Youth Start Entrepreneurial Challenges Field Trial Report

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The Impact of Youth Start Entrepreneurial Challenges

Results from a randomised controlled trial of a flexible entrepreneurship programme at primary and secondary level of education

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The project was coordinated by Dana Redford, PhD, President at the Policy Experimentation & Evaluation Platform (PEEP), who, together with Kåre Moberg, was responsible with for the overall conceptualization, development, and coordination of the joint research project in collaboration with the Ministries of Education of Austria, Luxembourg, Portugal and Slovenia, which were responsible for implementation and data collection.

Introduction

This report presents the programme evaluation of the project, “Youth Start Entrepreneurial Challenges”. This entrepreneurship education programme was tested in a practical trial in four countries: Austria, Luxembourg, Portugal and Slovenia. 107 secondary schools (B1/B2) and 84 primary schools (A2) were included in the evaluation. A phase-in randomisation design was applied, and the participating students were followed longitudinally and surveyed multiple times. Three rounds of data collection were performed, including in total 18,363 students (13,081 on secondary level and 5,281 on primary level).

The report is divided into four sections. The first section presents the background of the project. The second section focuses on the secondary level. The third section presents the study on the primary level. The final section gives a summary of the assessment studies.

Executive summary

A practical trial, in which the challenge-based entrepreneurship programme "Youth Start Entrepreneurial Challenges" (YSEC) was randomly assigned to secondary (B1/B2) and primary schools (A2), was performed in order to assess the effectiveness of this type of programme. Different versions of the programme, including different number of challenges, were tested. The trial included 107 secondary schools (13,081 students) and 84 primary schools (5,281 students) in four countries (Austria, Luxembourg, Portugal and Slovenia).

The results show that the programme is most effective on secondary level of education (B1/B2). At this level, YSEC has a significantly positive influence on students' confidence in performing multiple entrepreneurial competences, and it increases their entrepreneurial intentions and ambition to work with innovation in established organisations. In addition to this, the programme has a significantly positive influence on students' level of school engagement. On average, the programme works most efficiently when implemented in its intensive version, that is, in its shorter version where the number of challenges and teaching units required is limited. However, this varies between the countries and relates to the schools' preparedness to implement this type of programme. The results also demonstrate that the programme has the strongest influence on students who have prior experience with social entrepreneurship education. This indicates that entrepreneurship education should be provided multiple times at different education levels, but that it is important that there is alignment between the educational offerings. The results also show that female students improve significantly more in competences that are often identified as the reasons why they are more reluctant to be self-employed, including financial literacy, resource marshalling and managing uncertainty.

At primary and lower-secondary level (A2 level, with a focus on pupils aged 9-12 or 10-14, depending on the country), the effects are more limited. At this level there seem to be issues with the transferability of the programme design, since it is only in Austria, the country in which the programme was developed, that the intended effects of the programme could be identified.

1. Background

Youth Start Entrepreneurial Challenges (YSEC) was a policy experimentation project funded by Erasmus+. The aim of this policy experimentation was to assess the influence of an entrepreneurship programme with a flexible, yet structured design that could be embedded in the existing curriculum. The programme was implemented at primary/lower-secondary (A2) and secondary (B1/B2) level of education. The A2 level focus primarily on pupils aged 9-12 (91% of the sample is within this age span)[1]. The B1/B2 level primarily focus on students in the age span 15-18 (with the majority being 15-17). The evaluation of the intervention that was performed in this project will provide the ministries of education of the participating countries with information about the programme's effectiveness. Based on the information provided in the programme evaluation, the ministries can make informed decisions about whether or not the programme should be continued, scaled up or adjusted. The aim of the project is also to provide solid information to ministries of education and policy makers in other countries who consider investing resources in educational initiatives of a similar structure.

1.1. Two levels of education

The initial focus of the field trial was on the secondary level, but the ministries involved in the project wanted to expand it to also test the programme at the primary level, both the youngest pupils at A1 level (age 6-8) and the more mature pupils at A2 level. It was decided that at primary level, only A2 pupils should be included in the quantitative trial. Although a strong participation and commitment was established at an early stage at the primary level, the initial experimental protocol and call for participation was only focused on the secondary level. The initial randomisation was thus solely focused on secondary schools and there were several issues with the trial implementation at the primary level. In order to compensate for these problems, the trial at the primary level was complemented with an additional qualitative data collection. However, this report only focuses on the quantitative trial[2].

[1] There are a few pupils in the age span 13-15. Due to the specific school structure, with focus on language In Luxembourg, it was decided to focus on older pupils in this country (mean age=12,7) compared to the other countries (mean age=11,4).

[2] Results of the qualitative research performed at A1 and A2 level can be found on the projects web page: www.youthstartproject.eu.

1.2. Rationale for the project

Numerous assessment studies of the effects of different entrepreneurship programmes have been performed (Nabi et al., 2017). Unfortunately, only very few of them apply rigorous evaluation methods, and only very rarely is participation in the educational programme randomised (Rideout & Grey, 2013). In order for the programme evaluation to provide reliable causal information, a random allocation of the educational programme was used in this practical trial. The randomisation is at school level, and a phase-in method was used, which means that all participating schools received the educational programme at some point in time.

Programme evaluations, especially on the primary and secondary levels of education, have usually focused on formalised programmes with a strong focus on venture creation[3]. Most evaluations of these types of programme have demonstrated that there is a positive influence on students' development of entrepreneurial behaviour, attitudes, competences and intentions (see for example Elert et al., 2015). However, many schools and teachers find it challenging to integrate these types of programmes in their curricula while at the same time having to meet all other topics' teaching and learning goals (Lackeus, 2016, 2017).

The alternative to this approach has most commonly been to restructure the curricula and embed entrepreneurial and enterprising education in all topics (Jones & Iredale, 2010). This approach is unfortunately very resource-intensive, since it typically requires far-reaching changes regarding teaching structure, schedules and work routines as well as a significant investment in teacher training (Moberg, 2014). The effectiveness of this approach has also been questioned, since its aim regarding learning goals can be viewed as too broad and therefore perceived as fuzzy by educators (Lackeus, 2017).

An alternative to teaching entrepreneurship as a sole standing programme or as an unstructured embedded teaching approach is to embed entrepreneurship education in the curricula by implementing structured and codified educational units suitable for multiple topics. The Youth Start Entrepreneurial Challenges (YSEC) is an example of such a programme. The educational programme is divided into educational units (Challenges) that are designed specifically for teachers of different topics and aligned with their normal learning goals.

The specific focus on primary/lower-secondary (A2) and secondary (B1/B2) level of education is deliberate, since the importance of gradual skill development at an early stage of education is widely recognised

[3] Examples of these programmes are Company Programme/Mini Company by Junior Achievement, Venture/Entrepreneurship by Network for Teaching Entrepreneurship (NFTE) and Bizworld/Bizwiz by the Bizworld organisation.

(Heckman et al., 2013), and studies have demonstrated that entrepreneurship education is especially effective in pre-tertiary levels (Dyer, 1994; Kourilsky, 1995). From a policy perspective, it thus makes sense to focus on the levels where the greatest impact can be achieved. In addition to this, educational ministries have a larger influence on educational activities at these levels compared to tertiary level of education.

1.3. The Structure of the Programme

The design and structure of Youth start Entrepreneurial Challenges (YSEC) was developed by the Austrian organisation "Initiative for Teaching Entrepreneurship" (IFTE). The programme is based on the broad and inclusive TRIO model taxonomy (Aff & Lindner, 2005). The TRIO model broadly divides entrepreneurial competences into three categories: 1) *Entrepreneurial Core skills* (being adaptive, innovative and able to start personal projects), 2) *Entrepreneurial Culture* (entrepreneurial thinking and action, open mindedness, creativity, risk-taking, goal setting, self-initiative and the culture of sustainability), and 3) *Entrepreneurial Civic Education* (developing new ways of responsibility, citizenship and developing partnerships that are beneficial to oneself, others and the environment). It thus presents entrepreneurship education with a much broader focus than venture creation. The learning goals are well aligned with the newly developed taxonomy for entrepreneurial competences "EntreComp" (Bacigalupo et al., 2016).

In a recent review of assessment studies in entrepreneurship education (Nabi et al., 2017), the authors, based on the framework developed by Béchard & Grégoir (2005), divided the educational initiatives in accordance with their educational focus into four groups: 1) *Supply model*, 2) *Demand model*, 3) *Competence model*, 4) *Hybrid model*. The supply model focuses on reproduction methods (lectures, reading, etc.). The demand model focuses on personalised and participative methods (simulations, interactive searches, etc.). The competence model focuses on communication, discussion and production methods (portfolios, debates, etc.). Many of the methods included in the supply model are typically covered in the traditional education system. The YSEC programme, with its focus on personal development and fostering of entrepreneurial competences, can be viewed as an infusion of teaching methods included in the demand model and the competence model. It can thus be categorised as a hybrid model, since it includes approaches from different categories.

A specific programme structure with multiple challenges, which should be well suited for implementation at primary and secondary schools in the participating countries, was developed specifically for this policy experimentation project. Each programme unit is structured as an educational challenge with well-defined teaching and learning goals. Precise teaching material, both for teachers and students, is provided for each

of these educational challenges. The design of the educational challenges in the YSEC programme makes them suitable for many different topics (for example language, natural science, mathematics, gymnastics). Their entrepreneurial learning goals are aligned with general learning goals at the secondary level of education. They can thus be taught by many different teachers as an embedded part of the ordinary curriculum. One main difference between the challenges is their extensiveness. Some of the challenges only encompass few educational units and can be completed during a single school day or just a few school days; others encompass an extensive amount of educational units and need to be implemented over the course of many weeks.

1.4. A practical trial

Practical trials are an effective way to test the outcomes of policy experiments (Edovald & Firpo, 2016). The defining characteristic of such a trial is that it is an experiment, i.e., using a randomised controlled trial (RCT) methodology, but where the implementation takes place under real-world conditions and is delivered by regular staff. This type of methodology is often called "Pragmatic RCTs", since it is not possible to hold multiple variables constant throughout the implementation. In such RCTs the loss of internal validity is compensated by gains in the external validity, since the outcomes are produced in a real-world setting and not in an artificial context (Edovald & Firpo, 2016). Performing this type of trial requires careful preparation and set-up. However, if the randomisation and the implementation of the experiment as well as the data collection are successful, the analysis is typically a straightforward process (Bouguen & Gurand, 2012).

1.4.1. Level of assessment

When designing the structure of the practical trial, we aligned our concept of assessment and evaluation with Fayolle and Gailly (2015). Anchored in Kirkpatrick's seminal work about assessment (1959a, 1959b, 1960a, 1960b), Fayolle and Gailly (2015) discuss different forms of assessment and their different outcome levels. According to Kirkpatrick's model, there are four interlinked levels: 1) *reactions* – participants' general satisfaction with the programme; 2) *learning* - the skills and techniques acquired as well as attitude changes; 3) *behaviour* – whether the acquired learning is being applied in the participants' professional behaviours and day-to-day activities; 4) *results* – impact on indicators such as performance, productivity or activity, as a consequence of the behaviour changes. Fayolle and Gailly (2015) also elaborate on additional levels that can be assessed such as 1) *relevance* – the relation between the needs and expectations of society; 2) *coherence* – whether contents, pedagogical resources and means are coherent with the

objectives; 3) *efficacy* – whether the objectives have been met; 4) *efficiency* – whether the objectives are met and resources optimised.[4]

In order to be able to compare the programme evaluation to other programme evaluations and to inform stakeholders about the programmes' influence, the level of focus when it comes to students is on their perceived learning and, to some degree, their behaviour. The main focus is on how the programme influences students' entrepreneurial self-efficacy, entrepreneurial attitudes and entrepreneurial intentions, but also how it influences their intrinsic motivation and school engagement. This translate into a focus on efficacy. Since different versions of the programme, that require different amount of resources, were tested, the focus of the trial was also on the programmes' efficiency.

The trial did also focus on the needs of teachers and their satisfaction with the programme. Following the work of Fayolle and Gailly, this would translate into a focus on coherence, which can be viewed as fairly natural, since this is aligned with the teacher profession. Following Kirkpatrick's model, the focus of the teacher assessment has been on the teachers' reactions, that is, their satisfaction with the different challenges and how it worked with their students. Although this evaluation did not assess any "impact", it has been very important to include in the trial, since teachers are an important stakeholder, and it is important to assess how teachers in different contexts use the programme as well as how satisfied they are with it. This assessment, which was mainly performed during the first round of the project implementation, was used to improve the programme and different educational challenges as well as the implementation during the consecutive rounds.

1.4.2. The fidelity of the study

Ensuring a high level of fidelity in practical trials is challenging (Edovald & Firpo, 2016). This is especially true in large-scale multisite educational interventions, such as YSEC. Although materials for each challenge are well structured and defined, and the teachers receive a structured teacher training programme, many factors may influence the implementation of the programme and how students experience it. Due to the size of the implementation, as well as the fact that four countries participated, it was necessary to perform the teacher training in different manners in accordance with the specific national context. In order to ensure the highest degree of similarity for the implementation, each country team had teacher trainers who, in the start of the project, participated in a mutual train the trainers programme led by the Austrian programme designers. All

[4] Other assessment frameworks such as Context, Input, Process, Product (CIPP) model, (Worthen & Sanders, 1987); Training Validation System (TVS) Approach (Fitz-Enz, 1994); and Input, Process, Output, Outcome (IPO) Model (Bushnell, 1990), were considered. However, since the educational programme that was going to be assessed already was developed, the classic goal-based assessment approach was found to be most suitable. See Eseyrel (2002) for an overview of different assessment approaches.

the materials were translated by the ministries of education in close collaboration with the programme designers, who made sure that only contextual examples such as names of companies, institutions and cities were altered.

Since a flexible structure is one of the advantages of the YSEC programme compared to other entrepreneurship programmes, no protocol regarding topics and types of teacher teaching the challenges was specified. Naturally this had as an effect that the implementation varied slightly at the different schools. Each participating country assigned their own researchers, who were responsible for the communication with schools and teachers, and the data collection. The Evaluation Body and the International Coordinators assured that the data collection was done in a correct manner. These researchers visited the schools in order to ensure that the implementation was performed as intended. They also interviewed teachers about their experience with teaching the challenges and sent out questionnaires to assess the teachers' experience with each challenge. This was performed in order to gauge teachers' experience with the programme, but also to ensure that the intervention fitted seamlessly into the schools' ordinary practice.

2. Secondary level (B1/B2)

The Youth Start Entrepreneurial Challenges programme has a structured, yet flexible design. This allows assessment of different versions of the programme. In the initial experiment protocol, only a two year implementation with data collection were planned, but a third round was added due to problems with the initial implementation and the data collection in round 1, as well as an identified need to collect additional data on students participating in the extended programme during the second year.

2.1. Different versions of the programme

Most secondary students are unfamiliar with entrepreneurship. This makes it challenging to assess entrepreneurship programmes' efficiency. Part of the influence of entrepreneurial education programmes can most likely be assigned to the participants' unfamiliarity with entrepreneurship as a concept (Moberg, 2017). If the participants never really reflected on their entrepreneurial competences or considered a career as self-employed as a viable option, a short educational intervention can have a significant influence. The type of teaching method used in the intervention is then often of less importance, since the increased familiarity with entrepreneurship as a concept *per se* will have an influence on entrepreneurship-related

outcomes. It is thus important to assess whether or not there are significant differences between short entrepreneurship programmes and extensive entrepreneurship programmes in order to find out whether entrepreneurship education has a true added value - beyond making the participants familiar with the concept. The design of the educational challenges in YSEC project made testing this possible.

In order to not only analyse the efficacy, but also the efficiency of the programme, three different versions were tested at the secondary level of education. An *intensive*, an *extensive* and an *extended* version of the programme were developed. The intensive version is composed of four short challenges that can be completed within a couple of days (the implementation of these challenges should take between 14 to 26 classroom hours). The extensive version includes the same challenges as the intensive version, but additional challenges of a more extensive character were added (the implementation of these challenges should take between 26 to 46 classroom hours). The extended version is similar in its structure to the extensive version, but it is composed of different challenges and is only offered during the second school year to students who have completed the extensive version of the programme (in addition to the 26 to 46 classroom hours that these students get in the extensive programme, they also get an additional 24 to 44 classroom hours in YSEC during their 2nd year).

In each participating school, it was requested that one third of the students should receive the intensive version and two thirds the extensive version. Of those students who received the extensive version half would receive the extended version during the consecutive school year (that is, one third of the students in the treatment group). This structure varied to some degree among the schools due to different numbers of classes. Most commonly, there were three classes in each school. In cases where there were only two or four classes at the schools, they would let half of their students receive the intensive version and the other half the extensive version. Since the programmes depend on trained teachers, the different versions of the programme were implemented at the class level and no students should change classes in order to get a specific version of the programme. By comparing the effectiveness of the intensive and the extensive and extended versions of YSEC it is possible, to some degree, to assess the programmes' efficiency.

2.1.1. *The educational challenges that are tested*

An effort was made to follow the TRIO model and include challenges aligned with the different categories when designing the three versions of the programme. The structure of the programme implementation is flexible, and the schools were allowed to spend different amounts of hours in their implementation of it. There is a suggested sequence of the challenges, but the schools were not required to follow it. Nor are

they compelled to implement the challenges in specific topics, even if some challenges suit certain topics better than others. In Table 1, the structure of the three programmes and the challenges they include are presented.

Programme	Challenge	Description	#Educational units
Intensive / Extensive	Trash Value Challenge	Students learn how to upcycle waste products. They use them to create individual objects. Then they present their objects and assess each others' presentations. A key aspect of this challenge is the analysis of the values created (material and immaterial values).	5-6
	Hero Challenge	An active approach to learning from practical experience: students select somebody who has successfully implemented a business idea and interview him or her, using certain guidelines. Then they present their results to the class – using visual aids, if possible.	3-4
	Empathy Challenge	Empathy plays a crucial role in business, as the examples Nike and LEGO illustrate. Those who analyse the way their target clientele group think and feel have better chances of success. In order to understand this, students use key questions to create an Empathy Map for their own innovative idea.	2-4
	Idea Challenge	Students analyse the entire process chain of generating and marketing a product by developing a sustainable business model for their own idea. Furthermore, they learn about topics such as trademark protection.	4-12
Extensive	My Community Challenge	How can you measure the quality of life? And what do terms like gross domestic product or the Gini coefficient have to do with it? Specific tasks in the different training units will help the students answer these questions. Finally, they will develop their own indicator to measure quality of life and discuss, question and debate various aspects of wealth in our society.	6-10
	Lemonade Stand Challenge	From implementing an idea to purchase planning and accounting, this challenge will give students first-hand experience of what it takes to turn a product or a service into a big seller and how to achieve the greatest possible success within a given budget.	6-10
Extended	Start Your Project Challenge	How can you develop an idea into a business model? What are the necessary requirements? Step by step, students draft a core business plan for their own product or service: including start-up costs, market opportunities, target groups and a financial prognosis.	8-12
	Perspectives Challenge	Companies face challenges on many levels. Students will formulate various goals, investigate correlations and complete a field analysis. Furthermore, they will assess the outcome of events and develop different scenarios.	4-8
	My Personal Challenge	If you want to go on vacation, there is usually a lot to plan and organise. For this activity, students will reflect on what they expect from a vacation and will then plan a trip – this includes making a financial plan, deciding on how to get there and back, organising accommodation and activities at the destination.	2-4
	Open Door Challenge	This challenge requires organisational skills! Students will plan and organise an event in collaboration with external partners. They will be responsible for all steps – from designing invitations to correct final accounting.	4-8
	Debate Challenge	How can we exchange arguments for and against a certain topic and be fair at the same time? The debate club will teach you the rules and help you learn to discuss controversial issues, which may even concern your own group.	6-12

Table 1: Challenges included in the different versions of the programme

2.2. The randomisation process

Selection bias that occurs due to self-selection is typically problematic in studies of entrepreneurship education, since entrepreneurship education is an activity that attracts specific types of individuals - often with high levels of interest in entrepreneurship as well as with the intention to pursue a career as self-employed (Rideout & Grey, 2013). Randomisation is crucial in RCTs, because randomisation allows us to measure the counterfactual, that is, what would have happened if the intervention was not implemented (Schlotter et al., 2009). If the intervention that is tested is not randomly allocated to participants in the experiment, it is impossible to assess whether the measured effects can be assigned to the treatment or to

other unobserved variables or events that occur due to selection bias (Edovald & Firpo, 2016). It is therefore unfortunate that there is a severe lack of assessment studies within the field that use rigorous RCT methods and apply randomisation (Rideout & Grey, 2013). The usual way to try to remedy the lack of randomisation is to use a pre/post design and assess how participants develop over time. However, this design does not capture whether different individuals react in different ways to the educational intervention (Kraemer & Blasey, 2016).

Usually, the randomisation should be performed at individual level, since this increases the statistical power and thus the precision of the assessment (Edovald & Firpo, 2016). However, in order to avoid contamination and peer effects in educational settings, it is often preferable to perform the randomisation at school level and instead increase the sample size (Bouguen & Gurand, 2012). Because the educational programme tested in this assessment study includes teacher training and many educational activities that are visible to other students (excursions, fairs, etc.), it was decided that the randomisation should be performed at the school level.

The initial experiment protocol included two implementation rounds. The randomisation process was designed based on this. Since fast feedback on the programme implementation was required during the first round of implementation it was decided to include a mid-test which was collected after the first semester. In order to be consistent, this initial structure was kept in the following rounds. Three waves of data were thus collected in each round: pre, mid and post[5]. To ensure that participation in the project would be attractive to schools, and allow the use of a thorough RCT methodology, it was decided to use phase-in randomisation. Each participating school would thus implement the programme, but the time they would do this depended on which of the two groups they were randomly allocated to. At the start of the trial, each school was allocated at random to either the *Primus group*, which would implement the programme during the first round and function as a control group during the second round, or the *Secundus group*, which would function as a control group during the first round and implement the programme during the second round.

There are some issues with this design, since the implementation involves teacher training. However, since the main focus of the trial is on "first-year" students, that is, students who have just begun the secondary level of education, this problem is mitigated to a high degree, as the majority of educators continue to follow their students into the second year of education. However, the implementation becomes less "clean" during the second round of implementation. This mainly has consequences for the implementation

[5] When three waves of data are collected, it also becomes possible to assess actual mediation effects.

of the extended version of the programme, since many students in the Primus group, who are now in a special control group (students who only received training in the programme during their first year), will have teachers who are trained and experienced in teaching entrepreneurship. This contamination issue may have as a consequence that the extended programme in the trial is perceived as less influential than is actually the case.

Due to the need to collect additional data on students participating in the extended version of the programme, a delay in implementation of the programme during the first round in all of the participating countries except Austria as well as because of unexpected problems with the data collection method[6], a third implementation round was included in the trial. Since the third round was not included in the initial experiment protocol and was not initially communicated to the participating schools, it was not a simple task to uphold the reliability of the trial. However, since the main focus of the trial is on first year students, of whom the schools receive a new cohort every year, it was possible to maintain the randomisation process. A graphical overview of the randomisation process and the project implementation during the three rounds is presented in Table 2 below.

<table>
<tr><th></th><th colspan="2">Round 1</th><th colspan="2">Round 2</th><th colspan="2">Round 3</th></tr>
<tr><td></td><td>Primus</td><td>Secundus</td><td>Primus</td><td>Secundus</td><td>Primus</td><td>Secundus</td></tr>
<tr><td>1st year students</td><td>Intensive
Extensive</td><td>Control</td><td>Control</td><td>Intensive
Extensive</td><td>Intensive
Extensive</td><td>Control</td></tr>
<tr><td rowspan="2">2nd year students</td><td rowspan="2"></td><td rowspan="2"></td><td>Special control</td><td rowspan="2">Control</td><td rowspan="2">Control</td><td>Special control</td></tr>
<tr><td>Extended</td><td>Extended</td></tr>
</table>

Table 2: The randomisation process and programme implementation during the three rounds

As depicted in Table 2, all participating schools in the Primus group should implement the intensive version (one third of the classes) and the extensive version (two thirds of the classes) of the programme to first-year students during Round 1, while the schools in the Secundus group should function as a control group. During Round 1 no data on 2nd year students were collected since they need to receive the 1st year content first. In Round 2, the roles switched. During this round, the extended version of the programme should also be implemented at schools in the Primus group to half of the students who had received the extensive version of the programme. The other students who had received education during the first year functioned as a special control group, whereas the 2nd year students in the Secundus schools functioned as a "pure" control group to the students receiving the extended version. In Round 3, the roles switch again.

[6] During the first round, an App was used to collect the data in all countries except Portugal. Many schools experienced technical problems due to problems with access to Wi-Fi, which led to low response rates. In addition to this, the implementation of the programme, and the data collection, started later than planned in all countries except Austria.

2.3. Measurements

The questionnaire used to collect data on students builds on the validated assessment tool developed in the ASTEE project[7]. The main focus is on entrepreneurial self-efficacy, but the questionnaire also includes measures of entrepreneurial intentions as well as school engagement and educational motivation. The assessment tool used was previously tested and validated in 13 European countries. The measures experienced both weak and strong factorial invariance and a high level of precision. The questionnaire was, however, adapted to the specific study. Likert scales ranging from 1 to 7 are used for each item in the questionnaire.

Entrepreneurial Self-Efficacy (ESE). In this questionnaire, ESE is divided into seven constructs that measure the respondents' confidence in performing both entrepreneurial skills of a non-cognitive character (*creativity*, *resource marshalling*, *managing uncertainty* and *teamwork*), and skills of a more content-specific character (*planning*, *financial literacy* and *venture creation*). In order to limit the jargon bias, the items of the six former constructs, which are of a more generic character, do not include any references to entrepreneurship or business management[8].

Entrepreneurial Intentions, Intention to Work with Innovation, Entrepreneurial Attitudes. A construct measuring entrepreneurial intentions (Krueger & Carsrud, 1993; Liñán et al., 2011) and a construct measuring general entrepreneurial attitudes (McGee et al., 2011) were also included in the questionnaire in order to assess whether the different versions of the programme had an influence on entrepreneurship-specific outcomes. In addition to this, a construct measuring the participants' willingness to work with innovation in established organisations was added. Each construct is measured with three items.

Intrinsic Motivation and School Engagement. A construct measuring intrinsic motivation (Ryan & Deci, 2000a) was included to assess whether the different version of the programme had an influence on students' curiosity and interest in their educational process. This scale is often paired with a scale measuring extrinsic motivation, but due to space limitations and ambiguous results of prior tests of this scale (Moberg et al., 2014) it was not included in the questionnaire. The construct is measured with three items. School engagement (Karcher, 2003) was measured with a six-item scale. It was included in order to assess whether the students increasingly perceived their education as purposeful, and whether they engaged emotionally with their own educational process.

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[7] See Moberg et al., 2014 and http://asteeproject.eu/

[8] See Moberg, 2013 and 2014 for a more extensive discussion about this.

Perceived educational focus. Since education to a large degree is experienced very subjectively, two constructs measuring perceived educational focus were also included, one with a focus on business-oriented skills, the other with a focus on enterprising skills. Each of these constructs were composed of three items.

The measures all experienced Cronbach alphas >0.70. This indicates that they have a sufficient level of internal consistency (Nunnally, 1978). The results of the Cronbach Alpha tests are presented in table 3 in the Appendix.

2.4. Analysis

This section, which presents the results of the analysis, is divided into four parts. The principal focus is on "what" effects we can see, "how" these were generated, and "who" benefitted the most from this type of educational intervention. In the first part, results of non-response bias tests and the randomisation are presented. In part 2, the "what" or the overall effects of the programme on first year students are presented. This is followed by a presentation of "how" the different versions of the programme influenced first-year and second-year students. In part 4, the analysis of how YSEC influenced different types of students (the "who") is be presented. Since the educators were allowed to implement the challenges in the order they found most suited to their schools, it is difficult to assess which type of educational treatment the participants have received between the pre-test and the mid-test. For this reason, the analysis only focuses on the pre-test and the post-test.

2.4.1. *Matching, randomisation and non-response bias tests*

The matching process of students' responses is a complex process in large-scale practical trials. After the phone app was abandoned as a data collection tool, the matching had to be done manually. However, since all students were assigned a class number and asked to state their date of birth, the majority could be matched. In addition to this, four "bio-tags" were introduced in the questionnaire in round 2 in order to simplify the matching process. It was decided to base the matching process at the class level. The first step in deciding whether to keep the respondent in the study depended on whether the respondent had the same class number in both the pre and the post test. If the respondent had changed class or assigned a different class number in the two questionnaires, they were dropped from the analysis. The next step in the matching process was based on date of birth. The four bio tags that were used asked the respondents to

provide information about email, four last digits in their phone number, initials of their name, number of letters in first name and surname. These tags were mainly used as robustness checks when deciding whether or not the respondent could be matched. Respondents who lacked variation in their responses[9], were excluded from the dataset. In Table 4, an overview of the results of these matching processes is presented[10]. The category "Full sample" includes respondents who have responded to one questionnaire (either pre or post). The category "Final sample" includes respondents who could be matched on their pre and post questionnaires. The B1 category includes students who participate during the first school year; the B2 category includes students who participate during their second school year.

	Classes		**Students**	
	Initial assignment	Final participation	Full sample	Final sample
Austria				
- Treatment (B1)	51	38	1396	348
- Control (B1)	38	27	1198	276
- Treatment (B2) - extended	*21*	*13*	*454*	*113*
- Control (B2)	*39*	*25*	*620*	*232*
Portugal				
- Treatment (B1)	103	72	2037	1008
- Control (B1)	85	44	1420	578
- Treatment (B2) - extended	*7*	*5*	*93*	*70*
- Control (B2)	*94*	*52*	*1255*	*586*
Slovenia				
- Treatment (B1)	62	46	1195	424
- Control (B1)	26	15	522	267
- Treatment (B2) - extended	*15*	*14*	*270*	*102*
- Control (B2)	*28*	*20*	*505*	*199*
Luxembourg				
- Treatment (B1)	21	21	456	276
- Control (B1)	32	23	690	305
- Treatment (B2) - extended	*15*	*11*	*345*	*140*
- Control (B2)	*6*	*5*	*142*	*57*
Total	**643**	**431**	**12598**	**4981**
- Total B1	418	286	8914	3482
- Total B2	225	145	3684	1499

Table 4: The matching process

[9] Observations with no variation in the outcome measures within one questionnaire, that is, when the respondent had only clicked through using the same number value in all responses.

[10] The research paper "Filling in the blanks: The impact of entrepreneurship education on European high school students", written by Magdalena Streicher, Kåre Moberg, and Laura Rosendahl Huber, in collaboration with Casper Jørgensen and Dana Redford, which also base its analysis on the YSEC dataset, differs in few but important ways regarding which respondents that were included. Due to the specific focus of the paper, specific VET schools (technical, focusing on tourism and social work) in Austria were included in the paper. These schools were excluded in this report since they experienced many issues with the implementation of the programme as well as with the randomisation. Furthermore, since the implementation of YSEC was delayed in the first round, it is not included in the research paper, but we chose to include it in this report.

2.4.1.1. Non-response bias tests

Large-scale practical field trials often experience attrition problems. Students participating in the pre-tests leaves the study for numerous reasons: they drop out of their school or their class, they are not present when the follow-up questionnaire is distributed, they do not want to participate, they are not possible to match, their responses have been unserious, etc. It might be the case that it is specifically unmotivated students or students with specific backgrounds who drop out. Since the goal of a practical trial is to assess the influence of a programme in its natural setting, it is important to assess whether the attrition introduces a bias. Comparison tests of students who only participated in the pre-test with students who were matched in the pre and the post-test were thus performed. T-tests were used for Likert scale based variables and tests of proportions for binary variables. The results of these tests are presented in Table 5 in the Appendix. The tests demonstrated that there were very few differences between the two groups. However, there were significantly more male students that dropped out, as well as students who initially perceived that their education had a higher level of focus on business skills and less focus on enterprising skills. In addition to this, the students who dropped out had significantly higher entrepreneurial intentions, but significantly lower school engagement and intrinsic motivation. Some attrition bias, although limited, can thus be identified.

2.4.1.2. Randomisation tests

Since the randomisation was performed at the school level rather than at the individual level, there is a risk of initial differences between the groups. In order to assess this, t-tests were used for Likert scale based variables and tests of proportions for binary variables. In Table 6 in the Appendix, the results of this analysis are presented. The tests showed that there are some minor, but significant differences between the groups. There are significantly fewer males and students with a different ethnic background in the YSEC group. The students in the YSEC group also have a higher level of school engagement and, significantly more of them have experience with social entrepreneurship. However, these initial differences do not seem to influence the majority of the variables. They can thus be considered as very limited, but they should still be considered when interpreting the results.

2.4.2. The impact of YSEC on first year students

Difference in difference (DID) analysis was used to assess the influence of the programme. The traditional way of performing DID tests is to compare the average change of the treatment group with the average change of the control group. According to Imbens and Wooldridge (2009), the main advantage of this double differences' methodology is that any potential biases associated with the common development of students over time, unrelated to the educational programme, are removed. When every respondent is included both in the pre and the post-test, which is the case in our sample, Imbens and Wooldridge (2009) recommend the use of a different method that exploits the specific features of the panel data. Assuming unconfoundedness given lagged outcomes, they advocate regressing the difference in the value of the outcome variable of individual *i* at the start of the programme (t=0) versus the end of the programme (t=1) on a dummy indicating group membership (i.e. treatment or control) and the lagged outcome variable at t=0.

For ease of interpretation, all of the analyses in this report have standardised results (mean=0, standard deviation=1). The effects can thus be interpreted as the size of the share of a standard deviation that differs between students who have participated in the programme compared to students who have been in the control group. In Table 7, the overall influence of the YSEC programme on first-year students is presented. Since the educational treatment was randomly assigned, it should not be necessary to include control variables in the analysis. However, since the comparison of the groups in the pre-test indicated that there were some significant differences, an analysis was also performed in which the following control variables, measured as binary variables, were included: 1) gender (male), 2) education level of parents (tertiary level), 3) employment status of parents (both unemployed), 4) parents' experience with entrepreneurship (either father or mother running a company), 5) perceived family income level (below average), 6) perceived educational performance (above average), 7) experience with enterprising activities (experience with volunteering, being a leader or a founder of an activity outside school), 8) experience with entrepreneurship education (have been exposed to entrepreneurship education). Controls for country level variance (with Portugal as the base due to the highest number of respondents) are included in all analyses. All analyses are clustered on class level, since it can be anticipated that students in the same class influence each other and to a large extent experience the same type of teaching and teachers.

	Uncertainty	Finance	Creativity	Planning	Resource Marshalling	Teamwork	Venture creation	Intentions	Innovative employee	Attitudes	Business skills	Enterprising skills	Intrinsic motivation	School engagement	Entrepreneurial teachers
YSEC (No controls)	**0.0948***	0.0706	0.0544	**0.0801***	0.0466	0.0636	**0.0995****	**0.0848***	0.0452	0.0561	**0.160****	**0.106****	0.0636	**0.118****	**0.0867***
YSEC (Controls)	**0.110****	**0.0938***	0.0597	**0.0884***	0.0579	0.0580	**0.106****	**0.0869***	0.0537	0.0628	**0.164****	**0.107****	0.0580	**0.128****	**0.0864***
Austria	0.195***	0.198***	0.244***	0.159**	0.390***	-0.0970	0.131*	0.0565	0.227***	0.153**	0.363***	0.188**	-0.0970	0.0027	.1798**
Slovenia	0.0227	-0.0168	0.00936	-0.0158	0.0572	-0.0904	0.0151	-0.0401	-0.0220	0.0259	-0.150	-0.103	-0.0904	-0.293***	-.1889**
Luxembourg	0.0453	0.126*	-0.0431	-0.0063	0.0298	-0.125*	-0.0490	-0.119	0.0165	-0.0522	0.0018	-0.0564	-0.125*	0.0144	-.0721
N	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3442

* p<0.05, ** p<0.01, *** p<0.001

Table 7: The influence of the YSEC programme on first year students, both with and without control variables

The results presented in Table 7[11] demonstrate that students who have participated in the YSEC programme (either the intensive version or the extensive version) during their first year increase significantly more in the following variables: confidence in managing uncertainty, confidence in financial literacy, confidence in being able to plan, confidence in being able to start up a new venture, entrepreneurial intentions, and school engagement. We can also see that they perceive a significant increase in the teaching focus on business-oriented skills and enterprising skills and that they perceive their teachers as being significantly more entrepreneurial. Given the different school types in the four countries, it can be expected that students will perceive this change of focus differently. In order to assess this, interactions between countries and the treatment variable were included in the analysis. The results of these tests are presented in Table 8 below.

	Business skills	Enterprising skills	Enterprising teachers
YSEC	.4677***	.1557**	.144*
Austria	.5491***	.1668*	.1608
Austria*YSEC	**-.2793***	.0755	.0624
Slovenia	.4298***	.0805	.0234
Slovenia*YSEC	**-.9125*****	**-.2358***	**-.2906****
Luxembourg	.2619*	.0126	-.0270
Luxembourg*YSEC	**-.3761***	-.0667	-.0446
lag	-.5640***	-.5444***	-.5856***
_cons	-.2982***	-.1003*	-.0592
N	3482	3482	3442

* p<0.05, ** p<0.01, *** p<0.001

Table 8: Heterogeneous country effects on Business skills and Enterprising skills

The results show that, compared to Portuguese students, Austrian, Luxembourgish and Slovenian students perceive that there has been a significantly smaller change in focus regarding business-oriented skills. For Slovenian students this is also the case for enterprising skills and entrepreneurial teachers. There are thus

[11] Detailed results, including the influence of the control variables, are presented in table 7 in the Appendix

differences in the students' experience with this type of education and how students perceive the YSEC programme. In the case of Austria and Luxembourg, it can be inferred that this is due to the background of the students who participate in business-oriented schools. However, in Slovenia, the school types are similar to the ones in Portugal, implying that there has probably been some issues with the implementation.

2.4.2.1. Different versions of the programme

In order to assess the efficiency of the programme, the influence of different versions of the programme have been analysed. In Luxembourg and Slovenia, all participants have received the extensive version of the programme, so respondents in these two countries are excluded from the analysis. In Portugal, 532 students have participated in the extensive version and 475 in the intensive version. In Austria, the numbers are 261 students in the extensive version and 87 in the intensive version. In Table 9, the influence of the intensive version and the extensive version of the programme is presented.

	Uncertainty	Finance	Creativity	Planning	Resource Marshalling	Teamwork	Venture creation	Intentions	Innovative employee	Attitudes	Intrinsic motivation	School engagement	Entrepreneurial teachers
Extensive version	0.0708	0.044	0.0569	0.0926	0.0671	0.0782	0.102	0.0641	0.0395	0.0705	0.0782	-0.0154	**.1534***
Intensive version	**0.152***	**0.157***	**0.139****	**0.201*****	**0.132***	**0.168****	**0.203*****	**0.141***	**0.180****	0.118	**0.168****	0.0862	**.1695****
Country (Austria)	**0.238*****	**0.197*****	**0.285*****	**0.222*****	**0.419*****	-0.0601	**0.140****	0.0281	**0.274*****	**0.169*****	-0.0601	0.0382	.2026***
Baseline	-0.503***	-0.525***	-0.518***	-0.533***	-0.557***	-0.526***	-0.534***	-0.510***	-0.532***	-0.538***	-0.526***	-0.456***	-.5868***
Constant	-0.136**	-0.123**	-0.127***	-0.146***	-0.173***	-0.0441	-0.139***	-0.0755*	-0.128**	-0.101**	-0.0441	-0.00833	-.1231**
Prob > F	0.197	0.060	0.165	0.070	0.254	0.118	0.101	0.208	**0.018***	0.4414	0.118	0.099	0.7863
N	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209

* p<0.05, ** p<0.01, *** p<0.001
No control variables included

Table 9: The influence of the extensive and the intensive versions of YSEC

The results in Table 9 seem to indicate that, overall, the intensive version of YSEC is most effective. For the majority of the variables, the intensive version has a positively significant influence, whereas the influence of the extensive version is not significant for any of the variables except for the students' perception of their teachers as being entrepreneurial. Furthermore, it is only for the variable "ambition to work with innovation within established organisations" that the influence of the two versions are significantly different.

In general, the Austrian students increase more than their Portuguese counterparts. However, this does not mean that any of the versions is more effective in Austria, since the country variable includes both treatment and control[12]. It can be anticipated that the influence of the two versions of the programmes will vary in accordance with the schools' preparedness for implementing programmes such as YSEC. Since YSEC is an Austrian programme and the Austrian schools included in the sample all focus on business-oriented education it is to be expected that Austrian schools have better results with the extended version of the programme.

In order to assess whether the two versions have different influence in the countries, interaction effects between country and the two programme versions were included in the analysis. No significant interactions for the extended version could be identified, but there was a negative tendency for the intensive programme in Austria, with significantly negative interaction effects for Austrians students' confidence in managing uncertainty and financial literacy. It is thus the Portuguese schools that experience the greatest differences between the two versions of the programmes. However, it should be noted that only 87 students received the intensive version in Austria, which makes it difficult to obtain precise results.

2.4.2.2. YSEC's influence during the second school year

Many of the students who had participated in the field trial during the first year in Round 1 and Round 2 were followed during their second year of secondary school. In order to test whether an additional year of YSEC would continue to influence students, a DID-analysis, in which the treatment was the extended version of the programme, was performed. Tests were performed to see whether students who had received YSEC during year one but not during year two developed in a different way during the second year compared to students who had never received YSEC (results are presented in the Appendix in Table 10). Since there were no significant differences between these groups regarding their development in year two, both students that had never been exposed to YSEC and students that had been exposed to YSEC during year one but not during year two were used as the control group. In Table 11, the results of the analyses are presented (in the Appendix an extended version is presented).

[12] It rather indicates that the control group in Austria increases more than the control group in Portugal, which is natural, since also the control group in Austria experiences business-oriented education.

	Uncertainty	Finance	Creativity	Planning	Resource Marshalling	Teamwork	Venture creation	Intentions	Innovative employee	Attitudes	Business skills	Enterprising skills	Intrinsic motivation	School engagement	Entrepreneurial teachers
YSEC Extended (No controls)	**0.117***	**0.187****	0.010	0.104	**0.128***	-0.0293	-0.0142	-0.0062	-0.0144	-0.0266	0.145	**0.141***	-0.0293	0.0163	0.1122
YSEC Extended (Controls)	0.0811	0.128	0.0041	0.0545	0.0688	-0.0407	-0.0292	0.0069	-0.0575	-0.0703	0.170	0.0997	-0.0407	-0.0325	0.1074
Austria	0.173*	0.176*	0.0773	0.236**	0.387***	-0.0995	0.153*	-0.0516	0.230**	0.0336	0.306**	0.115	-0.0995	0.0371	0.1634
Slovenia	0.0429	-0.0297	-0.116	-0.0522	0.0082	-0.0875	-0.127	-0.125	-0.0228	-0.0433	-0.344***	-0.0657	-0.0875	-0.0612	-0.1244
Luxembourg	0.0576	0.199	0.0101	0.0744	0.126	-0.0192	0.0205	-0.0398	0.0728	0.10	0.0017	0.143	-0.0192	0.130	0.0531
N	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1441

* p<0.05, ** p<0.01, *** p<0.001

Table 11: The influence of the extended version of YSEC on 2nd year students

As we can see in Table 11, it looks like the extended version of the programme has a significantly positive influence on students' confidence in their ability to manage uncertainty, marshal resources and understand finance. However, when controls are included, these effects are no longer significant, which indicates issues with the randomisation, or country differences. In order to analyse whether there were country differences we interacted the countries with the treatment variable, using Portugal as a base. No significant interactions were identified, which indicate that at this level there are no significant differences between the countries in regards to the programmes lack of efficiency.

2.4.2.3. Heterogeneous effects

In order to further our understanding of how YSEC influenced different groups, tests were performed in which the variables included as controls were interacting with the treatment variable. Two variables clearly demonstrated an influence: gender[13] and experience with education in social entrepreneurship[14]. For these variables, significantly positive interaction effects were identified for multiple entrepreneurial competences. Each of the interaction effects were tested separate from each other but, in order to include the country variation, the country interactions, with Portugal as the baseline, were included in the tests. In Table 12 and Table 13, the results of these tests are presented.

[13] Since it is easier to interpret positive interaction effects we have changed the order of this variable in this test (male=0, female=1).

[14] The respondents were asked to indicate if they had participated in entrepreneurship education prior to YSEC. If they responded yes to this question they were asked 8 follow-up questions about the content of the entrepreneurship education they had participated in. The following items gauged the content: a) Business planning, b) Financial literacy, c) Product development, d) Social entrepreneurship, e) New venture creation, f) Visits to local entrepreneurs, g) Entrepreneurship competition, h) Other.

	School engagement	Venture creation	Marshalling resources	Innovative employee	Uncertainty	Finance
YSEC	.0303	.1799***	-.0029	.0271	.0639	.0741
Austria	.0367	.1902*	.4299***	.2564	.3002***	.2975***
Austria*YSEC	-.0159	-.1101	-.0450	-.0093	-.1042	-.1738
Slovenia	-.5031***	.1668*	.163*	.1185	.1867**	.076
Slovenia*YSEC	**.4218*** **	**-.2236***	-.1138	-.1502	-.1380	-.1049
Luxembourg	-.0249	.0214	.1052	.1094	.0609	.1633*
Luxembourg*YSEC	.1194	-.0928	-.1333	-.120	.0323	-.0504
Female	-	-	-.1193*	-.1107*	-.1888***	-.2346***
Female*YSEC	-	-	**.1941** **	**.1372***	**.1461***	**.1364***
lag	-.4916***	-.5310***	-.5473***	-.5524***	-.5217***	-.5405***
_cons	.0256	-.1362***	-.098	-.0463	-.0593	-.0282
N	3,482	3,482	3,482	3,482	3,482	3,482

* p<0.05, ** p<0.01, *** p<0.001. Country baseline = Portugal

Table 12: The heterogeneous influence of YSEC in the different countries and in regards to different genders.

	Venture creation	Uncertainty	Finance
YSEC	.1589**	.1135	.0999
Austria	.1799*	.2621**	.2432**
Austria*YSEC	-.0891	-.0618	-.1134
Slovenia	.1579*	.1378*	.0097
Slovenia*YSEC	**-.2096***	-.0889	-.0388
Luxembourg	.0111	.0435	.1310
Luxembourg*YSEC	-.0725	.0559	-.0113
Experience with Social entrepreneurship	-.1818	-.1834	-.3719*
Experience with Social entrepreneurship *YSEC	**.3509***	**.3188***	**.5373****
lag	-.5317***	-.5122***	-.5273***
_cons	-.1259***	-.1418**	-.1227*
N	3,481	3,481	3,481

* p<0.05, ** p<0.01, *** p<0.001. Country baseline = Portugal

Table 13: The influence of experience with social entrepreneurship education of the effects of YSEC

As we can see in Table 12, there are some differences between the countries regarding effects on 1st year students. In Slovenia, the influence of YSEC on the students' confidence in starting up a new company, is significantly lower, but the influence the programme has on the students' level of school engagement, is

significantly higher. We can also see that female students participating in YSEC, increase their confidence more than male students, in their ability to manage uncertainty, marshal resources and financial literacy. Their ambition to work with innovation in established organisation also increase significantly more. In Table 13 we can see that 1st year students who have experience with education focusing on social entrepreneurship, increase their confidence in their ability to start up a company, manage uncertainty and financial literacy, significantly more when they participate in YSEC.

2.5. Discussion of the results

The results of the analysis demonstrate that, at the secondary level of education, YSEC is an effective programme with regard to its influence on entrepreneurial self-efficacy, entrepreneurial intentions, intention to work with innovation, and level of school engagement. On average, the programme thus makes students more confident in entrepreneurial competences, such as managing ambiguity, creativity and financial literacy, and their feasibility and desirability to engage in entrepreneurial activities, both understood as new venture creation and innovation in established organisations, increase. In addition to this, students who participate in YSEC perceive their education as more purposeful and their school context as be more supporting and encouraging.

The influence YSEC has on entrepreneurial variables is not unexpected. Even if the programme has a greater focus on enterprising skills and innovation in general than on business skills and venture creation-specific activities, it is to be expected that the entrepreneurial assignments that the students perform will influence their perception of entrepreneurship and make them reflect on their entrepreneurial competences. Since perceived ability influences behaviour to a larger extent than objective ability (Markham et al., 2002), the results indicate that YSEC can be used effectively in promoting entrepreneurial activities.

The significantly positive influence of YSEC on students' school engagement is an important finding, since it demonstrates that entrepreneurship education, when taught in a practice-oriented and experiential way, can have a wide range of effects and not just influence entrepreneurial dimensions. The teaching methods used in YSEC thus seem to be well-aligned with the preferred teaching methods of the participants, since their engagement increases. When students' engagement in their education increases, and they find their education to be more purposeful and their educational climate more supportive, it can be anticipated that their educational performance in general increases (see Fredricks et al. 2004, Libbey, 2004, and Moberg, 2014, for a further discussion about this).

The qualitative data collection indicates that many teachers found it problematic to embed the programme in the curricula, especially the extensive version of the programme. This may have had the effect that teachers who were requested to implement the extensive version of the programme spent less time on the four intensive challenges. Since these challenges were more focused on getting experience with entrepreneurial activities, maybe it is more important to focus on these challenges rather than try to include additional and extensive challenges that have a broader focus. It thus might be a good idea to focus more on entrepreneurship than on enterprising skills and innovation in the education, since most negative aspects of venture creation, such as stress (Monsen & Wayne Boss, 2009) and fear (Mitchell et al., 2008), can be avoided in this context. In a recent study by Shir, Nikolaev and Wincent (*forthcoming*), the researchers find that, although both entrepreneurs and intrapreneurs have higher levels of well-being, only the entrepreneurs had higher levels of autonomy. The connection between autonomy and motivation is well-established (Ryan & Deci, 2000b) as well as its connection to entrepreneurial self-efficacy (McGee et al., 2009; Moberg, 2014). However, what the results of the analyses demonstrate is that the success of implementing the different versions of the programme depends on the experience and preparedness of the schools.

The results demonstrate that students with prior experience of social entrepreneurship education develop significantly more in their entrepreneurial self-efficacy. This demonstrates two things: 1) the importance of implementing entrepreneurship education at multiple levels of the education system, 2) the alignment of social entrepreneurship with the YSEC programme. The somewhat unexpected result that the intensive version works better than the extensive version indicates that it is the scale of the implementation that is problematic, not the content. When it comes to policy recommendations, this is an important finding. Rather than trying to include entrepreneurship education on a large scale during a single school year, this education should be spread out over many school years.

It is interesting to see that YSEC has a specifically strong influence on female students. Female students improve more than male students when it comes to their confidence in managing uncertainty, financial literacy and resource marshalling. Compared to men, women are more inclined to base their career choices on confidence in their own abilities (Bandura, 1992). This process starts early, which is demonstrated by adolescent girls showing lower confidence levels compared to boys in math, finance, decision making, problem solving and related areas (Marlino & Wilson, 2003). The same competence areas are viewed as barriers also later in life (Wilson et al., 2007). Women actively avoid entrepreneurial careers due to lack of social capital (Foss, 2010; Yetim, 2008) and a different perception of financial risk and uncertainty (Lockyer & George, 2012). This lack of confidence makes women avoid careers that are perceived as being male

dominated (Bandura et al., 2001; Scherer et al., 1990), such as entrepreneurship (Kourilsky & Walstad, 1998; Marlino & Wilson, 2003)

Other studies have demonstrated similar results with regards to the effectiveness for female students (Chowdhury & Endres, 2005; Wilson et al., 2007). However, these studies are based on adult respondents and on cross-sectional data. There are also studies that actually demonstrate the opposite effect (Bergman et al., 2011). The fact that, in a large-scale and randomised practical trial, we are able to demonstrate that female students participating in entrepreneurship education at secondary level develop their confidence more than male students in three competences identified as barriers to female entrepreneurship is thus a significant finding in regards to entrepreneurship policy.

It is somewhat surprising to see that students find that the programme to a large extent focuses on business-oriented skills. This result indicates that to many of the students in the sample a focus on business in their education has been very uncommon. The results do, however, show that there are differences between the countries in this regard. The Austrian and the Luxembourgish students, who in this sample participate in schools with more business-oriented focus, seem to have more prior experience with this type of education. The results show that, compared to the other countries, students in Portugal improve more when receiving the YSEC programme. This might explain why we do not see a significant impact of the extended programme. A very limited number of Portuguese students participated in the extended version of the programme, so the analysis at this level is based on students who are more used to education in business and entrepreneurship. From a policy perspective, this implies that, in order to gain the highest impact, this type of intervention should focus on schools where students are unfamiliar with business and entrepreneurship.

Overall, the results of the YSEC programme at secondary level demonstrate promising results. It should be noted that the programme was completely new to the schools. It can be anticipated that the impact will improve even more when teachers have been able to adapt the programme to their specific students and school context.

3. Primary and lower-secondary level (A2)

3.1. Background

The reasons for studying the effectiveness of the YSEC programme on primary/lower-secondary (A2) level is twofold. First, entrepreneurial skills are increasingly important in today's labour market and are seen as a key element to foster economic growth and to stimulate innovation within the European Union.[15] One of the conclusions formulated by the Council of the European Union is that entrepreneurship requires gradual development, starting from an early age and that entrepreneurial skills should be addressed at all levels of education (Council Conclusions, 2014). This notion of the importance of gradual skill development, starting early in life, is echoed by recent research on cognitive and non-cognitive skill formation by Heckman et al. (2013). This research suggests that the skills learned during one period in life (e.g. at primary school) augment the benefits of investments in these skills in subsequent periods (e.g. at secondary or tertiary level). If this model also holds true for the development of entrepreneurial skills, it could be that the entrepreneurship programmes targeting older students will be more effective for those students who participated in these programmes also at a younger age.

Importantly, recent research shows that these (non-cognitive) entrepreneurial skills are not only useful for those interested in pursuing an entrepreneurial career, but crucial for all individuals to be able to participate successfully in the labour force and respond to rapidly changing environments driven by technology, globalization and evolving skills needs (e.g., Council Conclusions, 2014; Chetty et al., 2011). One way to address this demand for entrepreneurial skills has been to integrate entrepreneurship education programmes within all levels of formal education. This has led to amplified pressure on the educational system to teach and foster entrepreneurial skills. Since entrepreneurship education programmes are used worldwide as a policy tool, testing their effectiveness is important to provide solid grounds for future policy decisions.

Second, many studies conducted in the entrepreneurship education literature so far have mainly focused on the effect of entrepreneurship education programmes on entrepreneurial intention or actual entrepreneurial behaviour and outcomes (e.g. business formation). Less is known about the impact of entrepreneurship education programmes on the antecedents of entrepreneurial intentions and behaviour, such as attitudes, values and skills (Liñán & Fayolle, 2015). This seems particularly relevant when evaluating the effectiveness of such programmes for younger pupils and students at lower education levels. In this case, the actual start-

[15] The Entrepreneurship 2020 Action Plan. Source:http://ec.europa.eu/enterprise/policies/sme/entrepreneurship-2020/index_en.htm

up decision is still far away and intention measures tend to be less informative (see e.g. Huber et al., 2014). Hence, the measurement of relevant (entrepreneurial) skills might be more informative and thus preferred.

3.2. Theory on early entrepreneurship education

The theoretical motivation to implement and evaluate the effectiveness of the YSEC programme specifically at the primary or lower secondary school (A2) level is mainly derived from the theory on the technology of skill formation (Cunha and Heckman, 2007) as well as recent evidence in the entrepreneurship literature that demonstrates the effectiveness of entrepreneurship education for pupils of a similar age group (Huber et al., 2014).

The model by Cunha and Heckman (2007) and subsequent research on skill formation emphasizes the importance of early investments in both cognitive and non-cognitive skills (e.g., Cunha & Heckman, 2008; Heckman et al., 2013). Findings from these studies suggest that an investment in skills not only has a direct impact on the current stock of skills but also produces spill-over effects in subsequent periods by boosting current skills and by making investments later in life more productive (Cunha et al., 2010), indicating that early investments in skills may be particularly effective in the long run. For the optimal development of skills over a person's life cycle, it is crucial to identify the key stages in which these skills are formed. Implementing the same education programme for different age groups will (hopefully) enable us to shed some light on this issue.

Some of the first evidence on the effectiveness of entrepreneurship education for children at primary school or lower secondary education is based on a field experiment conducted in the Netherlands among pupils aged 11 to 12. This study by Huber et al. (2014) shows that the participation in an entrepreneurship education programme at this age has a positive and significant effect on the development of entrepreneurial skills, such as creativity, need for achievement, pro-activity and self-efficacy.

There are two important differences between the study by Huber et al. (2014) and our research project. First, while they study the effectiveness of an extracurricular education programme, Youth Start Entrepreneurial Challenges (YSEC) is a programme that embeds entrepreneurship education in the regular curriculum of the school. Second, whereas the BizWorld programme evaluated by Huber et al. (2014) had a clear emphasis on teaching business and entrepreneurial skills as well as on teamwork, the focus of the YSEC programme is more on the individual development of entrepreneurial skills and a more general set of non-cognitive skills. Therefore, the outcome measures used to evaluate the YSEC are slightly different from those used to evaluate the education programme in the study by Huber et al. (2014).

To determine the relevant outcome measures for the evaluation of the YSEC programme, we closely follow the definition of entrepreneurship and the underlying competences as given by the Council of the European Union (Council Conclusions, 2014). These competences include, for instance, creativity and a sense of initiative; problem solving and critical thinking; decision-making and risk taking; adaptability and perseverance; self-discipline and a sense of responsibility; leadership and teamwork; planning and organizational ability; understanding of the social, economic and cultural context; and language skills and the ability to persuade. More specifically, in line with this definition and the goals of the YSEC programme, we expect the programme to have a positive effect on the following measures: Creativity and Entrepreneurial behaviour, Planning and Financial responsibility, Self-efficacy, Empathy (both in terms of awareness of own feelings as well as feelings of others, i.e., pro-social orientation).

These constructs are closely related to and explicitly based on the concepts used by Huber et al. (2014) and have been found to be positively affected by participation in an entrepreneurship education programme. Moreover, empathy is related to the broader concept of social competences. Social competences have been shown to play an important role in various school tasks and educational outcomes, and thus have been the objective of many behavioural interventions (Jurowski & Hänze, 2014). Furthermore, the concepts of Planning and Financial responsibility are related to financial planning and are thus in line with research on financial literacy that are aimed at teaching individuals the basics of financial planning and decision making (Lusardi & Mitchell, 2014). Finally, even though the measures used in this study are more specifically related to entrepreneurship, certain concepts such as creativity and empathy resemble parts of the broader constructs of Academic potential and Social Development from the YRS scales used in the studies by Heckman et al. (2013, 2006).

3.3. Methodology

3.3.1. Measurement tool

The tools used at A2 level to evaluate the programme's effectiveness were developed in two consecutive rounds. This was done because the decision to also use individual pupil assessments at this level was not part of the initial experimentation protocol and thus had to be developed in parallel to the implementation of the programme itself. Moreover, many of the required measurement tools were not readily available in all the different languages or validated for this age group. Since past research has shown that the use of self-assessment measures for this age group can be challenging (see Moberg et al., 2014; Huber et al., 2014), the first implementation round was used to develop and validate the measurement tools.

The survey in the first implementation round was based on several items from the ASTEE project and used in B1 level survey, complemented with several items from the study by Huber et al. (2014). The measures included were: *Creativity, Planning*, School engagement, Entrepreneurial behaviour*, Empathy*, Conscientiousness*, Entrepreneurial teacher, Self-efficacy*, Pro-activity (only post-test)*,* and *Persistence (only post-test)*.* Unfortunately, many of the constructs that had shown high reliability in the study by Huber et al. (2014) did not work well in the international setting of the YSEC programme. The items denoted with an "*" showed both weak internal validity (measured by Cronbach's α), and weak construct validity which was tested by means of a principal component analysis. Based on these findings these constructs were changed prior to the second implementation round.

To further improve the quality of the survey measures after the first implementation round they were reviewed and discussed extensively with the YSEC programme developers, and then further developed with the help of a psychologist.

3.3.2. Content of the programme

In Table 14 the overview of the programme shows the link between the different challenges and the measurement tools included in the survey in the second and third implementation round. In addition to these more challenge specific measures we also included more general outcome measures such as School Engagement (based on Fredricks et al., 2004), Self-Efficacy (based on Huber et al., 2014) and Entrepreneurial Teacher (based on the ASTEE questionnaire, Moberg et al., 2014). Self-efficacy has previously been found to be positively affected by participation in (early) entrepreneurship education and the other two measures were included to increase the comparability within the YSEC project between education levels (A2 and B1).

Challenge	Content	Trio model framework	Skills	Source
Idea Challenge	Design Thinking – The perfect chair	Core Entrepreneurial Education	Creativity	Huber et al. (2014)
My Personal Challenge	My allowance – Priorities for my pocket money	Core Entrepreneurial Education	Planning (financial) and Financial responsibility	Adapted from the Hope Centered Career Inventory (HCCI)
Empathy Challenge	Friendship Bag	Entrepreneurial Culture	Empathy (awareness and pro-social)	Adapted from Jurkowski, S., & Hänze, M. (2014)
Perspectives Challenge	Why are there no more fish in the sea?	Entrepreneurial Culture	Cause and effect	Not available
Trash Value Challenge	Waste to value – Makes something useful out of trash	Entrepreneurial Culture	Entrepreneurial behaviour	Own scale (pre-tested in YSEC Round 1)

Table 14: Educational challenges at primary level

3.3.3. Measurement tool quality

To assess the internal consistency of the measures Cronbach's α tests were performed. The values are as follows: *Creativity* is measured by three items (α = 0.73), *Planning* is measured by four items (α = 0.80), *Entrepreneurial behaviour* is measured by four items (α = 0.67), *Empathy (pro-social)* is measured by four items (α = 0.76), *Empathy (awareness of own feelings)* is measured by three items (α = 0.70), *School engagement* is measured by five items (α = 0.74), *Self-efficacy* is measured by six items (α = 0.81), and finally *Entrepreneurial teachers* is measured by three items (α = 0.76). The measure of *Financial responsibility*, which is measured by four items (α = 0.65) was not included in the Luxembourgish questionnaire. [16]

Even though some of the constructs demonstrate a Cronbach's α <0.70, overall the constructs used to evaluate the effectiveness of the programme at the primary level are reliable and internally consistent.

3.4. Research design

The research design of the evaluation of the YSEC programme at the primary level is similar to the secondary level and based on a Randomised Controlled Trial (RCT) with in-phase randomisation at the school level. However, the idea to also employ an RCT at this level was only decided after the majority of the planning and school registration had already been completed for the first implementation round.

[16] The reported Cronbach's α values are calculated as the unweighted average of the values from the pre-test and post-test for the full sample.

Hence, for Round 1 only Portuguese schools were randomised into treatment and control group whereas in the other countries representative control schools were found but could not be randomly assigned.

The fact that the RCT could not be implemented in the first implementation round in all countries is unfortunate. However, since this round was used to test the questionnaire and to further develop the relevant constructs, the data collection was still very valuable and important for the successful evaluation of the primary level programme in the subsequent implementation rounds.

In Round 2 and Round 3 the experiment at primary level in Portugal and Austria closely follows the experimental set-up employed at the secondary level. That is, in each of these countries the schools signed up to participate in the programme and were then randomly assigned to treatment and control group.[17] Three surveys were administered each year: (1) *pre-test* at the beginning of the school year, i.e., before the start of the YSEC Programme, (2) *mid-test* in the middle of the school year (January/February), and (3) *post-test* at the end of the school year, after all the Challenges had been completed. Furthermore, at the request of the Austrian programme development team, we continued to follow the initial group of students (from Round 1) in the subsequent school years. The students in the treatment group continue to receive additional new challenges, whereas the control group remains untreated. Due to the non-random assignment to treatment and control group as well as the difference in age and in terms of treatment between this sub-group and the rest of the sample, we will exclude this group from the main analysis.

In Slovenia the randomisation was also not possible in the second and third implementation rounds. Again, control schools were found but could not be randomly assigned. Furthermore, only two data points were collected for each of these implementation rounds.

In Luxembourg, no schools participated at the primary level in Round 2. In Round 3 several schools did participate, however, the sample was very small, targeted pupils on a higher educational level[18] and no randomisation was performed.

An overview of the data collection for Round 2 and Round 3 is shown in Table 15 below. Non-response bias tests were also performed (Table 16). These tests indicated that there were some significant differences between respondents and non-respondents that should be taken into consideration when interpreting the results of the analyses. There were more pupils whose parents were unemployed in the non-response

[17] In Portugal the randomisation was completely successful. In Austria, two schools were removed from the control group and added to the treatment group after the original randomised assignment. To make sure these non-random changes to the treatment and the control group do not bias our results, we will re-estimate the main specification while removing the schools that switched between treatment and control group from the sample. Moreover, as a further robustness check, we will also estimate the treatment effect using initial treatment assignment as an instrumental variable for final treatment status.

[18] Due to Luxembourg's special focus on languages, it was decided to target pupils one year older compared to other countries.

group. In addition to this, the students included in the analyses had higher levels of creativity, planning, financial responsibility and entrepreneurial behaviour, and they are more familiar with entrepreneurship as a concept[19].

	Full sample	Final sample
Austria		
- Treatment	704	444
- Control	298	115
Portugal		
- Treatment	678	515
- Control	454	356
Slovenia		
- Treatment	594	450
- Control	296	238
Luxembourg		
- Treatment	102	63
- Control	135	70
Total	**3,261**	**2,251**

* Full sample equals all pre answers, **Final sample equals all match between pre & post

Table 15: The matching process

	A2 resp matched in post	A2 resp not matched in post	diff
Creativity	3.952	3.838	-0.114***
Planning	4.245	4.135	-0.110***
Entrepreneurial behaviour	3.531	3.440	-0.090**
Empathy: Pro-social	4.306	4.247	-0.059*
Empathy: Awareness	3.969	3.952	-0.017
General self-efficacy	3.869	3.839	-0.030
School engagement	4.118	4.068	-0.050
Entrepreneurial teachers	4.012	3.972	-0.039
Financial responsibility	3.598	3.512	-0.086*
Males	0.496	0.495	-0.002
Parents' tertiary education	0.297	0.293	-0.005
Both parents unemployed	0.044	0.077	0.000***
Parents entrepreneurs	0.233	0.206	-0.027
Knowing the word entrepreneurship	0.542	0.479	-0.062**
Number of respondents	**2,251**	**3,261**	

Table 16: Non-response bias tests

[19] This indicates that many schools had started with the implementation of the programme before the pre-test was collected.

3.5. Effects of YSEC

Similar to the analysis at secondary level, difference in difference (DID) analysis was used to assess the influence of the programme. The majority of the sample was randomised, but since this was not done in all of the countries, control variables were also included in the analysis. The following control variables were used: gender (male), parents' experience with entrepreneurship (at least one of the parents is self-employed), whether the respondent is familiar with entrepreneurship (understands the concept), whether the respondent has experienced teaching aid (has received educational assistance). The analyses were clustered at class level in order to account for common error terms. In Table 17, the results of the analysis are presented.

	Creativity	Planning	Entrepreneurial behaviour	Empathy: Pro-social	Empathy: Awareness	General self-efficacy	School engagement	Entrepreneurial teachers	Financial responsibility
YSEC	-0.0250	-0.0163	0.0454	0.0751	0.0946	-0.0168	-0.0551	0.111	**0.1186***
YSEC with controls	-0.0247	-0.0219	0.0415	0.0723	0.0901	-0.0217	-0.0582	0.103	**0.1145***
lag	-0.544***	-0.509***	-0.511***	-0.472***	-0.545***	-0.445***	-0.338***	-0.460***	-0.562***
Portugal	0.0165	0.202**	0.545***	0.115	0.184	0.253**	0.258*	0.0459	0.671***
Slovenia	0.289**	0.155*	0.240***	-0.0208	0.146	0.147	-0.0765	-0.318***	.368***
Luxembourg	0.108	0.0131	0.0825	-0.0333	-0.0174	-0.00889	-0.169*	-0.244*	n/a
_cons	-0.113	-0.122*	-0.275***	-0.0837	-0.170	-0.135	-0.0255	0.0379	-0.464***
N	1722	1722	1722	1722	1722	1722	1722	1722	1589

* p<0.05, ** p<0.01, *** p<0.001

Table 17: The impact of YSEC at primary level

The results show that the difference in development between the treatment and the control group is very small. We see a positive, but not significant effect on the participants' entrepreneurial behaviour, entrepreneurial teachers and the two empathy variables "Pro-social" and "Awareness". However, a significantly positive effect can only be identified for the variable "Financial responsibility".

Nevertheless, the country variables do indicate that the results vary in the different countries. In order to assess this in more detail, the country variables were included as interactions with the programme. In Table 18, the results of this analysis are presented.

	Creativity	Planning	Entrepreneurial behaviour	Empathy: Pro-social	Empathy: Awareness	General self-efficacy	School engagement	Entrepreneurial teachers
YSEC	0.167	0.0412	**0.169***	**0.215***	0.252	0.209	0.232	**0.280*****
Portugal	0.173	0.241*	0.594***	0.264*	0.291	0.459***	0.503***	0.200***
Portugal interaction	-0.213	-0.0460	-0.0237	-0.231	-0.127	-0.298	-0.342	**-0.223***
Slovenia	0.451*	0.260*	0.415***	0.0702	0.301	0.318*	0.120	-0.188
Slovenia interaction	-0.215	-0.151	-0.247	-0.115	-0.210	-0.222	-0.251	-0.169
Luxembourg	0.334	-0.0763	0.206	0.0755	0.189	0.236	0.278	-0.0667
Luxembourg interaction	-0.359	0.224	-0.184	-0.143	-0.338	-0.377	**-0.767****	-0.269
lag	-0.725***	-0.703***	-0.561***	-0.700***	-0.695***	-0.654***	-0.503***	-0.539***
_cons	2.605***	2.819***	1.583***	2.814***	2.468***	2.227***	1.813***	2.056***
N	1722	1722	1722	1722	1722	1722	1722	1722

* p<0.05, ** p<0.01, *** p<0.001

Table 18: Country differences

The results in Table 18 show that there is some variation between the countries. The influence of YSEC becomes significant in three of the variables, which indicates that there has been an influence on these in Austria (which is used as baseline in the analysis). In addition to this, both Portugal and Luxembourg experience significantly negative interaction effects. In order to understand the country differences in more detail, separate analyses for each country were performed. In Table 19, the results of these analyses are presented.

	Creativity	Planning	Entrepreneurial behaviour	Empathy: Pro-social	Empathy: Awareness	General self-efficacy	School engagement	Entrepreneurial teachers	Financial responsibility
Austria									
YSEC	0.172	0.0374	**0.187***	**0.215***	0.275	0.222	0.230	**0.281****	0.1491
lag	-0.588***	-0.583***	-0.560***	-0.476***	-0.607***	-0.503***	-0.382**	-0.531***	-0.592***
_cons	-0.279	-0.180	-0.399***	-0.191	-0.313	-0.318**	-0.236	-0.0942	-0.500***
N	351	351	351	351	351	351	351	351	351
Portugal									
YSEC	-0.0476	-0.0127	0.149	-0.0170	0.122	-0.0868	-0.111	0.0548	**0.200***
lag	-0.530***	-0.593***	-0.554***	-0.460***	-0.522***	-0.468***	-0.321***	-0.506***	-0.574***
_cons	-0.0852	0.0730	0.237***	0.0731	0.00311	0.149*	0.255***	0.113*	0.1732**
N	550	550	550	550	550	550	550	550	550
Slovenia									
YSEC	-0.0535	-0.123	-0.0833	0.0977	0.0415	-0.0182	-0.0198	0.122	0.0345
lag	-0.514***	-0.349***	-0.482***	-0.491***	-0.537***	-0.396***	-0.340***	-0.408***	-0.5338
_cons	0.184*	0.0571	0.0491	-0.119	0.00936	0.00955	-0.126	-0.282**	-0.0418
N	688	688	688	688	688	688	688	688	688
Luxembourg									
YSEC	-0.193	**0.280****	-0.0254	0.0828	-0.0888	-0.180	-0.527	0.0101	n/a
lag	-0.603	-0.601	-0.412	-0.382	-0.479	-0.514	-0.246	-0.467	n/a
_cons	0.0700	-0.284	-0.169	-0.121	-0.0959	-0.0735	0.00884	-0.157	n/a
N	133	133	133	133	133	133	133	133	n/a

* p<0.05, ** p<0.01, *** p<0.001

i) The p-value for the variable "Financial responsibility" is 0.058

Table 5: The effects of YSEC in Portugal

The results show that the students who participate in the YSEC programme in Austria experience a significantly positive improvement in three of the variables, whereas the students in Portugal and Luxembourg only improve in a single variable. In Slovenia, there are no significant improvement in any of the variables.

3.5.1. Discussion of the results

The results of the tests indicate that the overall effect of the YSEC programme on pupils at the A2 level seems to be small. One of the reasons for this (non-)finding could be the limited explanatory power of self-assessed measures for this age group. However, based on the overall validity and the consistency of the measures, as shown by the Cronbach's α, this does not seem to be the most likely explanation. Rather the results show, that the YSEC programme at this level of education only works the way it was intended in Austria. The are many possible reasons to why this could be the case. At primary level, the YSEC structure and design was developed in parallel with the practical trial. The educational material and the teachers' training may thus need to be adjusted in order to have the intended transferability when it is implemented in other countries. Even Austria, the country from which the YSEC programme originates, demonstrated

high variation in the outcomes. So, based on the results of this practical trial, a thorough restructuring of the how the teaching material is implemented and how the teacher training is performed, ought to be considered. It might be the case that the schools need to get more experience with teaching the programme at this level and make further adjustments to meet the needs of their students and specific educational context. A final consideration is that it might also be the case that the influence of this type of educational programme only materialises at later stages for students.

4. Conclusions

In this report, the experiment design and results from a practical trial focusing on the assessment of an embedded, flexible, yet structured, entrepreneurship programme has been presented. The programme was implemented in four countries, in both primary schools and in secondary schools. The research design incorporated a randomised controlled trial (RCT), under everyday conditions with the programme having been implemented by teachers from diverse educational contexts. This type of methodology increases the external validity, since the outcomes were produced in a real-world setting and not in an artificial context. This design allowed for a rigorous evaluation of the causal effect of the programme on various entrepreneurial outcomes. Furthermore, the design of the experiment enables an analysis of longer term effects that are rarely explored in entrepreneurship education literature. The programme implementation varied in its length of implementation, which allows us to analyse the effect of programme intensity.

Results demonstrate that YSEC is an effective entrepreneurship programme at secondary level, since it influences many important variables such as entrepreneurial self-efficacy, entrepreneurial intentions and school engagement. One of the findings is that female students improve significantly more than male students in their confidence in performing competences that are typically viewed as traditional obstacles to female entrepreneurship, such as financial literacy, uncertainty management and resource marshalling. This indicates that this type of entrepreneurship programme can be effectively used to encourage female entrepreneurship.

For three out of four countries in the trial, the YSEC was a completely new programme embedded in the existing curriculum at secondary schools. It often takes time for a new programme to reach its full potential, since it is important for schools to adopt, adjust and calibrate it to their specific contexts. At primary level, YSEC was a new programme in all countries. At this level, the educational material and the teacher training had never been tested before. This may explain why the results showed that the

programme, at A2 level, only had its intended effects in Austria, which is the country where the programme was developed. Nevertheless, the positive influence that prior experience with entrepreneurship education has at secondary level points to the importance of implementing entrepreneurship education at different educational levels.

Assessing the efficiency of the entrepreneurship programme was one of the goals of this trial. At secondary level, three different versions of the programme were implemented. These three versions were: 1) the intensive programme, which is limited in scope, and has a strong focus on entrepreneurial core competences and attitudes, 2) the extensive programme, which has the same challenges as the intensive version, as well as two extensive challenges with a focus on civic education, and 3) the extended programme, which has a similar structure as the extensive version, but which was offered to students over two school years. Results showed that the most effective programme was the intensive version. This result is somewhat surprising, since the intensive version of the programme is also the version with the least amount of hours. However, as the qualitative research indicated, many teachers have trouble finding space in the curriculum for programmes that contained many hours. Since the extensive version includes two extensive challenges with less focus on core entrepreneurial competences, it might actually be the case that the students who participated in the intensive version received more hours of education dedicated to entrepreneurship. The results demonstrated that there were country differences regarding these effects, which indicates that the school preparedness has an influence on the effectiveness of the different versions. In order to further our knowledge concerning these outcomes, it would have been necessary to apply more process-oriented evaluation tools that capture the actual activities of the students.

Overall, the results demonstrate that a limited entrepreneurial programme can be embedded in the regular curriculum and effectively foster entrepreneurial self-efficacy, entrepreneurial intentions as well as school engagement at secondary level of education. The majority of the schools included in the project had limited experience with this type of programme, so it can be anticipated that the effectiveness of the programme will increase once it is more established and adapted to the schools' specific contexts. The strength of the YSEC design is its flexibility, which allows it to be implemented in many different topics by many different teachers, in combination with its structured teaching and education material. The results of this practical trial demonstrate that a programme broadly embedded in the curricula can foster entrepreneurship effectively with limited resources.

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APPENDIX

	Cronbach's Alpha B1	N	Cronbach's Alpha B2	N
Uncertainty	0,74	3,482	0,76	1,499
Finance	0,82	3,482	0,83	1,499
Creativity	0,87	3,482	0,88	1,499
Planning	0,85	3,482	0,85	1,499
Resource marshalling	0,85	3,482	0,85	1,499
Venture creation	0,87	3,482	0,90	1,499
Business skills	0,88	3,482	0,94	1,499
Enterprising skills	0,88	3,482	0,90	1,499
Intentions	0,89	3,482	0,91	1,499
Attitudes	0,87	3,482	0,86	1,499
Intrinsic motivation	0,79	3,482	0,78	1,499
School engagement	0,72	3,482	0,73	1,499
Entrepreneurial teachers	0,79	3,443	0,83	1,441

Table 3: Cronbach's Alpha tests of the constructs, based on baseline responses

	B1 respondents matched in post	B1 respondents not matched in post	diff
Uncertainty	4.325	4.372	0.047
Finance	4.210	4.261	0.051
Creativity	4.878	4.890	0.013
Planning	4.566	4.596	0.030
Resource marshalling	4.903	4.945	0.042
Teamwork	5.333	5.307	-0.026
Venture creation	4.080	4.091	0.011
Focus on Business skills	3.733	3.943	0.210***
Focus on Enterprising skills	4.678	4.550	-0.129***
Entrepreneurial intentions	3.590	3.729	0.139***
Innovative employee	5.098	5.083	-0.015
Entrepreneurial attitudes	5.062	5.050	-0.011
Intrinsic motivation	4.282	4.157	-0.125***
School engagement	4.857	4.690	-0.167***
Males	0.405	0.461	0.056***
Other language	0.409	0.421	0.012
Parents tertiary education	0.496	0.515	0.019
Both parents unemployed	0.030	0.036	0.006
Parents entrepreneurs	0.332	0342	0.010
Perceived low income	0.122	0.130	0.008
Perceived good student	0.289	0.258	-0.031
Enterprising activities	0.118	0.111	-0.008
Experience with entrepreneurship education	0.183	0.210	0.028**
Experience with social entrepreneurship education	0.030	0.245	-0.005
Number of respondents	**3,478**	**5,056**	
Entrepreneurial teachers	4.517	4.336	-0.181
Number of respondents	**1,403**	**2,040**	**3,443**

Table 5: Non-response bias tests

	Control	YSEC	Difference
Uncertainty	4.331	4.324	-0.007
Finance	4.224	4.207	-0.016
Creativity	4.875	4.875	0.000
Planning	4.537	4.591	.054
Resource marshalling	4.897	4.896	-0.001
Teamwork	4.257	4.284	0.027
Venture creation	4.066	4.081	0.015
Focus on Business skills	3.789	3.706	-0.083
Focus on Enterprising skills	4.691	4.641	-0.049
Entrepreneurial intentions	3.529	3.626	0.097
Innovative employee	5.041	5.118	0.077
Entrepreneurial attitudes	5.022	5.061	0.039
Intrinsic motivation	4.257	4.284	0.027
School engagement	4.767	4.898	0.131**
Males	.4305	.3813	-0.0493**
Other language	.4344	.3915	-0.0429*
Parents tertiary education	.4916	.5015	0.0099
Both parents unemployed	.033	.0282	0.0048
Parents entrepreneurs	.3422	.3249	0.0173
Perceived low income	.1199	.1226	-0.0027
Perceived good student	.3065	.2768	-0.0297
Enterprising activities	.1206	.1148	0.0058
Experience with entrepreneurship education	.1199	.1386	0.0187
Experience with social entrepreneurship education	.0245	.0384	0.0139*
Number of respondents	**1,426**	**2,056**	**3,482**
Entrepreneurial teachers	4.492	4.506	0.0142
Number of respondents	**1,403**	**2,040**	**3,443**

Tabel 6: Initial differences between students in the control group and students receiving YSEC

	Uncertainty	Finance	Creativity	Planning	Resource Marshalling	Teamwork	Venture creation	Intentions	Innovative employee	Attitudes	Business skills	Enterprising skills	Intrinsic motivation	School engagement	Entrepreneurial teachers
YSEC (No controls)	**0.0948***	0.0706	0.0544	**0.0801***	0.0466	0.0636	**0.0995****	**0.0848***	0.0452	0.0561	**0.160****	**0.106****	0.0636	**0.118****	**.0867***
lag	-0.499***	-0.519***	-0.517***	-0.554***	-0.521***	-0.516***	-0.526***	-0.483***	-0.553***	-0.517***	-0.498***	-0.540***	-0.516***	-0.451***	-.5888***
_cons	-0.0601*	-0.0548	-0.0219	-0.0488	-0.0293	-0.0323	-0.0636*	-0.0624*	-0.0141	-0.0337	-0.0597	-0.0494	-0.0323	-0.0630	-.0285
YSEC (Controls)	**0.110****	**0.0938***	0.0597	**0.0884***	0.0579	0.0580	**0.106****	**0.0869***	0.0537	0.0628	**0.164****	**0.107****	0.0580	**0.128****	**.0864***
Austria	0.195***	0.198***	0.244***	0.159**	0.390***	-0.0970	0.131*	0.0565	0.227***	0.153**	0.363***	0.188**	-0.0970	0.0027	.1798**
Slovenia	0.0227	-0.0168	0.00936	-0.0158	0.0572	-0.0904	0.0151	-0.0401	-0.0220	0.0259	-0.150	-0.103	-0.0904	-0.293***	-.1889**
Luxembourg	0.0453	0.126*	-0.0431	-0.0063	0.0298	-0.125*	-0.0490	-0.119	0.0165	-0.0522	0.0018	-0.0564	-0.125*	0.0144	-.0721
Male	0.100**	0.151***	0.0314	0.0052	0.00175	0.0550	0.148***	0.165***	0.0236	0.0863*	-0.0623	-0.0893**	0.0550	-0.0427	-.0861**
Other language	-0.0385	0.00526	0.0273	0.000478	-0.0247	0.0428	0.00279	0.00848	-0.00406	0.0452	0.0884*	0.0470	0.0428	-0.0072	.0295
Parents tertiary edu	0.105**	-0.0002	0.0307	0.0677*	0.0249	0.0268	0.0173	0.0011	0.0297	0.0062	-0.0255	0.0108	0.0268	0.0461	.0327
Parents unemployed	-0.138	-0.0736	-0.289**	-0.114	-0.0822	0.0397	0.0882	0.167*	-0.0317	0.0779	0.169	0.140	0.0397	0.0107	.1419*
Parents entrepreneurs	0.0501	0.0809*	0.0341	0.0835**	0.0708*	0.0387	0.0836*	0.110***	0.0569	0.0922**	0.0618	0.0508	0.0387	0.0089	.0516
Low income	0.0604	0.0676	0.103*	0.0237	0.0339	0.00987	0.0168	0.0374	0.0342	0.0121	0.0801	0.0265	0.0099	-0.0009	.0582
Good student	0.150***	0.0260	0.107***	0.192***	0.0863**	0.113***	0.0524	-0.0685*	0.111**	0.0213	-0.0405	0.0230	0.113***	0.132***	-.0134
Enterprising	0.0986*	0.0913	0.129**	0.0263	0.0453	0.0943	0.0969*	0.232***	0.0946*	0.102*	-0.0252	-0.00336	0.0943	0.0229	.0234
Experience with EE	0.0371	0.147**	0.174***	0.211***	0.160***	0.194***	0.177***	0.114*	0.190***	0.0769	0.328***	0.111*	0.194***	0.0966	.1145*
lag	-0.539***	-0.548***	-0.533***	-0.580***	-0.555***	-0.530***	-0.549***	-0.512***	-0.561***	-0.527***	-0.545***	-0.542***	-0.530***	-0.494***	-.5822***
_cons	-0.274***	-0.256***	-0.187***	-0.229***	-0.202***	-0.110*	-0.237***	-0.184***	-0.171***	-0.180***	-0.159*	-0.0878	-0.110*	-0.0744	-.0485
N	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3482	3442

* p<0.05, ** p<0.01, *** p<0.001

Table 7: The influence of the YSEC programme on first year students, both with and without control variables

	Control_pure	Control_special	Difference Pre Year 2	Difference DID Year 2
Uncertainty	4.430	4.405	-0.025	-.034
Finance	4.244	4.295	0.051	-.005
Creativity	4.799	4.967	0.168*	-.048
Planning	4.662	4.822	0.160*	.024
Resource marshalling	4.950	4.994	0.044	-.034
Teamwork	4.289	4.473	0.184*	-.035
Venture creation	4.089	4.149	0.060	.064
Focus on Business skills	3.373	3.807	0.434***	-.004
Focus on Enterprising skills	4.371	4.697	0.326***	-.013
Entrepreneurial intentions	3.523	3.734	0.211*	.109
Innovative employee	5.019	5.255	0.235**	.034
Entrepreneurial attitudes	4.933	5.059	0.126	-.035
Intrinsic motivation	4.289	4.473	0.184*	-.035
School engagement	4.937	5.080	0.143	.005
Males	.376	.332	.044	-
Other language	.415	.255	.160***	-
Parents tertiary education	.458	.523	.065*	-
Both parents unemployed	.023	.043	.020	-
Parents entrepreneurs	.293	.341	.048	-
Perceived low income	.122	.134	.012	-
Perceived good student	.278	.263	.015	-
Enterprising activities	.125	.112	.013	-
Number of respondents	**655**	**419**	**1074**	**1074**
Entrepreneurial teachers	4.308	4.547	.238**	-.019
Number of respondents	**640**	**417**	**1057**	**1057**

Table 10: Differences between the pure control group and students who have experienced YSEC during year 1

	Uncertainty	Finance	Creativity	Planning	Resource Marshalling	Teamwork	Venture creation	Intentions	Innovative employee	Attitudes	Business skills	Enterprising skills	Intrinsic motivation	School engagement	Entrepreneurial teachers
YSEC Extended (No controls)	**0.117***	**0.187****	0.010	0.104	**0.128***	-0.0293	-0.0142	-0.0062	-0.0144	-0.0266	0.145	**0.141***	-0.0293	0.0163	0.1122
lag	-0.512***	-0.577***	-0.524***	-0.496***	-0.490***	-0.494***	-0.525***	-0.472***	-0.548***	-0.406***	-0.445***	-0.545***	-0.494***	-0.441***	-0.537***
_cons	-0.0227	-0.020	-0.0265	-0.0315	-0.0335	-0.0047	0.0152	0.0306	-0.0251	0.0142	-0.118**	-0.0715	-0.0047	-0.0209	-0.0812*
YSEC Extended (Controls)	0.0811	0.128	0.0041	0.0545	0.0688	-0.0407	-0.0292	0.0069	-0.0575	-0.0703	0.170	0.0997	-0.0407	-0.0325	
Austria	0.173*	0.176*	0.0773	0.236**	0.387***	-0.0995	0.153*	-0.0516	0.230**	0.0336	0.306**	0.115	-0.0995	0.0371	
Slovenia	0.0429	-0.0297	-0.116	-0.0522	0.0082	-0.0875	-0.127	-0.125	-0.0228	-0.0433	-0.344***	-0.0657	-0.0875	-0.0612	
Luxembourg	0.0576	0.199	0.0101	0.0744	0.126	-0.0192	0.0205	-0.0398	0.0728	0.10	0.0017	0.143	-0.0192	0.130	
Male	0.145**	0.109*	0.159**	0.0602	0.0298	0.0443	0.166***	0.175***	0.0581	0.0636	0.114*	0.0248	0.0443	0.004	
Other language	-0.0613	-0.0619	-0.0046	0.0004	-0.0260	0.0272	0.005	0.0124	0.0002	0.05	-0.0041	-0.0057	0.0272	-0.0305	
Parents tertiary edu	-0.0059	-0.0001	-0.0093	-0.0256	-0.0252	-0.0185	0.0205	0.0694	-0.0251	0.0402	-0.0941*	-0.0843	-0.0185	-0.0323	
Parents unemployed	0.141	-0.148	-0.0515	0.173	0.0803	0.0478	-0.0801	-0.183	0.0395	-0.0409	-0.0201	0.111	0.0478	0.05	
Parents entrepreneurs	0.0902	0.0444	0.0733	0.0589	0.116*	-0.0612	0.109*	0.0883	0.0359	0.123**	0.0778	0.0508	-0.0612	0.0084	
Low income	-0.125	-0.0139	0.0032	-0.163*	-0.170	-0.0956	-0.0319	-0.0055	-0.126	-0.0475	-0.0569	-0.192*	-0.0956	-0.159	
Good student	0.237***	0.120*	0.117*	0.192***	0.127*	0.155**	0.0906	0.005	0.120*	0.0877	-0.0065	0.0293	0.155**	0.201**	
Enterprising	0.0897	0.0781	-0.0049	0.0535	0.0603	-0.0223	0.0552	0.0173	0.009	-0.00128	0.0202	0.0302	-0.0223	-0.147*	
lag	-0.541***	-0.596***	-0.535***	-0.519***	-0.525***	-0.506***	-0.539***	-0.488***	-0.559***	-0.410***	-0.538***	-0.558***	-0.506***	-0.468***	
_cons	-0.189***	-0.130*	-0.126*	-0.146*	-0.172**	0.0086	-0.125*	-0.0579	-0.113*	-0.105*	-0.140*	-0.0655	0.0086	-0.0183	
N	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	

* p<0.05, ** p<0.01, *** p<0.001

Table 11: The influence of the extended version of YSEC on 2nd year students