Entrepreneurship as a New Learning Philosophy

Helle Munkholm Davidsen
Professor, PhD, Head of Center for Innovation and Entrepreneurship
University College Lillebaelt
Department of Innovation and Development
Lucernemarken 1
5260 Odense S, Denmark
head@ucl.dk

Kirsten Bonde Soerensen
Assistant professor, Designer, MA in Rhetoric, PhD in Strategic Design
University College Lillebaelt

Questions we care about: Entrepreneurship has become a central part of school curricula in most European countries, not only as a subject matter but also as a mind-set. If entrepreneurship is to be integrated into schools as a mind-set, we need to investigate entrepreneurship as a learning culture and as a learning philosophy. The main questions in this paper are: What can entrepreneurship tell us about learning, and what are the implications for schools?

Approach: Our study is based theoretically on entrepreneurship theory. Methodologically it is based on the EU project YEDAC about entrepreneurship in secondary schools and on design theory. Empirically it is based on pilot studies about entrepreneurial learning in primary and secondary schools in Denmark.

Results: We present a theoretical, methodological and practical understanding of entrepreneurial learning with focus on a general conflict between entrepreneurship and the educational system concerning teaching culture and methods (active vs. passive, innovation vs. reproduction) and the paradigmatic role of education in society (industrial society vs. global knowledge society).

Implication: Integrating an entrepreneurial culture and mind-set in schools demands a new school culture and a new way of learning. We will present prototypes, which we have worked with in practice, that can support a new learning culture and more individual motivation for learning in basic schools.

Value: With our theoretical questions and the findings from our pilot studies about entrepreneurial learning, we will initiate a discussion about what it means for schools to use entrepreneurship as a learning philosophy.

Key words: Learning philosophy, learning methodology, effectuation, autonomy, Self-Directed Learning, Design Thinking

Introduction

Entrepreneurship has become a central part of basic school curricula in most European countries (European Commission 2012), not only as a subject matter but also as a mind-set (European Commission 2002, Education and Culture DG 2007). On the surface, on a policy level and on the level of educational steering documents (curricula, guidelines, recommendations), it looks as though entrepreneurship has actually been integrated into basic schools, but beneath the surface, the integration of entrepreneurship is more problematic. There are no problems as long as entrepreneurship is viewed either as a subject to be taught on its own or as a special theme to be worked with in isolated project weeks. By contrast, if entrepreneurship is to be integrated into daily teaching as a new kind of learning, then the entrepreneurial mind-set becomes a problem.

At a general level, this is because, as Robinson and Blenker (Robinson and Blenker 2013) indicate, the emancipatory spirit in entrepreneurship is in opposition to the controlling and regulation logic in education. Entrepreneurship is about seeing and exploiting new opportunities, but the educational system is about certifying well-established knowledge. Or as Robinson and Blenker put it in relation to students, "how [do] we set our students up – as passive receivers of 'knowledge' on the one hand, or as active participants capable of shaping their own learning, on the other" (Robinson and Blenker 2013: 2)?

So it seems we have a general conflict between entrepreneurship and the educational system. This conflict consists of different aspects, which we divide into two dimensions:

- Teaching culture and methods (active vs. passive, innovation vs. reproduction)
- The paradigmatic role of education in society (industrial society vs. global knowledge society)

In the following we will look into these dimensions on a theoretical level (What does entrepreneurship tell us about learning?), on a political level (What is the role of education in global knowledge society in the light of entrepreneurship?) and on a practical level (How does entrepreneurship influence what teachers do in daily teaching in classrooms?).

Our focus is on basic schools, but our conclusions are meant to be generic in relation to education on all levels from primary school to university. Our study is based theoretically on entrepreneurship theory. Methodologically it is based on the EU project YEDAC about entrepreneurship in secondary schools and on design thinking. Empirically it is based on pilot studies about entrepreneurial learning in primary and secondary schools in Denmark.

In the following we will start by defining what we mean when we talk about entrepreneurship as a learning philosophy[1]. Then we will look at entrepreneurial learning as paradigmatic in a global knowledge society. On that background we will specify what we think this means for learning culture and learning in practice.

Different kinds of entrepreneurship education

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[1] The term "philosophy" is used here instead of "didactic" and "pedagogic", because these terms are not well-known in an English-speaking context.

In defining entrepreneurship education, we follow Gibb (1993), who distinguishes between learning entrepreneurship as a subject matter and as a general competence: "A clear distinction can be made between programmes aimed at developing enterprising behaviour, skills and attributes from those focused upon small business and entrepreneurship" (Gibb 1993:30).

We furthermore make a distinction between entrepreneurship to be learned as a competence and entrepreneurship as a certain way of learning. It seems relevant to separate these three understandings of entrepreneurship education, since they have different learning objectives and different methodological implications.

The goal of entrepreneurship education as a subject is learning about venture creation; it provides the knowledge necessary to start up businesses (such as economic and financial literacy, knowledge of business organization and processes). Entrepreneurship education as a subject can be learned methodologically in different ways (both traditional and entrepreneurial ways[2]) since the method is secondary to the subject. Entrepreneurship education aimed at creating an entrepreneurial mind-set or entrepreneurial competences can address all kinds of subjects, because the content is secondary to the main learning objective, namely developing entrepreneurial competences (such as taking initiative, risk taking, creativity and problem solving). The main goal of entrepreneurship as a certain way of learning is as a contrast to learn a subject in an entrepreneurial way. Here it is not entrepreneurial competences that are the learning objective but any kind of subject matter (such as science, history, language etc.). However, the entrepreneurial learning method is not secondary, because it is mandatory to learning the subject in an entrepreneurial way. Entrepreneurial learning will often include developing entrepreneurial competences, but this is not the main goal. We sum up these three understandings of entrepreneurship education in figure 1.

Figure 1

Entrepreneurship education	Main learning objective	Method
As a subject	Knowledge about business creation	Traditional or Entrepreneurial
As competences	Entrepreneurial competences	Entrepreneurial
As learning	A subject	Entrepreneurial

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[2] We are distinguishing methodologically very broadly between traditional and entrepreneurial learning. We define traditional learning as teacher-directed learning, where the teacher guides a whole class in learning the same content in the same way. In opposition to traditional learning, we here initially define entrepreneurial learning broadly as all kinds of activating learning that support self-directed learning and entrepreneurial behavior (meaning that students can take initiative, explore possibilities, transform ideas to action, take responsibility for their own learning etc.).

One may say that "true" entrepreneurship education is entrepreneurship education where the subject is entrepreneurship and the method is entrepreneurial learning. But the research in entrepreneurship education has led to a broad investigation of the potentiality of entrepreneurship in relation to learning as such, which has resulted in a variety of uses of the term. Therefore, it seems necessary to define in what sense we are using the term. Furthermore, we are here focusing on a specific understanding, namely entrepreneurial learning, that we need to separate and specify in order to investigate it more closely.

Entrepreneurship as a learning philosophy
In the following we look more closely at entrepreneurial learning as a certain way of learning. Most literature about entrepreneurship education concerns the connection between entrepreneurship as a subject and as a mind-set (Gibb 1993, 2002, Hannon 2005, Neck and Greene 2011, Blenker et al 2012, Robinson and Blenker 2013). The research area of entrepreneurship education seems to have been born as a distinct field with the question: Does entrepreneurship as a subject require a certain learning methodology that supports entrepreneurial competences? That question has led to the development of entrepreneurial learning methods that are related not only to the subject of entrepreneurship, but to learning as such. The notable element in this development, from a learning perspective, is that it is entrepreneurship theory that is used as the basis for understanding learning. Thus, understanding entrepreneurial learning as a certain way of learning requires asking: What can entrepreneurship theory tell us about learning?
Below we will present what we see as generic aspects in the relation between entrepreneurship and learning. We will focus on the conceptual link between learning and small business ownership (Gibb 1993) and on the learning implications of two generic aspects of entrepreneurship, namely "effectuation" (Sarasvathy 2001) and "autonomy" (Gelderen 2012). These two concepts are especially interesting from a learning perspective because they are linked to the way we learn and to the motivation to learn.

Similarity between entrepreneurship and learning
Gibb, in his classic article "The Enterprise Culture and Education: understating enterprise education and its links with small business, entrepreneurship and wider educational goals" (Gibb 1993), very precisely pointed out that there is a conceptual link between entrepreneurship and learning.[3] Entrepreneurship as "independent small business ownership" (Gibb 1993:13) is very much like learning, or at least a certain kind of learning, namely active learning. This entrepreneurial learning is in opposition to passive or so-called traditional learning, which for its part is parallel to the behaviour of an employee. We will return to that point, but first we will look into the similarity Gibb makes explicit between entrepreneurship and learning.
Entrepreneurship as small business ownership is reminding of learning because small businesses contain organizational and personal elements that correspond conceptually to learning environments and "learning behaviour" (Gibb 1993: 16ff). Basically, both (active) learning and business ownership require personal responsibility, open tasks and freedom to solve problems within limits. Going into more details about the parallels, we can, following Gibbs, point out the following similarities[4]:

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[3] This is also the reason why entrepreneurship education as a subject and as mind-set is often confessed (Davidsen 2014).

[4] Also described in Davidsen 2014.

Uncertainty and complexity
Business: Starting up a small business involves uncertainty and complexity.
Learning: Learning is also a field of uncertainty and complexity. When a learner is confronted with a new area or subject, the field is unknown and therefore experienced as difficult and complicated.

Dependency on the environment and limited resources
Business: Starting up a small business involves dependency on the environment and limited resources.
Learning: The learner is also dependent upon the resources and facilities he or she is offered, which are normally limited and restricted in different ways.

Ownership and personal control
Business: Starting up a small business involves ownership and personal control.
Learning: The learner in active and open learning process also is allowed ownership and control over the learning process.

Responsibility for outcome and process
Business: The combination of ownership and personal control in a small business leads to personal responsibility for the outcome and a commitment to see things work and to see things through.
Learning: If the learner is allowed ownership and control over the learning process, he or she is able to take responsibility for the process and its outcome. This requires freedom to act (within limits) and an amount of independence in the management of the learning process.

Recognizing and solving problems
Business: The uncertainty in starting up a business implies a holistic task structure, where the owner of the business is obliged to recognize and solve problems.
Learning: If the learner is presented with open tasks, the learner also needs to be able to recognize and solve problems.

Planning and prioritizing
Business: The open task structure in businesses forces the owner to decide for him- or herself how and when to do things, but also to prioritize resources.
Learning: Open tasks in learning also force the learner to make decisions regarding how and when to do things, and to prioritize resources.
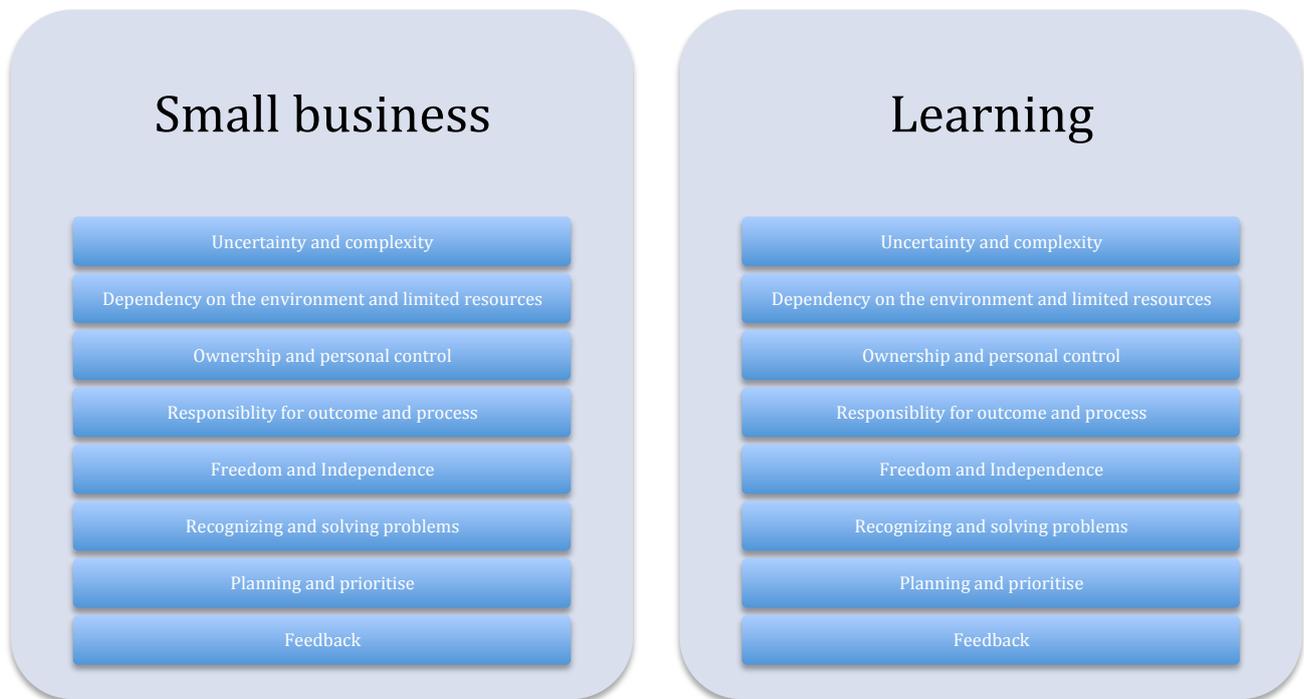
Feedback
Business: Response or feedback from the environment (customers, partners, affiliations etc.) in response to mistakes or as rewards is an essential source of knowledge in business.
Learning: The learner also relies on feedback from the environment, and mistakes are also here an essential source of learning.

The conceptual link between small business and learning is summed up in the following figure:[5]

Figure 2

Small business	Learning
Uncertainty and complexity	Uncertainty and complexity
Dependency on the environment and limited resources	Dependency on the environment and limited resources
Ownership and personal control	Ownership and personal control
Responsiblity for outcome and process	Responsiblity for outcome and process
Freedom and Independence	Freedom and Independence
Recognizing and solving problems	Recognizing and solving problems
Planning and prioritise	Planning and prioritise
Feedback	Feedback

So what does entrepreneurship reveal about learning, according to our analyses of Gibb? It shows that active learning and all kinds of project-based learning basically are entrepreneurial, because they are organized entrepreneurially and require entrepreneurial behaviour. It also tells us which elements should be presented in learning if it is to be denominated as entrepreneurial; namely, it should be based on open and holistic tasks, allow freedom, independence and personal control in solving tasks, and it should thereby lead to personal responsibility and ownership. This furthermore makes it possible for students to plan their own learning processes, while being aware of the dependency of the environment and its limited resources and regulated by feedback from teachers and others. Any kind of learning can be organized in this way as entrepreneurial learning with the purpose of learning a given subject.

Autonomy
In the light of entrepreneurship, some of the elements from Gibb are furthermore worth stressing: personal control, freedom, independency and personal responsibility. These all concern the autonomy of the learner, and as Gelderen points out (Gelderen 2012), autonomy is a recurrent value in the investigation of entrepreneurs' motivations. It is primarily not the prospect of economic profit that motivates entrepreneurs but the freedom to make their own

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[5] Gibb creates several relevant and interesting models to illustrate the components of both small business and enterprise education in his article (Gibb 1993). This model does not represent an attempt to summarize or replace his model but simply stresses the conceptual link.

decisions and choices. Gelderen directly connects the autonomy of the entrepreneur with the autonomy of the learner through the pedagogical method self-directed learning. We will return to that.

At first we will stress that entrepreneurship makes it clear that the autonomy of the learner is central. This has several implications. It means that the personal development of the learner, including their personal values, is important. It also means that the learner more generally should be allowed more freedom to choose. This is a problem especially in basic schools and in relation to traditional teacher-directed learning, because it is the teacher that alone decides what is thought and how. Traditional learning in most basic schools is furthermore managed through central national curricula that contain mandatory learning objectives. This makes it difficult for learners to make learning choices in relation to their own personal needs and wishes. When that is not possible, it is also difficult for learners to take responsibility for and ownership of their learning.

Rogers and Freiberg, in their book with the significant title *Freedom to learn* (1994), make it clear that one of greatest problems for students in engaging in learning is that they are put out of influence. Students experience being made passive, neglected and denied opportunities, choices and personal respect (Rogers and Freiberg 1994: 5ff). Rogers and Freiberg use the metaphor of the tourist to express the feeling of students: "Many students seem simply to be visitors or *tourists* in the classroom, moving from one idea to the next without any sense of comprehension, commitment, or involvement" (Rogers and Freiberg 1994: 9).

In a study we conducted at a Danish school, we asked the pupils in fourth and eighth grade to reflect on what was important for them in learning in relation to personal values. They made visual depictions[6] (collages) of a good and a less good school day and pointed out what affected "the goodness of the day". Then they remarked whether they themselves had influence on the different aspects. One of the significant results from that study is that the children thought they had influence on nearly all aspects of their life other than learning.

Thus, there seems to be a major conflict between the development of students' personal autonomy and traditional learning, and more generally also between entrepreneurship and the school system. This has to do both with the paradigmatic role of education in society and with teaching culture and methods. Before we look more closely at these aspects, we are going to learn one more thing about learning from entrepreneurship.

Effectuation

It is, as stated above, important for the development of autonomy, responsibility, ownership etc. to have choices and possibilities. The fixed national curricula in relation to basic schools therefore posit a problem. Both subjects and learning objectives are fixed. It is furthermore viewed as essential for the quality of learning to set up explicit learning goals (Hattie 2009). We need therefore to open up the learning possibilities in relation to subjects to allow more freedom to learn. As we know, one of the generic aspects of entrepreneurship is seeing opportunities (Sarasvathy 2001, Shane 2003), identified by Sarasvathy as "effectuation". Effectuation is, according to Sarasvathy (Sarasvathy 2001), characterized by being "means driven" as opposed to being "goal oriented". This means that entrepreneurs do not set fixed goals through business plans, strategies or market analyses. Instead, they act on the opportunities they see here and now.

Learners in the traditional school are not allowed – as the entrepreneur is – to see possibilities and act on them. Their learning possibility is fixed by predefined learning goals. If subject

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[6] We will return to visualization as a method later on in this paper.

matters instead are considered a means, as a field of possibilities, then students can find their own innovative ways of learning through the subject matter. They will be able to follow their own ideas. They will be able to profit from the learning potentiality in the individual meeting with the subject matter. An entrepreneurial approach to learning will thus focus on the potentiality of the subject matter offered to the students rather than on fixed learning objectives.

Other studies have used effectuation as pedagogical method, but then it is used in relation to creating entrepreneurial projects more than to learning a subject (Günzel-Jensen and Robinson 2014). The learner's ability to see possibilities in the light of the individual-opportunity nexus (Shane 2003) has also been transformed to an entrepreneurial pedagogic, but again with the goal of creating entrepreneurial projects (Blenker et al 2012). We would like to use the concept of effectuation to point explicitly at subject matters as a field of learning possibilities. In practise this is not easy, because we need then to view subject matters and learning goals in a new way that opens them up for the students. In the section about learning culture and entrepreneurial learning in practice, we will discuss this problem further.

Entrepreneurial learning

Our perspective here is to see learning in general in the light of entrepreneurship. What can entrepreneurship, theoretically and conceptually, reveal about learning? The generic understanding of entrepreneurship as seeing opportunities (effectuation) leads to seeing subject matters (curriculum) as means and opportunities that can be realized in different ways (vs. reproduction of predefined curriculum set goals). The generic understanding of entrepreneurship as seeking autonomy leads to stressing the active and personal engagement in learning (vs. passive tourist). The conceptual similarity between small business ownership and learning leads to a precise characterization of entrepreneurial learning as supporting effectuation and autonomy: Entrepreneurial learning is based on open and holistic tasks. It allows freedom, independence and personal control in solving takes. It results in personal responsibility and ownership. It makes it possible for students to plan their own learning processes. It makes students aware of the dependency of the environment and its limited resources. It is regulated by feedback from teachers and others. Our perspective here is to transform this concept of entrepreneurial learning not only to entrepreneurial projects but to learning as such. Entrepreneurial learning, though, is not only about learning. It is also about school culture and the role of education in society

Entrepreneurial learning in the 21st century

Entrepreneurship education is a central part of the political agenda for many reasons. It is linked to economic growth but also to the more general development of the global knowledge society in the 21st century. This development has, in an educational context, led to the European framework for lifelong learning (Education and Culture DG 2007) with the main aim to "identify and define the key competences necessary for personal fulfilment, active citizenship, social cohesion and employability in a knowledge society" (Education and Culture DG 2007:3). One of the eight key competences that are identified is "sense of initiative and entrepreneurship". This mean that entrepreneurship as a competence is pointed out as central for both personal and social development, for active citizenship and for employability.

Educational research (Griffen et al 2010) has also identified a need in schools for new 21st-century competences. These new competences are about not only learning but more generally about being a citizen in the 21st century. They are furthermore close to entrepreneurial

competences like problem solving, decision making, communication and collaboration.[7]

These educational changes express a general transformation in society from the industrial society of the 20th century to the project-based global labour market of the 21st century. It is the "human condition" as such that has changed radically from the stable and predictable industrial society of the 20th century to the open and innovative 21st century. As Peter Drucker argued in 2000, the biggest changes right now are within "the human conditions": "People have to manage themselves" (Drucker 2000:163). This leads to an increasing need to identify our personal values and become self-leading (Covey 2005, Drucker 2000) and self-directed in both learning and working life.

This creates a need to alter many of our dominant values and basic assumptions that stem from the Industrial Age and are still part at the educational system in many respects. In particular, our values and assumptions related to the concept of "a human being" are vital. In the Industrial Age, a human being was considered a thing that needed to be managed and controlled – an assumption that still prevails in many of our organizations and educational institutions.

In the traditional school system, learning is still treated as production, manufactured according to certain standards. Examinations control to what degree the "products" are in accordance with these standards. School buildings and the organization frames of learning also remain industrial factories. The teachers are the working leader. They monitor the "workers", and students are socialized to work with fixed tasks that conform to predefine norms.

Learning in this traditional form resembles the work form of employment, and they are both in opposition to the behaviour of the self-leading and self-directed entrepreneur. Following Gibb, employment is, in opposition to self-employment,:

> Regulated environment (…) where an employer substantially dictates to the employee what jobs to do, when to do them, how to do them, provides limits to the scope of responsibility through job descriptions, provides controlled environment, feeds back on performance (…) limitations to work hours and largely regulates the interlace between personal and business life. (Gibb 1993:18)

This description of employment could just as well be a description of learning in traditional schools. In the Industrial Age it made sense to train students to this regulated work life, but it does not fit 21st-century society.

Entrepreneurial learning is therefore about more than learning. It represents a new paradigm for learning, citizenship and work competences that reflect the human condition in the 21st century. This condition can be condensed to the need for self-directedness and self-leading.

Learning culture
The main reason there is a conflict between the school system and entrepreneurship is the fact that the school system is built to match the work culture of employees. Schools are, as a consequence, based on regulation, standardization and control. If entrepreneurial learning is to be integrated into the school system, we need to change the system more radically.

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[7] Griffen et al 2010 define the 21st-century competences as follows:
Ways of thinking: Creativity, critical thinking, problem solving, decision making and learning
Ways of working: Communication and collaboration
Tools for working: Information and communications technology (ICT) and information literacy
Skills for living in the world: Citizenship, life and career, and personal and social responsibility

In the European CIP project about entrepreneurship education named YEDAC (www.yedac.eu), the main goal is to develop a trans-European model for secondary school teachers to support the use of entrepreneurial learning in teaching different subjects. When we started this project in 2012, the intention was to describe a learning model that could simply change the way teachers taught subjects. We soon realized that this was not enough. We needed to change the learning culture, and especially the teacher's role and the relations between teachers and students. Teachers and students need to work together as partners to allow students to influence the learning. The teacher's role must consequently change from leader to facilitator and guide. We also need to open up the classrooms to break down uniform teaching and transform learning into wider and more differentiated learning opportunities. In the YEDAC project, we do that by integrating cooperation with external partners and regional contexts, and by using activating learning methods that support entrepreneurial competences. We have expressed these points in the didactic YEDAC model below. The main point in the didactic YEDAC model is that one needs to do all things: change the learning culture, open up the learning environments, use activating learning forms and support entrepreneurial competences as part of the learning of subjects. One cannot turn just one of the gears. They need to work together to create entrepreneurial learning:

Figure 3

The crucial part in the model is the teacher's role. It is not easy for teachers, who use to be in control, to let students participate in decision making and work with them as partners. We

have therefore in the YEDAC project also developed a planning model and tools for facilitating the process to support the teachers' new role (www.yedac.eu). We will not go into detail about these tools here. Our point is more generally that it is difficult and a huge change for teachers in basic schools to transform their role

It is not a new point in educational research that the role of the teacher must change to give more freedom and self-directedness to students. Gelderen (2010) points to self-directed learning as a learning methodology that gives teachers a new role and supports the autonomous motivation of students. Self-directed learning is the one learning philosophy calling for the freedom of students to set their own goals and follow their own direction in learning. In self-directed learning, students are asked to

> take the initiative, with or without help from others, in diagnosing their learning needs, formulation learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcome. (Knowles 1975:18)

This classic description of self-directed learning is also an apt definition of entrepreneurial learning. It is the freedom to make a decision, to act from your own free will and according to your own goals and personal identity that connects entrepreneurship and self-directed learning. Personal identity – "Who am I?" – and personal values – "What matters to me?" – are considered mandatory for self-directedness as well as for entrepreneurial learning as pointed out by Blenker et al 2012.

It is a radical shift to go from the directedness of the teacher to the directedness of students. It does not mean that the teacher matters less. On the contrary, Gelderen stresses that students need the teacher's guidance even more to find their own goals and potential, but also to create qualitatively good learning environments (Gelderen 2012). It is therefore not essential that self-directed learning is self-leading in all respects. The central element in the guidance is not free choice but relevance (Gelderen 2012, Assor et al 2002). What matters is that it is relevant to students and the quality of the learning. In all, this creates new tasks for teachers (Gelderen 2012, Reeve 2006), who need to guide the student in
- building upon the student's goals, abilities and preferences and
- clarifying the relevance of learning activities.

They also need to contribute with
- openness to student feedback and criticism in regard to the relevance of the activity and
- different opportunities,

Finally, they need to
- encourage independent thinking and
- allow students to find their own solutions.

Our experiences from the YEDAC project and from a current research study is that it is not at all easy for teachers to move from their traditional directing and controlling role to a supporting and facilitating role. We think it is because we need to focus more on

- the subject matter as an open field of possibilities that can be interpreted and learned in many ways and

- what is valuable for the individual in relation to learning.

We furthermore think we need to focus on what this means for the learning in practice, and we need to take into account new tools to support this focus. It is hard for teachers themselves to see subject matters as containing many possibilities when they are used to following strict learning objectives set by national curricula. It is not only students that need to learn to be entrepreneurial. It is also the teachers, and they need support in *seeing* new possibilities.

We have been working specifically with this challenge in our current research study, where we use visualization and design thinking to get closer to understanding what entrepreneurial learning mean in practice.

Learning in practice

In our current study in Denmark, we are researching ways to integrate a design approach in elementary education for both teachers and pupils. Our specific focus is on
- seeing subject matters as numerous possibilities and
- identifying personal values.

Our hypotheses are that we can
- Support pupils' motivation for learning and influencing their own learning by making both their own values and their own choices more visible through design and design activities
- Support pupils' motivation for learning and influencing their own learning by visualizing learning goals and presenting different ways to them visually
- Support teachers' motivation for seeing subject matters as numerous possibilities by visualizing learning goals and different ways to reach the goals

More specifically, we have used design processes and generative tools to give more direct access both to the students' own values and to the selection of their learning goals. We have redesigned subject matters in two ways to open up more learning opportunities. In one case (a program about the interpretation of native-language literature for fourth grade), we related learning objectives to different types of learning roles that allow students (and teachers) to learn and to choose or even create own learning assignments. In the other case, (a program in mathematics in ninth grade), we related learning objectives to different kinds of use in the external world.

The basic assumption in the study is that using design thinking and visualisation opens up reflection. It is not easy, especially for elementary school pupils, to identify what matters to them or find new ways of learning for themselves. So our hypothesis is that visualization can support self-directedness and self-leadership. Regarding visualization, there are different understandings and levels of visualization. Visualization is one of the designer's main skills and part of a design practice in which creating and bringing into the world is central. The designer starts analysing, identifying and maybe redefining (reframing) a problem or a possibility. Part of this iterative process is visualizing and creating different solutions as representations and prototypes, which finally lead to a product of a tangible or intangible nature.

Visualization is thus part of the reflexive practice that is characteristic of the designer, described in Schön's notion of "reflection in action" (Schön 1983). Schön also describes this process of reflection as a reflective conversation with the material ("reflective conversation with materials") (Schön 1983, Bamberger and Schön 1983).

In our study we have made prototypes for "reflection on values". In workshops with ten-year-old and 15-year-old students, we asked them to reflect visually on learning, school, being a pupil etc. One of the exercises, which we mentioned in a previous section, was to ask the students to draw themselves on "a good day at school" and write up to five things or situations that contributed to them having a good day at school, such as "a good packed lunch" or "a fun game in the schoolyard". The next exercise was to indicate who caused the activity or the situation, like "my mother made my packed lunch" or "my classmates were part of the fun game in the schoolyard". Finally we asked the students whether they felt that they had influence on the different situations. "No influence or little influence" involved adding a red dot, and "influence or some influence" involved adding a green dot.

As mentioned, it seemed there was a clear pattern: pupils felt they had influence on various situations in their lives and in school, except for learning. We have not yet finished these studies, so we cannot for now tell whether these "value workshops" have changed the students' motivation for learning and their ability to see more options in learning. But we can see a need for reflection, because it seems unfamiliar for the pupils to reflect at all about how and why learning is meaningful for them.

After the value workshop, the students tested our redesigned learning program. In the literature program, they were presented with a new lesson plan including four learning roles, which had different assignments to choose from: investigating the world, sensing the world, exploring the world and speaking to others:

Figure 4

Investigating the world   Sensing the world   Exploring the world   Speaking to others
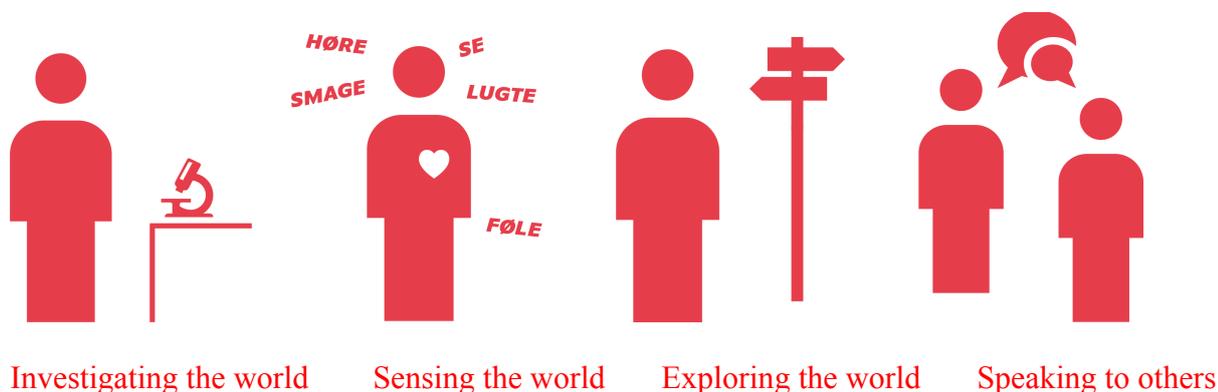
The learning roles represent one way to demonstrate that a subject matter can be viewed in different ways. More specifically, they represent different ways of investigating and interpreting the world. As Aristotle pointed out, knowing the world is based on curiosity. To gain knowledge or to learn is, in other words, about being curious about the world, and one can be curious in different ways. A well-known form of gaining knowledge among children is dissecting things: a clock, a bike or a frog. Exploring what is on the other side of the fence, the street or the river is another way. Talking with other people, with friends, parents, a fireman etc. is also a common way to gain knowledge about the world. Sensing the world through stories, music and nature is also a well-established way of getting to know the world.

In the literature-program we connected these four ways of getting to know about the world to specific learning objectives such as "preparatory reading" (getting background knowledge) or "analysing the persons in the novel". Four tasks were connected to each learning goal, so the pupils could choose between completing the tasks by investigating the world, exploring the

world, speaking to others or sensing the world. They would all learn the same things but in different ways. In this way the pupils had the freedom to choose how to learn, and they had an opportunity to reflect on what learning roles motivated them most.

In the math program for ninth grade, we related the subject to the use of math in the external world (math as a daily tool for calculation, as a tool for craft, as a language in science and journalism). Then we related specific learning objectives in relation to probability calculation to tasks linked to the different kinds of use (daily calculation, craft, science and journalism). It is a general design point that the learning objectives and the tasks in both programs were presented in a visual form to show literally the students that there were more options.

As mentioned, we still need to analyse the final results from the study, but the pupils were overall very happy to have the opportunity to choose, and they were generally able to engage in more active learning. The reflection of their own values and learning preferences seemed, as mentioned, to be difficult for them. This tells us that it is important to assist self-directed entrepreneurial learning with learning possibilities created by the teachers. This is also the conclusion of Gelderen. If left to themselves to create learning, students are not able to create learning environments that are sufficiently rich or qualitatively high enough.

Conclusion

Entrepreneurship as a learning philosophy affects the whole school system and especially how teachers in practice organize their teaching. If we want to support autonomy, effectuation and entrepreneurial learning as described by Gibb, we need to create new kinds of learning environments and new kinds of learning cultures. In the YEDAC project and in our current studies, we are trying to work within the frame of the traditional school to find ways to support more entrepreneurial learning. But we need much more radical kinds of school innovation to create truly entrepreneurial learning. This is not relevant just for learning. It is equally important for the development of the 21st-century global knowledge society.

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