrepreneurship and the aims of entrepreneurial education are key issues for the entrepreneurial school. They are often addressed through professional teacher development.

Stereotypes, entrepreneurial narratives and role models

46.   In many societies, the image of a heroic and innovative male, who prefers to act in solitude for monetary profits, is still a common stereotype of the entrepreneur. It may thus not come as a surprise that the same stereotype has made its entry into the understanding of entrepreneurship in education. It is mainly the narrow interpretation, which leaves entrepreneurship and entrepreneurial learning with the ideological and political connotations. Leffler (2008) summarises from the perspective of Scandinavian countries, what she calls a "battle fought in the language used, where the economists own the concepts of the entrepreneur and entrepreneurship, and the schools own the concepts of pedagogy".

47.   The political and economic connotations of entrepreneurship and "the entrepreneur" are also causing resistance of teachers to entrepreneurial education. These connotations should to be dealt with in pedagogic discussions and professional development in order to provide access to information and knowledge that allow for a more balanced and context-related judgement. Backström-Widjeskog (2008) found from a study of secondary school teachers in Finland that the exposure to a wide range of information about entrepreneurship and entrepreneurial education resulted in teachers focusing

---

6

        https://www.researchgate.net/publication/235937853_Personal_values_and_entrepreneurial_intention_an_empirical_study

[7] Sagar, 2013; Vaidya, 2014

"individual and social competences, while those who possess limited knowledge focus on economic and business-related activities".

48.   Stereotyped images of the entrepreneur among students can be counteracted in class through entrepreneurial narratives (Smith, 2002; Vaidya, 2014). It is interesting to note that success and morality are two recurring themes in entrepreneurial narratives. Pippi Longstocking[8], a nine-year-old unconventional and assertive girl with superhuman strength, who can lift her horse with one hand and frequently makes fun of unreasonable adult attitudes, especially when displayed by pompous and condescending adults (Wikipedia), may serve as an entrepreneurial role model for younger learners in order to stimulate self-assertiveness, creativity and curiosity. Mother Theresa and Florence Nightingale may serve as examples and role models for older students of individuals who paved successfully alternative ways. Stakeholders holding a stereotyped image of an entrepreneur may easily agree with Bill Gates as a good representative. However, this same entrepreneur, with strong economic connotations, is nowadays a representative of social entrepreneurship. There are numerous examples of entrepreneurs which students and stakeholders can relate to in the purpose of recognising that the skills related to successful entrepreneurship are the same for economically and socially motivated activities.

49.   Komulainen et al. (2013) analysed 219 narratives of 15–16-year old students of Finish comprehensive schools who participated in the annual writing competition "Good Enterprise!". The study explored the kinds of representations of space, place and possible self which youth reproduce in their narratives and what kinds of representations are favoured by school. Narratives representing entrepreneurship as familiar, domestic, rural and local activity were more frequent and successful than narratives of the global self. Also Bosma et al. (2012) found indications that the role models employed in economic entrepreneurship programmes resemble the students in terms of gender and nationality. The "icon" role models of entrepreneurs represented in media were, however, on rarely accepted by the students as role models who preferred "next-door examples" which influenced the students through personal as well as professional networks.

Experience reports from practicing entrepreneurial schools

50.   We have asked teachers and school leaders, who participated in the OECD Potsdam capacity building seminar in November 2014, about the reasons and motivations of why they opted for entrepreneurial education. Their spontaneous answers are worth to be considered as inspirational evidence for peers even though they were not investigated in a scientific framework.

51.   A teacher from a secondary school in Portugal highlighted the relevance of learning environments for the intrinsic motivation, engagement, positive attitudes and mindsets of students: "*Because they [the students] are doing their own projects based on their own ideas. They work in teams and apply their knowledge to real contexts*".

52.   After having participated in a business plan/idea competition, the same school reported a decrease in drop-outs and a better motivation among students as well as teachers due to presentations and assessments in business competitions: "*Students learn topics/content 'automatically' through inner motivation, because they want to present a 'perfect business case' to the external jury of professionals. Teacher motivation is much bigger because students are enthusiastic and 'on fire', they enthuse the teachers! Students' achievements in these competitions are much, much higher than in 'regular lessons'* ".

---

[8] By Astrid Lindgren, a Swedish author of children books, translated into 95 languages.

53.	The head teacher of a comprehensive school in England reported the following:

- "*Lower ability students volunteering to present power-point about their learning to local business leaders – demonstrating improvement of confidence;*

- *Pupils choosing tasks to take home to improve e.g. letters to business, parents;*

- *Seeking adult support to learn how to develop the skills necessary to complete tasks (e.g. using the decimal point accurately on a calculator when totaling money) ;*

- *Increased motivation and engagement;*

- *Willingness to persevere, solve problems;*

- *Greater attention to presentation and quality of work;*

- *Ability to use personal strengths in order to work effectively as part of a larger team; and*

- *Improvement in attainment in early years in those areas of the curriculum which link directly with entrepreneurial skills*"

54.	Many students in this school come from low-income families. Hence, the report of the head teacher is interesting with regard to the above mentioned findings of the study in Israel, which indicate that the impact of an entrepreneurship programme (in this case Junior Achievement) is negative on students who are disadvantaged because of their socio-economic background; that is, they do not perceive starting a business as a viable career choice. The findings from England confirm that the motivation and professional competence and personal engagement of teachers, and the institutional support provided by the school, can counteract this.

55.	For vocational education and training schools, a key driver is the enhanced contacts with employers, which result from activities that develop entrepreneurship skills, as it was reported by the vice-head of a school from Austria: "*Students are more independent, assertive and mature. Fewer drop-outs. Better chances for employment and good feedback from internship mentors and employers; Contacts with new and real world are exciting. Presentations of achievements to big audiences. Motivated teachers from motivated students – it works both ways*".

56.	The school leaders and teachers in Potsdam pointed to the effect of entrepreneurial education on increased teacher motivation and how teachers get enthused by their students engagement and changed approach to learning which result from working in real-life contexts and contacts with interlocutors other than their teacher/s. Guskey concludes from several decades of empirical research that real change in a teachers' attitudes towards the aim of professional development occurs only *after* the teacher has observed and experienced the benefit of the reformed teaching in the student learning outcome. Hence, teachers' professionally related perceptions and attitudes have a strong influence on how teaching practices and learning environments get shaped. Teachers who show resistance or hesitation to entrepreneurial education may more easily change perceptions and attitudes with the help of discussions regarding the understanding of entrepreneurship and the aims of entrepreneurial education. Teachers' perceptions and attitudes need to be taken into account, analysed and constructively acted upon. In-service training and broader professional development programmes are, as Guskey (2002) points out "systematic efforts to bring about change in the classroom practices of teachers, in their attitudes and beliefs, and in the learning outcomes of students".

57.	When asked about the learning outcomes of entrepreneurial education, all participants agreed about the positive effects on student achievement. In general, this seems to be an increasingly accepted

rationale for education practitioners, yet there is a scarcity of research-based evidence this. There is thus a need to investigate the relationship between entrepreneurial education and student achievements. For this, the experiences of education practitioners are a very valuable and extensive source of information. They could be systematically made use of if tested and analysed with the help of established research methods and tools. Some countries are spearheading development in this direction. For example, the Swedish School Law from 2010 emphasises that "the school should lean on (i) scientific grounds and (ii) proven experience" (author's translation). Likewise the National Agency of Education considers both as valuable sources of evidence to reform education and teaching practice. The scientific grounds are based in findings from systematic research studies which are published in peer-reviewed, scientific journals. The "proven experience" is based on the tacit knowledge[9] of practitioners, which has been which systematically investigated with the help of research methods and tools and consecutively tested by other teachers. Findings from empirical studies suggest that "proven experience" may have more impact on the change of teachers' perceptions and attitudes (here regarding entrepreneurial education) than evidence from education research.

58.   There is an abundance of practitioners' experience which could be considered as evidence, with the help of single or teams of researchers, who collaborate with schools. The researchers could provide research methods, tools and critical friendship to the practitioners, who could gather and analyse empirical data by themselves. An example of a collaborative applied research project, in which researchers provide research methods, tools and critical friendship to practitioners, and collectively gather and analyse empirical data, is the SUPER network[10] in the Faculty of Education at Cambridge University. The Muncipality of Kungsbacka[11] in Sweden, where the author of this paper works, is part of this network. Similar initiatives are the Education Endowment Foundation[12] and the National Foundation for Educational Research[13], both located in the UK.

CONSTITUTING ELEMENTS OF ENTREPRENEURIAL LEARNING ENVIRONMENTS

Physical and mental rooms

59.   It is useful to differentiate between the physical room and the mental room of a learning environment. The physical room can have many representations both inside and outside school premises. Examples are the classroom, the laboratory, the mechanical workshop, the hospital ward, the school premises, the neighbouring forest, businesses as well as the Internet. Whereas, the teacher has a low degree of influence on the characteristics of the physical room, he/she has a large degree of influence on the different forms of physical rooms which are transformed into learning environments.

---

[9] Tacit knowledge of education practitioners is the result of experience, know-how and the observation of effects of changes in pedagogy on students.

[10] http://www.educ.cam.ac.uk/research/projects/super/

[11] www.kungsbacka.se

[12] http://educationendowmentfoundation.org.uk/

[13] http://www.nfer.ac.uk/

60.	The mental room is represented by the content, methods, approaches and contexts utilised by the teacher. This includes the type of assignments and whether they allow for and encourage students' own initiatives, creativity and responsibility, are based on student inquiry, relate to the student and the society, and are open to different solutions. Additionally, the mental room includes the settings of the learning process, for example, design and development of a process or a product, team work, group discussions, self- and peer assessment as well as the settings for how students present their knowledge and skills in written tests and oral presentations in class or to external audiences. The mental room can thus be regarded as the representation of the teacher's interpretation of the curriculum in combination with his/her teaching experience.

Teacher's professionally related perceptions and attitudes

61.	Both the physical room and the mental room in the students' learning environment are strongly dependent upon the teacher's professionally related perceptions and attitudes. The teacher is the most influential actor in the actual implementation of the curriculum, that is, in how the students' learning environment is shaped (Anderson, 2007; Crawford, 2007; van Driel, 2001). The teacher's perceptions of and attitudes towards knowledge, theories of learning, learning styles and the students' resourcefulness in their own learning process are key determinants of this. Teachers are aware of how their professionally related perceptions and attitudes shape the learning environment of their students.

62.	In the entrepreneurial learning environment the teacher learns together with the students. Additionally, the teacher views him-/herself as well as the students as active learners, which means that the learner is encouraged and allowed to create new knowledge with the point of departure of his/her prior knowledge and experiences, preferably in authentic assignments and contexts. Thus, an entrepreneurial learning environment is more easily shaped by a teacher who holds a constructivist view on learning (Snowman et al., 2009.

63.	Hence, entrepreneurial education is to a large degree the result of the teacher's approach to shaping the learning environment, rather than a well-defined method (Crawford, 2007). Hence, professionally related perceptions and attitudes should be addressed in professional development efforts and the wider school development strategy. Teachers may need continuing professional development to change their teaching practice. We will discuss this later in this paper.

64.	However, teachers do not act independently. Collaboration with the surrounding world is an integral part of the teaching practice and the learning environment. Influence of the school management, colleagues, students and parents are also important factors. Teachers may need support from the whole organisation in the change process.

Experience reports from practicing entrepreneurial schools

65.	A review of the case studies presented in the OECD Potsdam capacity building seminar in November 2014, result in the author's conclusion that the narrow understanding of entrepreneurship and therefore economic connotations of the aims of entrepreneurial education prevail among the secondary level and the VET schools. Nevertheless, since some of these study programmes have a curricular purpose of *about* and *for* entrepreneurship, a greater emphasis on building learning environments that enhance education *through* entrepreneurship will enhance the development of "life skills", that is, the sense of initiative and the ability to turn ideas into actions.

66.	Participants in Potsdam agreed that the **physical room** spans in many ways beyond the ordinary classroom. Some of the most commonly utilised rooms include premises all over the school as well as in close geographical proximity, such as a near-by forest or park, a farm, a factory,

businesses, museums, the public library and a cinema. Often, these physical rooms are used not only for entrepreneurial education but in the broader framework of flipped classrooms[14]. Less often used are Skype and other virtual communication rooms, trade fairs, shopping malls, sports clubs, the church and students' homes. Finally, collaboration across different age groups and generations bring yet another dimension to the physical rooms, such as, for example, a community centre for the elderly, and the classrooms and course activities of both younger and older students.

67.   Physical rooms can be created by re-imagining how spaces in schools can be utilized, for example by making the hall an expo or breech out space as it is practiced by several of the UK schools who participated in Potsdam. In this way, also classrooms can be used differently by re-organising tables and chairs in a flexible and spontaneous manner based on assignment needs. A comprehensive school in Finland, covering grades 1-12, has worked very purposefully on re-arranging the classroom by purchasing couches and round tables to promote team work, triangular tables, which can be easily turned into a circular shape and tables with flexible heights. In this school all secondary level classes are located on the same floor. All doors are opening to a common hall which students can use to study and work in groups. An open-space lounge was created with sofas, a microwave oven, a coffee machine and a water boiler. Students can choose to work in the lounge also during lessons. The same school is currently adding a new building which was designed to facilitate flexible learning environments. There will be glass walls, open spaces, social areas and plenty of small conference rooms which can be utilised by teachers as well as students. There will also be small and sound-proof examination rooms in which students can take computerised exams when they wish to do so.

68.   The mental room in the students learning environment is extended with the same degree of variation as the physical room. A Danish elementary school has opted for a shift in focus towards the utilisation of skills and knowledge in processes which create value for others and in which every child is acknowledged and recognised as a unique resource in the learning process. The overall aim is to empower the students. In a comprehensive school in the UK, the learning environment is guided by "Ask it!" and enquiry-led approaches to learning in which students are involved in the planning of the study. Teachers ask questions in the purpose of deeper learning.

A CHANGED ROLE FOR TEACHERS

69.   Entrepreneurial education can be organised in single activities, separately from ordinary education or throughout the school curriculum (Berglund and Holmgren, 2007; Cheung, 2008; Leffler, 2006; Leffler, 2009; Vaidya, 2014). The bandwidth between single activities and curriculum integration may vary from school to school and also among teachers within the same school.

70.   Variations may result from the age of students. In many countries there are fewer teachers per group/class of students at lower age, which makes the teacher "own" more of the students' total school time. This, in turn, makes it easier from a practical perspective to integrate entrepreneurial education approaches, such as an interdisciplinary and authentic learning environment, into the regular teaching practice (Sagar, 2013).

---

[14] E.g. http://www.knewton.com/flipped-classroom/

71.   Which role a teacher takes in the classroom and in shaping the students' learning environment heavily depends on his/her views on knowledge and learning theories, which, in turn, are associated with his/her professionally related perceptions and attitudes. Teachers who perceive entrepreneurial education as a novel approach may find it more cumbersome to change their entire teaching practice in the short run. Since entrepreneurial education is an *approach* to teaching, the multitude of aspects which are included in it requires time for reflection for the teacher to embrace it all. Also, teachers may want to see for themselves that the novel approach benefits the student achievement and that it "simply works". For these teachers, changes in teaching practice may be more doable if planned as single activities, which may also function as trial and learning activities for the teacher.

72.   Teachers may perceive entrepreneurial education also (partly) as an increased degree of collaboration with the surrounding world (Svedberg, 2007). This perception can also be found in the field of education research (Johannisson and Madsén, 1997; Røe Ødegård, 2000) as well as in policy (Falk-Lundqvist et al., 2012; Sagar, 2013). Collaborations with the surrounding world is regarded as a tool for providing an entrepreneurial learning environment in an integrated manner, a first step to a more explicit practice of entrepreneurial education (Falk-Lundqvist et al., 2012; Sagar, 2013). Teachers often express the need for support in establishing contacts with actors in the surrounding world. Some teachers may struggle with and find it too time-consuming to make contacts. As a result, these teachers may shape entrepreneurial education as single activities.

73.   Sagar, Pendrill and Wallin (2011) studied what Swedish primary, secondary and VET school teachers perceive as requirements for collaborating with the surrounding world, CSS. These requirements are also relevant for entrepreneurial education in the sense of education *through* as well as *for* entrepreneurship.

Table 4.   Requirements for collaboration with the surrounding world in education

Main concern…	… which includes issues around:
School management	• Student group size • General organisation • Students with 'special needs' • General flexibility • Support in development process for including CSS • Decision making, clear demands/goals for including CSS • Participation and involvement in process for including CSS • Timetable for option education activities
Time	• Time for planning together with colleagues and individually • Time for carrying out the plan • Time to reflect and adjust to new approaches • Time to make contacts with the surrounding world

Teacher's personal character traits and disposition	• Courage to:
	  • Try something new
	  • Break norms and traditions
	  • Let go of control
	  • "Fail"/"Trial and Error" approaches
	• Engagement, curiosity and interest
	• Will to change things
	• Ability to take initiative/to recognize possibilities
	• Self-confidence and Pro-activeness
	• Creativity and Imagination
	• Empathy

	• Being a positive role model
Colleagues	• Joint participation and decision making
	• Coherent views on teaching and education
	• Positive attitude in general and towards changes specifically
	• Ability to listen to and understand each other's different situations
	• Support and generousity
Surrounding world	• Positive attitude
	• Win-win collaborations
	• In close vicinity
	• Network of contacts
	• Simplicity
Economy	• In general terms
	• Transportation
Continuing Professional Development, CPD	• For inspiration
	• For a change in attitude/approach towards the students' resources, the schools' overall mission as well as towards interdisciplinary teaching and to regard CSS as a "pedagogical method".
	• For development work in general

Source: Adapted from Sagar, Pendrill and Wallin (2011).

74.   The success of individual teachers in steering entrepreneurial education away from single activities towards curriculum integration may be positively impacted by pedagogic discussions and collaborative teacher learning. To this end, the school management should be willing to make organisational changes in order to facilitate synergies between different education activities, and with regard to collaboration with the surrounding world. This also includes the possibility for pedagogic discussions and peer observations in teacher teams, which have been shaped in consideration of subject competence and also, *importantly*, in consideration of other personally related perceptions, attitudes as well as competences which have impact on the individual teacher's professional growth.

75.   Teachers in the Swedish study the availability of time to reflect and plan education activities as a requirement to build more cross-subject synergies. It takes time to adjust to new ways of thinking around knowledge learning processes, that is, time to change professionally related perceptions and attitudes. Some of the statements confirmed frustration over not having enough time to try out new ideas out, evaluate and re-design, before some new obligation is introduced. The time needed may not necessarily be extra time. Respondents were generally aware that they themselves are responsible, to a certain degree, for how they prioritise the time given both individually as collectively.

76.   The importance of time as an issue has been confirmed also in empirical studies from other parts of the world. Time was identified as a major barrier for the progression of entrepreneurial education in secondary schools in Hong Kong (Cheung, 2008). Additionally, in a case study of the introduction of entrepreneurship education in an Israeli elementary school, Heilbrunn (2010) also observed a negative influence on the development from the teachers' sense of being overloaded with work and thus lacking time to prepare and implement alternative teaching formats.

77.   Studies explicitly focusing on entrepreneurial learning environments in primary and secondary school reveal similar needs of teachers. For example, Leffler (2009) concluded that entrepreneurial education requires that teachers themselves possess or develop entrepreneurial attitudes and skills, such as daring to break habits and to let go of certain aspects of control to allow the students the controlled freedom which is required in an entrepreneurial learning environment. Similarly, Young (2009) pointed out that the generation of an authentic learning environment requires

teachers who are comfortable with risk taking and willing to turn over some control of the learning environment to the students.

78.	The impact of the teacher's professionally related perceptions and attitudes on the learning environment is confirmed also by Cheung's (2008) investigation of entrepreneurship programmes in secondary schools in Hong Kong. The observed difference between the junior and senior students' learning environments and teaching approaches was explained by the teachers' judgment of the younger students not being independent enough to effectively learn from entrepreneurial education activities. The teachers did not think that the junior students had the abilities which are required to learn in an entrepreneurial learning environment; take responsibility, be creative, take initiative, reflect on and analyse open-ended problems etc. There was also an issue around the students, who were contemporaneously supposed to take their public examinations. The teachers did not think that the knowledge and skills, which students may gain from entrepreneurship programmes, would be reflected positively in the examination results and that the students would be more efficiently prepared through traditional teaching approaches.

79.	The issues discussed here strongly indicate the emergence of a changed role for teachers in entrepreneurial education; this also applies to the other alternative teaching concepts as presented in Table 2, above. Continuing professional development, in one form or another, is a valuable support in making teachers change and grow. However, as findings from various empirical studies suggest, teachers "need to see for themselves" before they fully engage into a change process.

Continuing professional development for teachers

80.	Teachers need to have a specific set of knowledge and skills to act as professional teachers. This specific set of knowledge may be referred to as a teacher's professional knowledge base. Shulman (1987) differentiated six different components of knowledge that teachers require when teaching a specific content:

1.	Content knowledge

2.	General pedagogical knowledge (including classroom management)

3.	Curriculum knowledge

4.	Pedagogical content knowledge that brings together content and pedagogy

5.	Knowledge of learners and their characteristics (including the character if communities and cultures)

6.	Knowledge of educational purposes and values and their philosophical and historical groundings.

81.	In particular, pedagogical content knowledge has been discussed as a key component of an all-encompassing professional knowledge base for teaching. Hence, in continuing professional development for teachers the combination of the questions "what to teach" and "how to teach" have been central elements.

82.	In a subsequent research, Shulman and Shulman (2004: p. 259) suggested a refinement of the required professional knowledge of teachers by additionally taking into account social and collaborative factors. It is important to note that the additions to a teacher's required knowledge base

are independent of the school subject to be taught. They argue that an "accomplished teacher is a member of a professional community, who is ready, willing, and able to teach and to learn from his or her teaching experiences". Key characteristics are being *ready*, that is, possessing vision, *willing*, in terms of having motivation, *able*, that is, both knowing and being able "to do", *reflective*, in order to learn from experience, and *communal* in the sense of acting as a member of a professional community. With regard to entrepreneurial education, this means to possess vision and motivation for teaching, to learn from experience by reflecting on it individually as well as collaboratively, and to truly act as a member of a professional community by contributing to school development.

83.   Based on this, the so-called "Interconnected Model for Teacher Professional Growth", developed by Clarke and Hollingsworth (2002), represents a comprehensive approach to continuing professional development (CPD), which is referred to as teacher's growth. Clarke and Hollingsworth (2002) opted to not use the term "development" since it implies a more straightforward and one-dimensional process than teacher learning actually is; growth implies a multi-dimensional process.

84.   Teacher's growth occurs through the mediating processes of reflection and enactment between the domains of change, which include the following (Figure 1):

- The personal domain of change: Teacher knowledge, beliefs, attitudes and perceptions;

- The domain of practice: Professional experimentation such as new approaches in teaching practice;

- The domain of consequence: Salient outcomes, such as student learning and interest;

- The external domain: Sources of information, stimulus or support from CPD and/or colleagues as well as school management.

Figure 1. Interconnected domains of teacher's growth
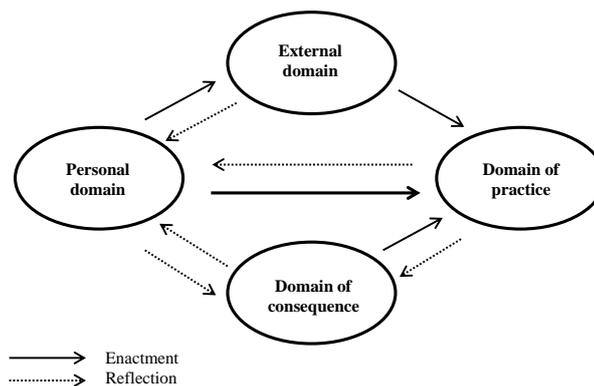
Source: Author. The Interconnected Model for Teacher Professional Growth (after Clarke & Hollingsworth, 2002 in Sagar, 2013, p. 60)

85.   Teacher's growth is a long-term and multi-dimensional process. To be effective, changes needs to happen in more than one domain. Effectiveness as well as paths of growth may, however,

vary among individual teachers[15], even when the external domain of change is the same or very similar. It is important to note that, as Opfer and Pedder (2011) reminded us, "teacher learning is intimately connected to learning at other levels of the system. The point here is not that all levels must be taken into consideration for each and every aspect of teachers' professional learning, but that any attempt to understand teachers' professional learning at only a subsystem level must be understood as partial, incomplete, and biased". This means that, as indicated above in Table 4, which lists requirements for collaborations with the surrounding world, teacher learning is part of a wider school development process.

86.   An application of the Interconnected Model for Teacher Professional Growth, with its four interrelated domains, to teacher's professional learning in the framework of entrepreneurial education, could imply the following scenario. As a starting point, the teacher experiments in class a new educational design, implying a change of the teacher's role. The courage and willingness to experiment depend on the teacher's personal perceptions and attitudes. These are influenced by the CPD message and the extent to which the teacher has been inspired and convinced by it as well as the support from colleagues and school management. Typical questions that a teacher my ask him/herself in this initial phase of change/growth are: Is there enough evidence and practical guidance for me to start and sustain changes in my teaching practice? How have colleagues responded to the CPD message? Where can I get support for the teaching practice? Is my school part of a network of entrepreneurial schools from which I could get inspiration and support? Does my school have access to partners in the surrounding world for collaborations that I could build on?

87.   After the experimentation phase, continuing teacher change is influenced by the observed change in students' interest and achievement, the domain of consequence (Figure 1). Every stimulus from the external domain and every change within the teacher are associated with reflection both at individual and collaborative levels. This reflection may be caused by or lead to enactment, that is, reflection may be the result of changes, which occurred in one or several of the domains as well as reflection may be the cause of these changes.

88.   The Model is also helpful to plan and monitor the wider process of school development. It points towards the importance of taking into account the different interconnected domains which partly reside inside teachers and partly in the school and the surrounding environment. Identifying key barriers and enablers in each of these domains may also bring to light what has worked and what has not worked in a developing process, and why. For example, was the success/absence/failure of a change due to (i) the teacher's personal perceptions and attitudes, (ii) his/her knowledge, (iii) the support (or lack) of colleagues (iv) school management, the (v, vi) design and delivery of the CPD message, (vii) the students' response to changes, other factor or a combination of all or some of these factors?

89.   Sagar (2013) used the model to analyse teacher change in response to professional development for entrepreneurial education in Sweden and concluded that teacher change is highly individual even though several factors in the external domain were similar and that support from colleagues may compensate lack of organisational support from school management. However, a lack of collegial support may not be compensated by moral support from the school management. For example, one teacher, who initially exhibited resistance to growth, engaged successfully in the process because of collegial support, whereas another teacher, who initially exhibited large potential for growth, ended up like an "extinguished flame" due to the lack of collegial support.

---

[15] see also Harland & Kinder, 1997; Opfer & Pedder, 2011; Sagar, 2013

90.	These conclusions, in turn, have implications both for the design and delivery of CPD and for the formation of teacher teams in a school. Firstly, the highly individual nature of teacher growth indicates that CPD may benefit from setting individual goals for a CPD intervention. Secondly, due to the strong collegial forces, it is suggested that not only subject related competence is considered when shaping the teacher teams at an (entrepreneurial) school, but that also the teachers' non-subject related competences as well as personally related factors (i.e., professionally related perceptions and attitudes) are considered to provide each individual teacher in a team the best possible growth.

Critical success factors in continuous professional development

91.	There are several factors which are critical for CPD effectiveness. It is interesting to note that these are very similar to the requirements, which teachers themselves express, for collaborating with the surrounding world and introducing entrepreneurial education. As Sagar (2013) concluded from a review of different CPD activities, the influence of critical factors may be both negative and positive depending on the conditions, the contexts and the different domains of change included in the overall change process.

- **Access to special knowledge.** For education *through* entrepreneurship in general school subjects, there are indications that the special knowledge needs to include general teaching approaches in connection with specific content knowledge, for a "purposeful effectiveness" (Sagar and Mehli, 2013). The CPD message also needs to be integrated into the practice during the CPD, rather than being dealt with as a side project.

- **The impact of collegial coherence on individual as well as collaborative reflection**. Peer-observations and pedagogic discussions are powerful tools for teacher growth in teachers' learning communities as, for example, William (2012) underlines in his book "Embedded Formative Assessment". The degree or lack of coherence in the teachers' learning community has a large impact on the paths of growth of individual teachers. The forces in the learning community are powerful and can encourage as well as inhibit individual teacher growth. Hence, awareness and caution is needed in the process of creating the teachers' learning communities, the teacher teams at the school. These findings confirm Elmore's (1996) conclusions that the composition of small groups of teachers should consist of a mixture of sceptical and committed teachers. Peer-observations, with specified aims, are powerful tools for professional growth, when performed in a secure and trust-based community.

- **Support from the school management**, including moral support, organisational support, and incentives to change.

- **Time**. Teachers need to be given time for individual and collaborative reflection, adjustment to new ways of thinking, to experiment with new educational design in the classroom as well as time to access special knowledge and the CPD message.

92.	Sagar and Mehli (2013) investigated the outcomes of two CPD programmes, which had the common aim of supporting teachers to change their teaching so that it would increase the students' interest in school science and technology but were different in terms of the teacher's required professional knowledge base and programme design. Both courses, who exhibited great potential to be effective, showed different results in all measured outcome categories. The learning point here is that the first issue to be addressed in evaluating the effectiveness of a CPD measure is to clearly define what the expected outcomes are.

93.   In a similar vein, Opfer and Pedder (2011) recommended steering away from a search for *general* conclusions about CPD effectiveness towards trying to describe, in more details, different circumstances and features of teacher growth. This knowledge may then be used to guide CPD design and delivery for similar circumstances and to raise awareness of the strong impact of the personal domain of change on CPD effectiveness. With this awareness, CPD measures can be designed in such a way that the individual goal-setting process for participating teachers and group dynamics are taken into account.

Experience reports from practicing entrepreneurial schools

94.   This section summarises the spontaneous inputs from education practitioners in a debate about CDP in entrepreneurial education in the OECD Potsdam capacity building seminar in November 2014. The strength of collegial forces was confirmed by all schools and positive outcomes were reported from initiatives including all school staff in CPD. A whole school staff approach is, however, only possible due to a supportive school management. This underlines the significance of the school management support for teacher growth and school development.

95.   Several VET schools reported positive impacts from peer learning CPD activities, which included several schools. This was echoed by a Danish primary, which had a similar experience whilst including also researchers and experts from the local school board. A primary school in England was offering both formal and informal CPD activities on a regular basis. Examples of informal CPD are class observations as well as "teach meets" in which teachers share examples, which, in some cases, are disseminated more widely within the school. The impact of the collegial coherence was also mentioned in relation to CPD for new staff.

96.   A comprehensive school in England reported on an innovative and successful networking approach whereby "Students run workshops in other schools and this lead to the receiving staff, which is reluctant, realising the positive outcomes".

CONCLUSIONS

97.   This paper has reviewed the constituting elements of entrepreneurial education, and discussed in particular learning environments, a changed role for teachers and the importance of continuous professional development which includes multiple levels of the system, that is, the teacher, the school, and its collaborations with the surrounding world.

98.   Entrepreneurial education may be interpreted and understood in terms of narrow and wide perspectives. This understanding gets shaped as education *through*, *for* and *about* entrepreneurship. Economic, political and ideological connotations of entrepreneurship and the "entrepreneur" may cause resistance against entrepreneurial education and the development path towards an entrepreneurial school. In an entrepreneurial school all teachers, school leaders, career counsellors and support personnel are aware of the different interpretations and understandings of entrepreneurship and the aims of entrepreneurial education. The entrepreneurial school provides entrepreneurial education integrated into the ordinary teaching practice instead of single, separated activities.

99. Entrepreneurial education is best described by a closer look at the learning environment, which includes a physical room and a mental room. Teacher's perceptions and attitudes towards entrepreneurship play a salient role in this. Research shows that the teacher's professionally related perceptions and attitudes have a strong impact on how the students' learning environment. They influence, for example, which physical rooms the teacher chooses to include in the learning environment and what the teacher chooses to include in the mental room.

100. CPD can help to distinguish entrepreneurial education from other related and very similar concepts, which all aim at steering away from traditional teaching practice, by underlining the aspect of "learning-by-creating-value", in which the value may be social, personal, cultural, environmental and/or economic. CPD includes inspiration, concrete examples and assignments in which the subject content is included. This means that science teachers get to work with entrepreneurial education examples which are from science education, social science teachers from social science education and so on. Teachers and other school personnel who work in the class room are given good amounts of time and opportunities to discuss and reflect on their professionally related perceptions and attitudes in relation to the CPD and in relation to providing entrepreneurial education. This includes time to make contacts with the surrounding world for collaborations and partnerships.

101. The entrepreneurial school provides CPD for all teachers and school personnel. The CPD considers all four domains of change in the teacher's entire professional environment. This means that all school personnel participate in the CPD, including the school management. Additionally, the consideration of the personal domain of change may result in individual goals and personalised support for each teachers' professional growth. This mimics the students' situation in an entrepreneurial learning environment.

REFERENCES

Aikenhead, G. S. (2004, 25 – 30 July). *The humanistic and Cultural Aspects of Science & Technology Education.* Paper presented at the 11th International Organisation for Science and Technology Education (IOSTE) Symposium, Lublin, Poland.

Anderson, R.D. (2007). Inquiry as an Organizing Theme for Science Curricula. In Abell, S.K & Lederman N.G (Eds.), H*andbook of Research in Science Education.* New Jersey: Lawrence Erlbaum Ass.

Baranović, B., Štibrić, M., & Domović, V. (2007). Enterprise education – the perspective of teachers in compulsory schools. *Sociologija i prostor (45)*3/4.

Besançon, M., & Lubart, T. (2007). Differences in the development of creative competencies in children schooled in diverse learning environments. *Learning and Individual Differences, (18),* 381–389.

Bosma, N., Hessels, J., Schutjens, V., van Praag, M., & Verheul, I. (2012). Entrepreneurship and Role Models. *Journal of Economic Psycology, (33)*2, 410-424.

Cheung, C-K. (2008). Entrepreneurship education in Hong Kong's secondary curriculum - Possibilities and limitations. *Education + Training, (50)* 6, 500-515. DOI 10.1108/00400910810901827

Clarke, D., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education, (18),* 947-967.

Crawford, B. (2007). Learning to Teach Science as Inquiry in the Rough and Tumble of Practice. *Journal of Research in Science Teaching,(44)*4, 613–642.

Day, C., & Sachs, J. (2010). Professionalism, performativity and empowerment: discourses in the politics, policies and purposes of continuing professional development. In C. Day, & J. Sachs (eds): *International Handbook on the Continuing Professional Development of Teachers*. Glasgow: Bell & Bain Ltd. Originally published in 2004.

Desimone, L. M., Porter, A. C., Garet, M. S., Suk Yoon K., & Birman, B. F. (2002). Effects of Professional Development on Teachers' Instruction: Results from a Three-year Longitudinal Study. *Educational Evaluation and Policy Analysis, (24)*2, 81–112.

van Driel, J H. (2001). Professional Development and Reform in Science Education: The Role of Teachers' Practical Knowledge. *Journal of Research in Science Teaching, (38)*2, 137-158.

Duckworth, K., & Schoon, I. (2010). Who becomes an entrepreneur? Early life experiences as predictors of entrepreneurship. Oral presentation.

Elmore, R. F. 1996. Getting to scale with good educational practice. Harvard educational review, 66, 1-27.

EU. (2006). European Commission. *Key Competences for Lifelong Learning – A European Framework.* Official Journal of the European Union: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_394/l_39420061230en00100018.pdf

Falk-Lundqvist, Å., Hallberg, P-G., Leffler, E., & Svedberg, G. (2012). *Entreprenöriell pedagogik i skolan – drivkrafter för elevers lärande.* Stockholm: Repro 8 AB.

Flexner, A. (1955). The usefulness of useless knowledge. *Journal of chronic diseases, 2*(3), 241-246.

Gavron, R., Cowling, M., Holtham, G., & Westall, A. (1998). *The Entrepreneurial Society*, London:

Institute for Public Policy Research.

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

Gibb, A.A., & Cotton, J. (1998). *Entrepreneurship in schools and college education – creating the leading edge.* Background paper to the conference held at the Department of Trade and Industry Conference Centre, December 8th 1998.

Gibb, A.A., 1998, Entrepreneurial core capacities, competitiveness and management development in the 21st century, Keynote speech at the Internationalizing Entrepreneurship Education and Training 8th annual conference, July 26-28th, European Business School, Oestrich-Winkel Germany.Hattie, J. (2009). *Visible Learning – a synthesis of over 800 meta-analyses relating to achievement.* Oxon: Routledge.

Gilbert, J. (2006). On the Nature of 'Context' in Chemical Education. *International Journal of Science Education, (28)*9, 957–976.

Heilbrunn, S. (2008). Advancing Entrepreneurship in An Elementary School: A Case Study. *International Education Studies, (3)*2.

Heilbrunn, S., & Almor, T. (2014). Is entrepreneurship education reproducing social inequalities among adolescents? Some empirical evidence from Israel. *The International Journal of Management Education (12)*, 445-455.

Herrington, J., & Oliver, R. (2000). An Instructional Design Framework for Authentic Learning Environments. *Educational Technology Research and Development*, *48*(3), 23–48. ISSN 1042-1629

Jarman, R., & McClune, B. (2002). A survey of the use of newspapers in science instruction by secondary teachers in Northern Ireland. *International Journal of Science Education, (24)*10, 997 – 1020.

Johannisson, B., Amundsson, A., & Kivimäki, K. (2010). Training in entrepreneurship as a many-sided struggle for growing insight. In J. Sjøvoll, and K. Skogen (eds.) *Creativity and Innovation: preconditions for entrepreneurial education.* Trondheim: Tapir Academic Press, 171-188.

Johannisson, B., & Madsén, T. (1997) *I entreprenörskapets tecken: en studie av skolning i förnyelse.* Stockholm: Närings- och Handelsdepartementet, Ds 1997:3.

Jones, B., & Iredale, N. (2006). Developing an entrepreneurial life skills summer school. *Innovations in Education and Teaching International, (43)*3, 233–244. ISSN 1470–3297 (print)/ISSN 1470–3300 (online)/06/030233–12. DOI: 10.1080/14703290600618522

van der Kuip, I., & Verheul, I. (2003). Early Development of Entrepreneurial Qualities: the Role of Initial Education. SCALES-paper N200311.

Komulainen, K.J., Korhonen, M., & Räty, H. (2013). On entrepreneurship, in a different voice? Finnish entrepreneurship education and pupils' critical narratives of the entrepreneur. *International Journal of Qualitative Studies in Education, (26)*8, 1079-1095. DOI: 10.1080/09518398.2012.731530

Lackéus, M. (2013). Developing Entrepreneurial Competencies - An Action-Based Approach and Classification in Education. Licentiate thesis in technology. Chalmers University of Technology.

Leffler, E. (2009). The Many Faces of Entrepreneurship: a discursive battle for the school arena. *European Educational Research Journal, (8)*1. http://dx.doi.org/10.2304/eerj.2009.8.1.104

Leffler, E., & Svedberg, G. (2005). Enterprise Learning: a challenge to school education? *European Educational Research Journal, 4*(3), 219 – 227.

Leffler, E. & Svedberg, G. (2010). A global entrepreneurship wind is supporting or obstructing democracy in schools: A comparative study in the North and the South. *Education Inquiry, 1*(4), 309–328.

Mason, C. QAA. (2014). *Creating entrepreneurial campuses*. QAA622 - The Quality Assurance Agency for Higher Education, UK. Registered charity numbers 1062746 and SC037786

Mbebeb, F. (2009). Developing productive life skills in children: Priming entrepreneurial mindsets through socialisation in family occupations. *International Journal of Early Childhood*, (*41)*2, 23-34.

National Research Council, NRC. (2000). *How People Learn – Brain, Mind, Experience and School* (Expanded ed.). Washington DC, National Academy Press.

Obschonka, M., Silbereisen, R.K., & Schmitt-Rodermund, E. (2010). Entrepreneurial intention as developmental outcome. *Journal of Vocational Behavior, (77),* 63–72.

Obschonka, M., Silbereisen, R.K., Schmitt-Rodermund, E., & Stuetzer, M. (2011). Nascent entrepreneurship and the developing individual: Early entrepreneurial competence in adolescence and venture creation success during the career. *Journal of Vocational Behavior, (79),* 121–133.

OECD (1989). *Towards an Enterprising Culture – A Challenge for Education and Training*. Paris: OECD.

Opfer, V. D., & Pedder, D. (2011). Conceptualizing Teacher Professional Learning. *Review of Educational Research, (81)*3, 376-407. DOI: 10.3102/0034654311413609

Osborne, J., Simon, S. & Collins, S. (2003). Attitudes towards science: a review of the literature and its implications. *International Journal of Science Education, (25)*9, 1049 – 1079.

Reiss, M. J. (2004). Students' Attitudes towards Science: A Long-Term Perspective. *Canadian Journal of Science, Mathematics and Technology Education*, *(4)*, 97-109.

Rodrigues, R. G., Dinis, A et al. (2012). The Effect of an Entrepreneurial Training Programme on Entrepreneurial Traits and Intention of Secondary Students. *Entrepreneurship - Born, Made and Educated.* T. Burger-Helmchen: InTech.

Sagar, H. (2013). *Teacher Change in Relation to Professional Development in Entrepeneurial Learning.* Thesis for degree of Doctor of Philosophy in Science Education at the Department of Physics, University of Gothenburg, Sweden. Ale Tryckteam AB: Bohus. ISBN Printed edition: 987-91-628-8866-4. ISBN Digital edition: 987-91-628-8867-1: http://hdl.handle.net/2077/34375

Sagar, H., & Mehli, H. (2013). Expanding Teachers' Competences in Authentic and Entrepreneurial Teaching Issues in Science and Technology - an Investigation of two Approaches. *NorDiNa.*

Sagar, H., Pendrill, A-M. & Wallin, A. (2012). Teachers' Perceived Requirements for Collaborating with the Surrounding World. *NorDiNa, 8*(3), 227-243.

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.

Schreiner, C. (2006). *Exploring a ROSE-garden: Norwegian youth's orientations towards science – seen as signs of late modern identities*. Doctoral Thesis, Faculty of Education, University of Oslo. Oslo: AiT e-dit AS.

SjØberg, S. (2005). Naturvetenskap som allmänbildning – en kritisk ämnesdidaktik. Lund: Studenlitteratur. Originally published in 2000.

Smith, R. (2002). Inspirational tales: propagating the entrepreneurial narrative amongst children. In (eds) Bygrave, W. D. et al: *Frontiers of Entrepreneurship Research 2002*: Proceedings of the Twenty-Second Annual Entrepreneurship Research Conference. 2002. Babson Park, Massachusetts: Babson College Center for Entrepreneurship.

Shulman, L. S., & Shulman, J. H. (2004). How and what teachers learn: a shifting perspective. *Journal of Curriculum Studies, (36)*2, 257-271.

Stevenson, L., & Lundström, A. (2002) *Beyond the rhetoric: defining entrepreneurship policy and its best practice components.* Örebro: Swedish Foundation for small business research.

Vaidya, S. (2014). *Developing Entrepreneurial Life Skills.* ISSN 2211-1921 ISSN 2211-193X (electronic). ISBN 978-81-322-1788-6 ISBN 978-81-322-1789-3 (eBook). DOI 10.1007/978-81-322-1789-3. New Delhi: Springer.

Verheul, I., & Thurik, A.R. (2001). Start-up capital: 'Does gender matter?'. *Small Business Economics (16),* 329-345.

Wiliam, D. (2014). *Att följa lärande – formativ bedömning i praktiken*. (Original: *Embedded formative assessment 2011)*. Poland: Dimograf (for Studentlitteratur).