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## Entrepreneurship Education: Creating A Positive Adrenaline

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# ENTREPRENEURSHIP EDUCATION: CREATING A POSITIVE ADRENALINE

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## **ABSTRACT**

A method to develop Entrepreneurship Education in any regular Engineering course is presented. The method is based in a team of students working on the description of the idea for the development of a real start-up using a structured approach trained by a business advisor and by the teacher. The team analyses the problem, the potential market, the solution, the development and the financing challenges of the start-up. The team works the Case development along an Engineering Course related with the technology of the start-up. The dedication of each student to the Case development is 25 hours, working along the different phases of the analysis and synthesis, mentored by the business advisor and the teacher. The added value of the experience is based on: first, the preparation and development of a 1 hour interview of the student team with one of the founders of the company, usually the CEO; second, a weekly validation of the technological value proposition with the business advisor, as part of the analysis. Along with the interview, the student team will consolidate their findings and debate with the CEO about their own ideas, being a process full of positive adrenaline and creating a very significant engagement along the whole course. The approach has been tested in two academic years, working 4 cases with the collaboration of 4 start-ups of EIT InnoEnergy. The results of the student surveys demonstrate the validity and engagement level of the approach.

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## **1 INTRODUCTION**

### **1.1 The objective that is addressed**

This paper is aligned with the objectives of the European Institute of Innovation & Technology ([EIT](#)), a body of the European Union, and the ambition to create a positive impact for our society. An extract of the EIT Vision: "...is to become the leading European initiative that empowers innovators and entrepreneurs to develop world-class solutions to societal challenges and creates growth and skilled jobs."

The paper is focused on developing a new method for entrepreneurship education, capable of generating more and better impact in the creation of start-ups, even in the short term. The new method that is presented here has been developed because of the opportunities generated by the collaboration of the authors and EIT InnoEnergy, an alliance that incorporated companies, start-ups, universities, research centres, business schools, business advisors and more stakeholders.

### **1.2 The context for the development**

The topic of entrepreneurship education has attracted a lot of attention and has generated significant contributions in recent years. A fundamental view about the nature of entrepreneurship and the skills of an entrepreneur is stated by (Gartner

1988): an entrepreneur is characterised for creating organisations. A comprehensive review of methods and approaches in entrepreneurship education is given in (Gartner and Vesper 1994). The “standard” course includes elements such as business model writing, speakers, readings and cases. All in all, offering basic tools and a number of practical experiences to create background and developing skills. Frequently, judging panels including outside professionals assess the work of the students.

(Liñán and Fayolle 2015) deals with a key factor recently identified in entrepreneurship education: entrepreneurial intention. The research highlights five factors: the model, the influence of personal variables, entrepreneurship education, the context, the entrepreneurial process and the intention. (Kirby 2004) states about the relevance of educating “for” entrepreneurship, instead of educating “about” entrepreneurship, the ultimate goal is to focus on student centered approaches.

When talking about student centered methods, a fundamental work to be considered is (Dewey 1986). The essence of the proposal is to use direct experience as the fundamental engaging approach in education.

A relevant contribution on the student centered approach applied to entrepreneurship education is (Robinson, Neergaard, Tanggaard and Krueger 2016). This paper, based on an ethnographic approach, focuses on the pre-foundation phase, as original when compared with the typical approach analysing the post-foundation phase.

The method presented in this paper integrates the different approaches in the literature listed above with the specific opportunities of the EIT InnoEnergy alliance.

## **2 METHODOLOGY**

### **2.1 Description of the method**

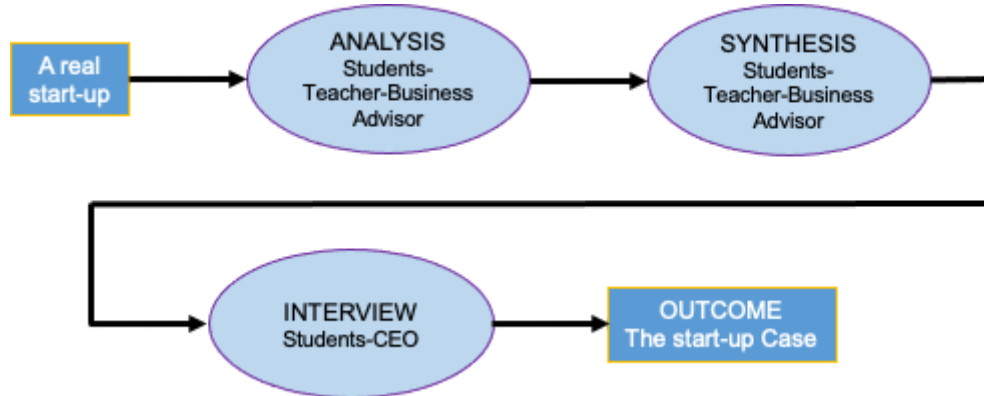
The method presented in this paper incorporates some fundamental principles identified in previous research and own contributions:

1. The capacity of the students to become entrepreneurs (create an organisation) after the experience in the course.
2. The course should work on basic topics like the analysis and synthesis of a business model and similar tools.
3. Outside professionals will add a relevant perspective in the course.
4. Entrepreneurial intention of the students should be fostered.
5. The method should be oriented to action (student centered education) rather than to entrepreneurial theory.
6. The method should include the pre-foundation and the post-foundation analysis of an entrepreneurial idea.

Taking into account the previous 6 principles, the analysis of the actors that participate in the experience follows:

- The Students. MSc students, with a technical background and fundamental skills already developed during the Bachelor and during the previous courses.
- The Teacher. Specialised in the topic of the MSc programme and with experience in Entrepreneurship Education, both from the theoretical side and the performance side (knowledgeable about start-up cases).
- The Business Advisor. An outside professional that complements the knowledge by the Teacher, providing a deep contextualization about the business aspects.
- The Start-up. A real start-up participates in the assignment.

In summary, the assignment for the students is built around the analysis of the pre-foundation and the synthesis or development (post-foundation) of a real start-up. Everything working in a team and in collaboration with the teacher and the business advisor, in a professional way. The synthesis of the start-up case is elaborated by the students, with proposals about the start-up development. An interview of the students with the start-up CEO (or other C-level positions) is arranged in such a way that a consolidation of the case is made. A final elaboration of the start-up case is done by the students consolidating their findings after the interaction with the CEO during the interview. The assignment is described in the flow diagram of Figure 1.



*Fig. 1. Flow diagram of the assignment.*

The explanation of the interactions among the actors is graphically shown in Figure 2. The teacher and the business advisor interact 3 times with the start-up: first, before starting the semester, for the global preparation of the assignment; second, for the preparation of the interview students-CEO and, third, for a post semester wrap up.

The students interact once per week with the business advisor and the teacher presenting their current work, with a later debate. The students interact additionally once per week with the teacher, for clearing technological concepts. The students have only one interaction with the start-up, for the interview with the CEO.

Finally, the teacher and the business advisor run mutual interactions before the semester (preparation), during the semester (execution) and after the semester (wrap up).

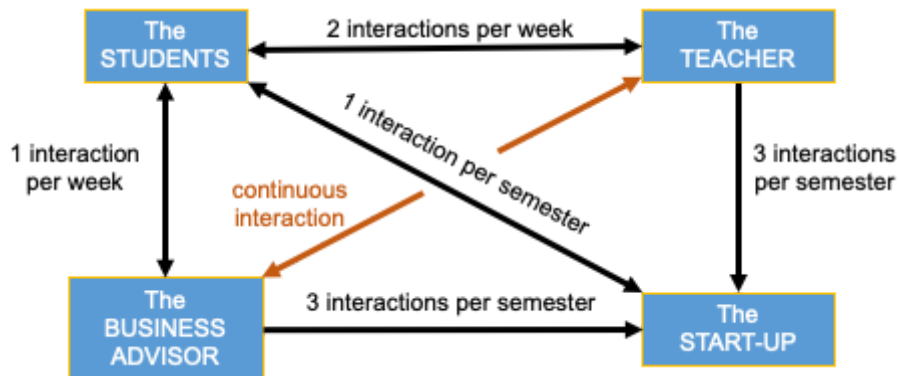


Fig. 2. The interactions among the actors in the assignment.

The content of the assignment is shown in a block diagram format in Figure 3.

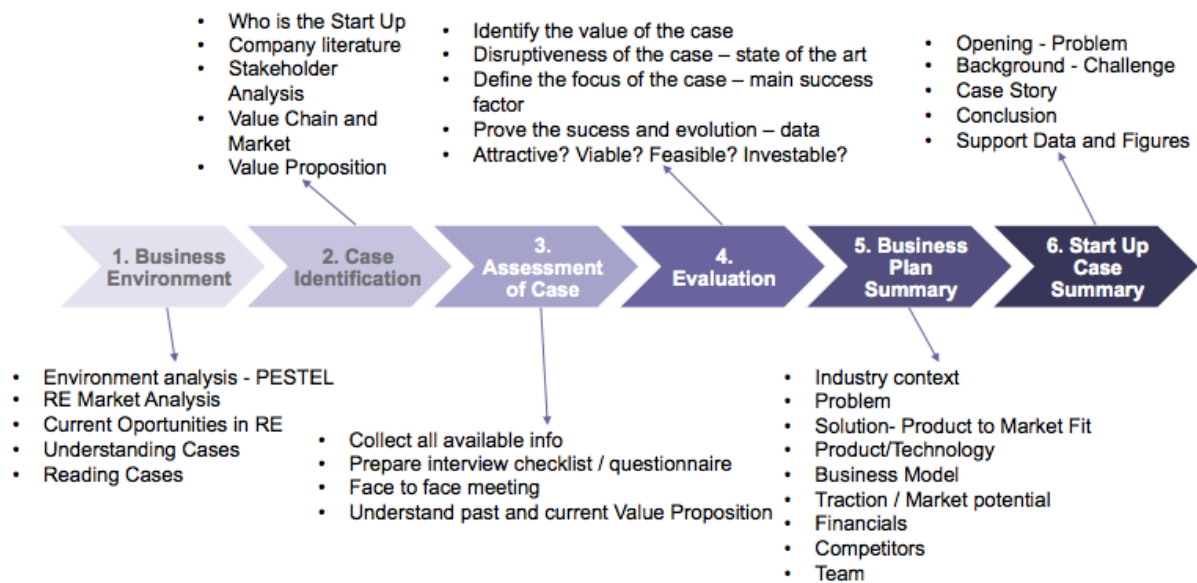


Fig. 3. Block diagram of the assignment content.

The block diagram shows the 6 steps for making feasible that all the objectives of the assignment are completed:

1. Business Environment: pre-development of the start-up, analysing the context.
2. Case Identification. This step is also part of the pre-development. The students work in detail on the value proposition of the start-up.
3. Assessment of Case. Progress in the analysis of the start-up and preparation of the interview with the CEO.

4. Evaluation. Completing the analysis of the start-up and running the interview with the CEO.
5. Business Plan Summary. After the interview with the CEO, the business plan of the start-up looks clear.
6. Case summary. Wrapping-up all the analysis and synthesis of the assignment.

The 6 steps along with the bullet points in Figure 3 constitute a checklist of all the points to be worked in the analysis.

## 2.2 Implementation

The method has been implemented in [MSc RENE](#) (Master's in Renewable Energy), one of the programmes of the [EIT InnoEnergy](#) Master School. This programme is awarded with the EIT Label, under the quality seal of the EIT Quality Assurance and Learning Enhancement ([EIT QALE](#)). The University is [UPC-BarcelonaTech](#), under the umbrella of the [Master's degree in Energy Engineering](#), accredited in Spain by the [Ministry of Education's degree register](#).

The course where the method is applied is "[Renewable Energy Technology](#)", a mandatory course in the semester 1 of the programme. This course is planned for a duration of 1 semester and a student load of 5 ECTS, equivalent to 125 hours of work per student. The method is implemented as the only assignment of the course for the student team. For making the load of the assignment proportional to the size of the course, a load of 25 hours per student has been chosen. Subsequently, the number of students in the team is designed to have a significant capacity to run the analysis and synthesis of the start-up case. The optimal number of students in the team is 4-6, since then an amount of 100-150 hours is available globally. The design of the method based in student teams shows different benefits:

- The amount of work available to generate significant results is matching the needs of the intended analysis.
- The work of the students in teams makes possible to improve the skills related with team building.
- Particularly, a number of even students in the team is preferred, since it forces the decision making by agreement instead of by voting, which is considered an additional benefit of the team building training.

The first week of the course, the business advisor and the teacher run a kick-off session, explaining how the assignment is organised and key topics about the analysis and synthesis of a start-up, such as success factors of start-ups, a short description of the start-up and some tools to analyse energy market scenarios.

From this point on, the student team runs the different phases of the process depicted in Figure 3 with the continuous mentoring of the teacher. One presentation per week is done by the student team.

The key moment during the assignment is the interview with the start-up CEO. The interview is led by the student team that has made a previous preparation with the business advisor and the teacher, who are also present during the interview.



The grading for 80% of the course is done by the teacher consulting the opinion of the business advisor. Every phase of the assignment is graded: weekly presentations, preparation of the CEO interview, CEO interview, case report. At the end of the course, a peer evaluation is done, asking all the students to grade their colleagues and themselves. This mark weighs 20 % of the final grade. This grading method is motivating in the sense that keeps the student team concentrated in performing very well with the start-up case assignment.

### **3 RESULTS**

#### **3.1 Assignments done so far**

The teacher and the business advisor have collaborated with EIT InnoEnergy in identifying start-ups in their portfolio that are thematically interesting for the scope of the course where the assignment is done and also attractive for the students.

The attractiveness for the students has been chosen because of addressing an interesting technology in the field of renewable energy and because of having a high level of innovation (architectural innovation, disruptive innovation or radical innovation). See (Christensen 2013).

An initial pilot with only one company was held in the autumn semester of academic year 2021-22 with [Flexidao](#). The interview was conducted with Joan Collell, CGO, and Emanuele Rossi, Innovation and Product Manager. Flexidao has invented a renewable energy monitoring software. Four students participated in this assignment.

After the success of the pilot, 3 more cases were run in the autumn semester of academic year 2022-23. The companies and the number of students were:

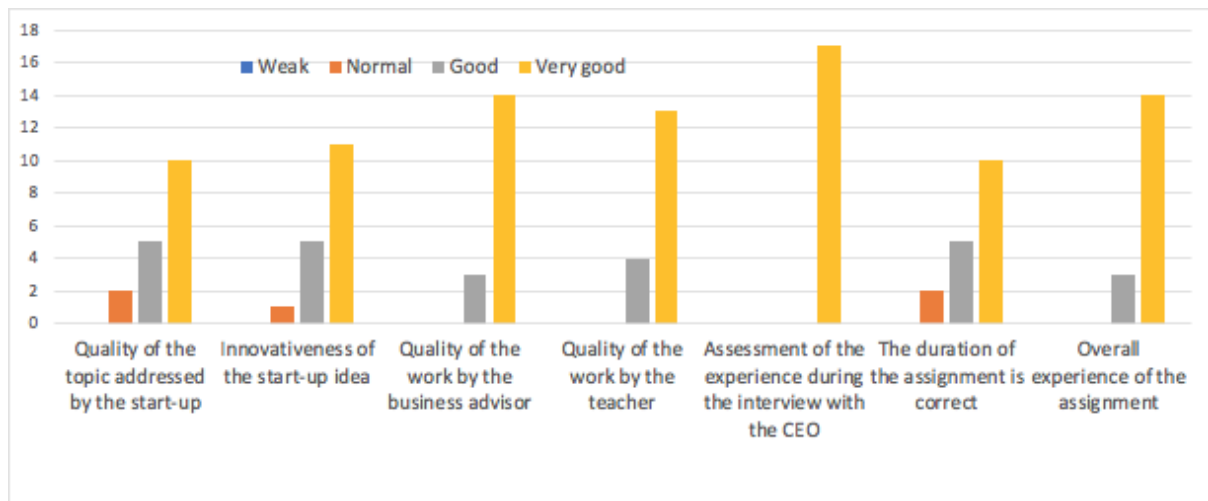
- [BeePlanet](#), a second life for EV batteries in renewable energy facilities. Four students worked on this case. Jon Asin, CEO, participated in the interview.
- [Ezzing](#), optimises the whole value chain of stakeholders in solar PV installations. Five students worked on this case. Víctor Sancho, CEO, and Blanca Cidoncha, Head of Business Development, participated in the interview.
- [X1Wind](#), has patented and developed a disruptive floating wind system for offshore wind turbines. Four students worked on this case. Alex Raventós, CEO, participated in the interview.

#### **3.2 Results of the student surveys**

Globally, 17 students have participated in the 4 editions of the start-up case assignment. They are coming from 10 countries in 4 continents. This means a variety of perspectives in the class. Table 1 shows a summary of the answers in the student surveys, designed to assess if the new method to develop entrepreneurship education presented in this paper is valuable.

Qualitatively, the results show the high level of engagement of the students with the method: professional experience with the business advisor and the start-up CEO, acquiring knowledge contextualised with business, knowing the essentials to become entrepreneurs, practising soft skills in team building and communication. Definitely, the experience of the interview with the CEO shows the best results and it was additionally identified as the key element of the method when the students were informally asked in the lecture room if running the method without such an interview could be equally valuable. The answer was clear: definitely, not. This is the “positive adrenaline”.

Table 1. Summary of the student surveys answers



#### 4 CONCLUSIONS AND ACKNOWLEDGMENTS

A new method to develop entrepreneurship education in a student centered approach has been presented. The method is valid for any course in an engineering master and also facilitates the development of soft skills by the students.

The combination of the work of the teacher and a business advisor has proven to be very effective to create a strong engagement with the student teams. The business advisor shows a relevant level of empowerment, because of the practical experience in developing businesses.

The idea of co-working the analysis and synthesis of a real start-up case among the student team, the teacher and the business advisor is certainly strong. And, very specially, the level of “positive adrenaline” created because of the milestone defined by the interview with the start-up CEO is really high. Quantitatively and qualitatively, the students agree on how differential and engaging this experience is (surveys in Table 1).

The duration of the assignment is 25 hours per student and the work in a team makes feasible to get relevant results and is positively assessed by the students.

The method has the potential to be extended as an assignment in many engineering courses: the key point is in collaborating with a business advisor and with a start-up. Certainly this is an external element to the teacher and may be a limitation for the applicability.

#### Acknowledgements

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