IO9: Research paper on students' competences pre and post entrepreneurship education.

1. Introduction

This paper is based on a practitioner research and systematic inquiry into students' evaluation of their entrepreneurship skills before and after participation in a curriculum based module taking place three times (2018-20). The results of a preliminary studies of the first two modules were used to improve the third module. The participants were Erasmus students from different European countries and Danish students and along the way they revealed rather different understandings of Innovation and Entrepreneurship Education. The development of entrepreneurial skills and mindset is one of eight key objectives for lifelong learning defined by the European Commission in 2006, and since then, the EU member states have been working on implementation of innovation and entrepreneurship into the national education systems, but so far no common understanding of the concepts has been developed. Some member states focused on students' adaptation to a dominant socio-economic logic in society by targeting on entrepreneurship aimed at a commercial market, while other countries have focused more on entrepreneurship as creating social and cultural values for others. In these modules, the students mostly operated within the latter approach.

2. The theoretical framework

The curriculum of the modules were mapped out by a definition on entrepreneurship education recommended by the Danish Foundation for Entrepreneurship and Ministry of Education.
"Entrepreneurship is when you act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural or social". (FFE 2012)

This definition is centered on taking action to create value for others and to establish relationship between an individual/individuals and others. Based on the definition the curriculum was designed to nourish an entrepreneurial mindset where four dimensions, *attitude, action, outward orientation* and *creativity*, were embedded in the curriculum (Fig.1). *Attitude* is understood as a core dimension influencing and being influenced by creativity, action and outward orientation. We acknowledged that streams of psychological research indicate that attitude change will translate into behavior change when including factors as "intention specificity, action difficulty, contextual support, habitual behavior" and thus to succeed specific strategies must be applied. (Arbuthnott, 2009, p.161).
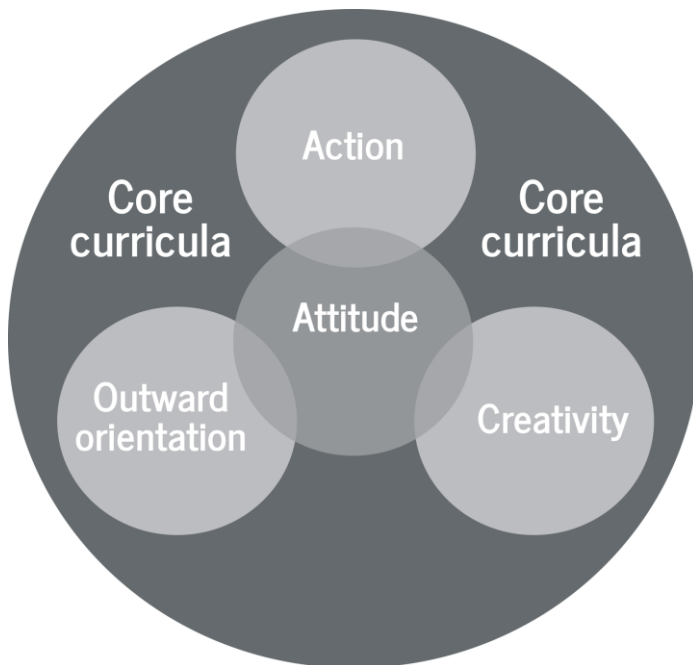

Fig. 1. The four entrepreneurial dimensions embedded in the core curricula of educational institutions (Rasmussen, Moberg, Revsbech p. 12)

3. The structure of the module

The module 'Entrepreneurship in school' was designed to support the students in their individual development of the four dimensions (Fig. 1) and during the three years, the module adapted to the changing interests of the students and lecturers and in the third module the didactics was transformed into e-learning due to the Corona lockdown.

The structure of the module was inspired by previous entrepreneurial development studies in the Baltic Sea region.
*"Europe is facing many global challenges (economically and environmentally) as well as a general change in work culture. The society has moved from an industrial society based on employment to a global knowledge society based on innovation and project-based work. This requires a new entrepreneurial mindset and culture. Schools in Europe have a special and important task in supporting and developing this entrepreneurial mindset. A focus on entrepreneurship during schooling and education prepares students for a future demand for innovation, initiative and entrepreneurial spirit." (*Entrepreneurship in Education in the Baltic Sea Region', 2006)

In connection to these beliefs entrepreneurship is to play an important role in a learning environment and the definition of entrepreneurship is seen as a key component in a real world learning environment;

In the report 'Entrepreneurship in Education in the Baltic Sea Region', 2006;

"*The sense of initiative and entrepreneurship is the ability to turn ideas into action. It involves creativity, innovation and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives. The individual is aware of the context of his/her work and is able to seize opportunities that arise. It is the foundation for acquiring more specific skills and knowledge needed by those establishing or contributing to social or commercial activity. This should include awareness of ethical values and promote good governance.*"

Most of the students were expected to have experiences and competencies within creativity, innovation and projects, but maybe not with entrepreneurship and risk-taking.

Competence areas and subjects included in the module

All subjects can be implemented in the module. Subject areas covered in the module will be English and pedagogical subjects.

Entrepreneurial skills involves four different areas of competencies; creativity, action-making, environmental awareness and personal/ethical attitudes.

1. Creativity skills - finding ideas and opportunities, use of knowledge, experiment and improvise, problem solving methods
2. Environmental awareness - global and local cultural awareness, context awareness, sustainability
3. Personal/ethic attitudes - risk-taking, awareness of ethical issues, self-efficacy, accept ambigurity
4. Action-making - to plan and manage projects, value creation, language for discussion, democratic skills, collaboration

In entrepreneurship education and during this module the learning outcome would be;

Skill goals: The student can	Knowledge goals: The student is to have knowledge of
communicate in different contexts	communicative and educational theories
take initiatives, risks and responsibility	theories about innovation, creativity and entrepreneurial competences
search and take opportunities	data collection methods
collaborate	co-creativity in varied ways and during different processes
turn ideas into action	project and process management in the classroom

transforms ideas into value added products taking environmental issues into consideration	environmental theory and entrepreneurship education
evaluate the credibility and value of entrepreneurial ideas and products	theories about evaluation in different ways
teach entrepreneurial skills and act in a creative classroom setting by focusing on the teaching methods rather than the content.	didactical processes in connection to innovation, creativity and entrepreneurship

Fig.2.

The modules were based on entrepreneurial theories and the students' experiences from internship were included in the module. The goal was that the students would be able to develop entrepreneurial knowledge and skills in order to to be able to use these in their future teacher profession. The entrepreneurial skills will in addition to this be developed during practical sequences.

The content of the module

The module was designed to combine theoretical knowledge, visits to external institutions and practical skills. At the end of a sequence of theoretical discussions, practical exercises and visits the students had to do one bigger task and three all in all. These three big tasks (explained below) allowed the students to choose their own theoretical discussions, experiments and visits outside the university.

Task 1: **"Make your own teaching material".** Based on a visit at the Experimentarium (an experimenting museum i DK), the students chose one of the themes/activities from the exhibition. They had to describe the chosen exhibition and turn it into a teaching material for a chosen level of age. They described the teaching material, which could be anything, and explained how this material efforts entrepreneurial thinking, what parts of the entrepreneurial process the material was focusing on, what age group it was made for, what subjects could be implemented when using this material, how they set goals etc. In other words; they had to write a teacher's guide to the material they made!

The students found this task very difficult and complex, but they worked hard and very well on the teaching material, and terrific teaching plans were made together with teachers' guides.

Task 2: **"Entrepreneurship in teaching; Invent/develop new games for 4th grade!"** The students were asked to invent games in their groups, where pupils in 4th grade would be able to test and develop democratic skills. They could start with a well-known game (card, ball, board, computer) and develop from there, or they could develop a new game from scratch. And these rules or obstructions had to be followed:

1. You must include 1 or 2 UN goals in the game.
2. You must include *the purpose of the primary school (Folkeskolens formål)* in your goals,
3. You are only allowed to use recycled materials for the game!
4. … and you must describe the purpose of the game!
5. The pupils in 4th grade must be able to play the game at approx. 20-25 minutes.

The students worked on their games for two weeks, and presented them for each other, in order to give friendly critical feedback. They had very good questions and comments like *"How does this game develop democratic skills"?* or *"If you do this, it will be easier for the children to understand"*.

All the students went to a local school to test the games in 4th grade, while we, the teachers and the university college lecturers, observed the practice carefully. The students had created very different games, and had very useful evaluations from the pupils, which they immediately transformed into improved games. In the end, the students played the games in the teacher education program, and we discussed how teachers can get pupils to develop games with an entrepreneurial focus.

Task 3: Creating a garden for students

This task was about creating a community or school garden for students at a university college, and the groups worked on this task for three weeks. In 2020 and due to the corona pandemic the students were asked to use their own neighborhood as location for a garden. Most of the initiators were interested in experiential learning and sustainability and they had little knowledge on gardening.

To create attention on a community garden project, the students were asked to develop an event that would attract more students. The students developed workshops on germination where students could learn to transform old potatoes and overripe tomatoes into new plants. The workshops would only use trash materials, old tins, flower pots made of transparent and opaque plastic as plant containers. They were also advised on how to experiment with self-irrigation systems and how to make windows in the plastic containers to be able to see how the potatoes evolved. A potential outcome is difficult to predict. For example, observing an old wrinkled potato turning into a budding new potato plant growing in an old can is about trash turned into value. The word trash has many negative connotations such as worthless or low quality. In this project, trash instead became a poetic way of creating life.

The next step was to learn about the possibility of establishing a school and/or community garden in the very different neighborhoods from Izmir to Roskilde. The students used a design thinking method to learn about community/school gardening and the interests of stakeholders, students, and management. In 2019 the proposals for a community garden developed by the students were turned down by the stakeholders as too time-consuming, expensive and unrealistic. As an alternative, plant containers were introduced to be placed at a nearby student residence. A prototype of recycled wood was developed and at the local Makerspace, it could be further developed.

In 2020 on Zoom, the students presented proposals for school/ community gardens in Turkey, Austria, Belgium, The Netherlands and Denmark.

4. Methods

To improve the quality of the three modules a practitioner research was conducted. The data came from analysing the changes of module plans, students products, questionnaires at the beginning and end of the modules, informal interviews with students and observations. Most of the data were gathered in the spring 2019 and 2020 during 2x14 weeks of class. In 2020 half of the classes were completed as e-learning. The total number of students was 47.

Measuring tools

The overall research question was focusing on the relation between the objectives of entrepreneurial education module and the students' understanding of entrepreneurial approach to education. We were interested in measuring the student's innovative and entrepreneurial competences pre and post- taking part in an entrepreneurship education module.

The definition of entrepreneurship education and the model (Fig.1) with four dimensions in entrepreneurship education was used to develop the measuring tools. We made short questionnaires and the students were also asked elaborate their answers. At the end of the first two module the participants were asked to fill in a Delphi form. The third module was still in progress when this paper was finished.

5. Results

Before starting the Module

For years entrepreneurship and innovation have been part of the European Lifelong Learning Program, but many students were unfamiliar with these concepts (Fig. 2). One student from Austria wrote "*I don't know what it means exactly but I think in our home country it is called different and it is about planning subjects, but otherwise I don't have any further information about entrepreneurship.*" This quote represents a tendency and often the students think that they have learned something like entrepreneurship but categorized differently.

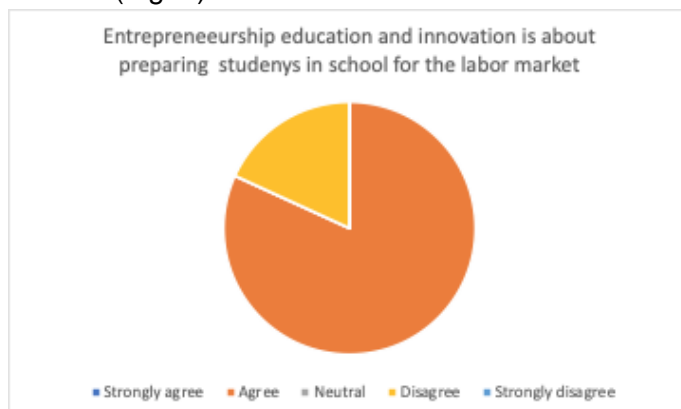According to most of the students entrepreneurship is about preparing pupils for the labor market. (Fig. 3)

Fig. 3.

When looking at the students' elaboration of the answers many nuances turn up, *"...It is not only financial or just cultural. It is a mix of all kind of different things, but super important in the "big" world".* This student from from The Netherlands expressed an understanding that can be difficult to incorporate into the traditional subject and test culture in many schools. Most of the students share an understanding of entrepreneurship and innovation as approaches to learning to speak up for yourself and others and to do something and sometimes taking a chance (Fig. 4)
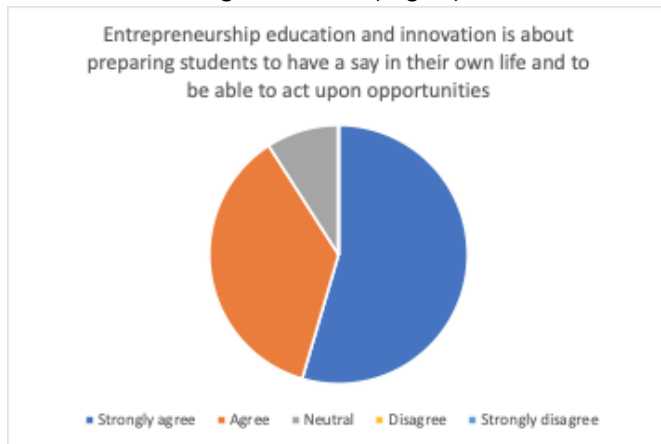

Fig. 4.

Words as *innovation* and *entrepreneurship* were not created to support education but has been incorporated by a political decision. (Fig. 5)
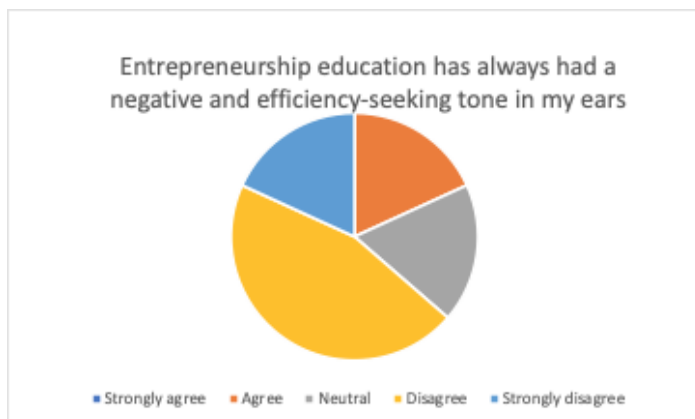

Fig. 5.

Most of the students do not get negative busines*s* associations when they hear the word entrepreneurship. A student from Belgium writes *"I think efficiency can be good. As an example, when you find a more efficient way to connect books at school, then you have more time to help students who need it"* In fig. 2 it was shown that the students are unfamiliar with entrepreneurship in an educational context.

The End of the Module

At the end of the module all participants were asked to fill in another kind of evaluation form called **Delphi-evaluation** (Fig.6); The students must write statements on the form and pass them around. All students read all statement and at the bottom of each statements they made a line if they agreed and no line if they disagreed. All statements were very important, and the positive statements were largely indications and affirmations of the content and form of the teaching, but there were also statements that did not relate precisely to

entrepreneurship education. The critical statements were statements that either criticized the content or organization of course, the teaching or a lack of teaching. They could be seen as expressing constructive proposals for changes.

The teacher trainer must merge all the statements into a scheme, and choose some of the statements (both the positive and the critical) in order to discuss and elaborate it with the students. The methods takes some time, but it can be used to depict what and how students think, or what they expect from an upcoming course.

Write 3 statements that you find good in this module	Sæt kryds, hvis du er enig (X if you agree.)
1.	
2.	
3.	

Write 3 statements that could be better in this module	Sæt kryds, hvis du er enig (X if you agree)
1.	
2.	
3.	

Fig. 6

We had a lot of different statements in this evaluation, and a very good insight into students' views on strengths and weaknesses in the module.

On the positive side we had following statements which had a great endorsement:

1. The module changes your mindset
2. The practical experiences/being outside the classroom was great
3. The module encourages to creativity
4. Inventing a game and presenting your idea in the school/testing on pupils was excellent
5. It gives you awareness of the importance of entrepreneurship
6. Good balance between theory and practise

7. We had very good ideas to incorporate entrepreneurship in the usual school subjects

On the negative side following statements had great support:

1. Two days a week was not enough
2. It had been nice with some deeper theoretical knowledge
3. Sometimes it was hard to understand the purpose of the task
4. More written feedback on the tasks
5. Would like to have more time when working on a game

The evaluation requires that we talk with the students about some of the statements in order to understand on a deeper level. Here we discussed the paradox that they liked the balance between theory and practice, and yet desired a deeper theoretical knowledge. We understood that it was the lack of time they had in mind, both when the educators reviewed a theory and when the students afterwards should implement the theoretical knowledge into practice.

It was obvious that inventing and presenting games was the best activity for all of the students, and we discussed why that was so much better than making teaching material or a school garden. Here we learned that the possibility not only to invent a game, but also to try it with pupils, made so much sense in an entrepreneurial perspective, they had to be creative inventing games, they had to be didactical innovative and outward oriented in order to develop democratic skills in the pupils.

6. Discussion and conclusions

Did we reach our goals? In many ways it is a YES. The students' evaluations showed that they perfectly understood and used elements from entrepreneurship education when working on the games.

> *"It made perfect sense that we should invent games and test them in school. It was a great experience for us and for the children. They learned a lot in the democratic field, and so did we. And the children were very entrepreneurial"* (Student evaluation June 2019).

The processes were great for the students, and their energy and enthusiasm on the practical level was high and they also used their theoretical knowledge to develop the pupils' skills in the games. The teachers in the school were very fond of the games and asked the students to copy and develop them afterwards. The students perceived this part of the course as an authentic experience.

In 2019 the theoretical frame of entrepreneurship education was not clear to the students when they were working on the school/community garden project. The students understood the project as a practice course without pupils. Some students responded by creating a passive learning atmosphere, however, most of them were positive about working outside the classroom and in other settings.

In 2020 the didactics was change to e-learning and the overall student approach to community/school garden had changed. Due to Corona lockdown of schools, the students expected to work with examples instead of testing products in a classroom. They had also

become interested in sustainable development and had a different understanding of using resources.

The evaluation showed that trust, timing and tasks are so closely related. The students accepted the transition to e-learning with a positive mindset. They had contact on Zoom, phone, skype with their lecturer, and the importance of this easy access to sparring with the lecturer is essential according to the students' evaluation. The design thinking method involves working with risk taking. This challenge was part of the course evaluation and by communicating a lot about risk taking during the course the students trusted that failing a task was not a problem. The groups had made a logbook and here their process was explained.

The 'teacher as researcher' concept established an enquiry orientation during the modules. From collected data we learned that the teacher students expected to meet authentic challenges related to the teacher profession, and to be able to transfer their new knowledge and skills to their future work in a classroom. They wanted to learn through active participation in entrepreneurship education and not just about entrepreneurship education from constructed scenarios. The students understood the relationship between entrepreneurship education and democratic formation, and they were able to use it in the concrete examples and to feel responsible for the pupils' development of democratic and entrepreneurial skills. It was complex and risky for the students to focus on so many things at the same time, and once in a while the challenges designed by us were too many. Entrepreneurship education and the teacher education program must provide authentic learning opportunities for the students, in order to promote entrepreneurial skills.

It is obvious for us (Teacher trainers) that we over the years have become more specific and targeted in our tasks to the students. By following the evaluations, it became easier to organize the tasks more precisely in order to develop the entrepreneurial competencies by the students. The descriptions became precise, and the students learned a lot more, when understanding the tasks faster.

A few students participated both in our module and in some of the intensive weeks in the EIPTE project, and it is clear that they have received a huge profit of the participation. One of them wrote:

> "It has given me both a critical and an ethical view of teaching, and has also given me a very good insight in developing creative and innovative teaching in all my subjects" (Evaluation 2019)

References

Arbuthnott, K.D. (2009). *Education for sustainable education beyond attitude change*. International Journal of Sustainability in Higher Education Vol. 10 No. 2, 2009 pp. 152-163 q Emerald Group Publishing Limited 1467-6370 DOI 10.1108/14676370910945954

Børne- og Undervisningsministeriet (UVM). (2017). Folkeskolens formål [Objectives of the primary school] København LBK nr 1510 af 14/12/2017. Retrieved from https://www.retsinformation.dk/forms/R0710.aspx?id=196651#id022b0e44-841e-4caf-9378-363beeaf94c1 (01-05-2020).

Bruun, J. et al. (2017). *International Civic and Citizenship Education 2016: Internationale hovedresultater*. Danmarks Institut for Pædagogik og Uddannelse. Aarhus: Aarhus Universitet

Eskici, M (2019): *Sustainable Learning Levels of High School Students.* In: Discourse and Communication for Sustainable Education (2019), vol. 10, no. 1, pp. 63-80

European Commission. (2018). Council Recommendation of 22 May 2018 on key competences for lifelong learning. In Retrieved from https://eur-lex.europa.eu/legal content/EN/TXT/HTML/?uri=OJ:C:2018:189:FULL&from=EN Official Journal of the European Union. 2018/C 189/4. (23-04-2020).

Jarvis, P. (2010): *Adult education and lifelong learning. Theory and practice.* Fourth Edition. London: Routledge.

McCallum E. et al. (2018). *EntreComp into Action, get inspired, make it happen.* Luxembourg: Publications Office of European Union.

Rasmussen, A. & Fritzner, A. (2016), *From Dream to Reality. Learning outcomes and didactic principles for teaching entrepreneurship in Nordic schools.* Retrieved from https://eng.ffe

ye.dk/media/789130/from-dream-to-reality.pdf (08-08-2019). Copenhagen: Nordic Council of Ministers. (15-04-2020).

Rasmussen, A. & Moberg, K. & Revsbech. (2015). *A Taxonomy of Entrepreneurship Education - Perspectives on goals, teaching and evaluation*. Ejlkovsgrade: The Danish Foundation for Entrepreneurship. Retrieved from https://eng.ffe-ye.dk/media/785766/taxonomy-en.pdf (01-05-2020).

Rasmussen, C. S & Christiansen, R. B. (2007): *Medborger og verdensborger – udfordringer for lærere og elever i skolen.* [*Citizen and world citizen - challenges for teachers and students in school*]. In *KLM i læreruddannelsen.* [*KLM in teacher education*]. Frederikshavn: Dafolo Forlag. 61-92.