

# STUDENT AGENCY - A DIFFERENT PARADIGM FOR LEARNING

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## ABSTRACT

Sustainability transitions are not hindered by technological barriers but above all by the lack of well-qualified people. Educating the next generation of engineers and product designers is therefore more important than ever. However, a traditional widely used model of instruction and evaluation is not sufficient to prepare this next generation for the demands of society. It is appropriate that curricula should be adapted. If necessary, in a disruptive way. The question was how to develop an education module in which students are agents in their learning. In which students decide what and how they will learn, and in which they can prepare for a role in society that is in shock. To propel them in a new direction a disruptive education innovation has been designed and tested. This new method turns the traditional education model upside down. Students and lecturers are transformed in equal partners in an innovation consultancy firm with a passion for engineering, product design, and with a focus on sustainability transition. Students explore their emotionally intrinsic values that enables them to accomplish great things, to experience meaning in their lives and work, and leads to a significant learning experience.

Purpose of this paper is to give individuals and organisations involved in higher education insight into a new method of education based on new values such as student agency, equal partnership, partnership learning communities, significant learning experience, and the strong belief students have the capacity and the willingness to positively influence their own lives and environment.

*Keywords: Education innovation, student agency, equal partnership, co-agency, significant learning experience*

## 1 INTRODUCTION

This study describes the unfolding of a particular case within a real-world context namely a disruptive education (service) innovation at Department of Engineering at Technical Faculty of Amsterdam University of Applied Sciences (The Netherlands). During their graduating year EPD students can participate in a future excellent programme (10ECTS). In the three years prior to the graduation year, they literally ‘followed’ the educational programme. It was high time to design a module that would give the students the opportunity to take the initiative themselves, to choose their own direction, to be responsible for the programme, the results and, above all, to discover where their possibilities are. The next generation of engineers are of paramount importance in finding solutions to problems and designing sustainable and responsible innovations shaped as much by environmental, social, and economic measures, as enabled by technology [1]. It is our duty to prepare them as well as possible for reality in society and thus the grand challenges facing people and nature. Over the past decade, there has been increasing attention to the need to adapt the education system to the demands of the increasingly complex and rapidly changing world [1] [2] [3]. The climate catastrophe and the exhaustion of the earth are two life-threatening problems for humanity. Global co-habitation is at risk because in the context of ecological systems, coexistence between humans and between humans and nature is under constant pressure. To propel students and lecturers in a new direction a disruptive education innovation has been designed and tested. The idea is quite simple: students and lecturers are transformed in equal partners in an innovation consultancy firm with a passion for engineering and product design, and with a focus on sustainability transition. Students can explore their emotionally intrinsic values that enables them to

accomplish great things and to experience meaning in their lives and work. A module in which students feel respected, appreciated, and acknowledged.

It turns the traditional education model upside down and leads to a significant learning experience for students as well as lecturers.

## **2 THE ORIGIN OF THE METHOD**

At the end of their study Business Engineering, students could choose from three specializations namely *Process Optimization*, *Business Development*, and *Innovation Management*. Egbert-Jan van Dijck, the first author, was responsible for the development of the curriculum as coordinator of the specialization *Innovation Management*. It was his idea to let the students go through their own transition in the run-up to their graduation research. The new method was conceived and developed by the first author and further tested together with Maarten Meijer, the second author, in a new module *Innovation Design* as part of the study Industrial Design Engineering (IDE).

Inspired by publications on *student agency*, *equal partnership*, *co-agency* [1] [2], and *significant learning experiences* [4] this education innovation has come about. These new concepts turned out to be an excellent fit for previous work experience as a partner of an innovation agency.

Having and maintaining the right of organisations to exist requires adapting to the ever-changing world. In the period in which economic growth, market share, (economic) profit maximization was key, the emphasis within organisational innovation was on product- and process innovation. But in recent decades, the emphasis has increasingly shifted to sustainable or responsible innovation, and transformative innovation. When it comes to sustainability transitions, then there is even talk of system innovation at meso-level. Thus, it is important to be able to switch between the big picture (world and society) and the details (organisations, and their products and services) and back and forward.

### **2.1 Objective**

The main goal of this education innovation was to develop an education module for students and lecturers in which students are agents in their learning. To decide what and how they will learn, and in which students can prepare for a role in society that is in shock. Every technical solution/design comes about in an increasingly complex and rapidly changing world. To come to a good solution as an engineer, students must be able to observe, interpret and include that changing environment in their solution/design. Otherwise, they will not create the solutions but the problems of tomorrow. They must learn to anticipate a changing world in which they increasingly have to consider the possible impact of their solution/design/innovation on other people and nature. Innovation in general is a process that can be carried out most successfully by a diversified cross-functional team. In all respects, the more diverse the better. It is therefore students from different specializations participate in this module. Thus, the module is open to students from other educational programmes within Engineering. This course builds within the specialization Industrial Design Engineering (*IDE*) on the courses *Value proposition design (VPD)* and *Product and Business (PB)*, but it is also accessible for students without this prior knowledge. The following chapters describe the unfolding of the education innovation in the *Innovation Design* course by merging the concepts of *Innovation management* with *product Design*.

## **3 THE NEW METHOD WITHIN THE ‘INNOVATION DESIGN’ COURSE**

Through the six years the module has existed it has changed from ‘Innovation Management’, a specialization as part of Business Engineering, to ‘Innovation Design’ as part of the study Industrial Design Engineering. All the years we have kept the focus on student agency. The name of the course changed in 2019 after an organisational change has been implemented within the department Engineering.

### **3.1 From Problem in Context (I) to Expected Outcome (O)**

The new method is the result of a design science research. The design propositions used follow the CIMO logic [5]. Due to the limitations of the scope of this article, it is not possible to write out the different design propositions. For this reason, an overview was chosen in which the (Problem in) context (C), the generic intervention (I), the generative mechanisms (M) and the expected outcome (O) are shown at three different levels. In the opinion of the authors, the newly developed method is an intervention that is both an appropriate solution to problem of the university (C2) and students (C3).

The generative mechanisms are obviously different for the university and the students. The desired outcomes are entirely in line for the university and the students (O). After all, the university wants to offer an education that successfully educates students to become the new generations who can create the future. The following is the description following the CIMO-logic per level:

- **Society level:** Sustainability transitions are hindered by the lack of well-qualified people (C1). Education needs to be adapted to provide well-qualified people now and, in the future (I1). Society stimulates higher education to ensure well-qualified professionals and the contribute to the betterment of a dynamic society through practice-based research and innovation (M1). Society will become more sustainable, and the world will be a better place for all human and non-human elements (O1).
- **University level:** Traditional widely used model of instruction and evaluation (Figure 1) is not sufficient to prepare the next generation engineers for the demands of society (C2). To develop an education module for students and lecturers in which students are agents in their learning, in which they can prepare for a role in society that is in shock (I2). Students and lecturers show greater motivation to work as co-agents and learn from each other (M2). A new educational student centric model (Figure 2) based on intergenerational cooperation (students and lecturers) is established to ensure a good alignment of interests, and the demands of an increasingly complex and rapidly changing world (O2).



Figure 1. Traditional Educational Model

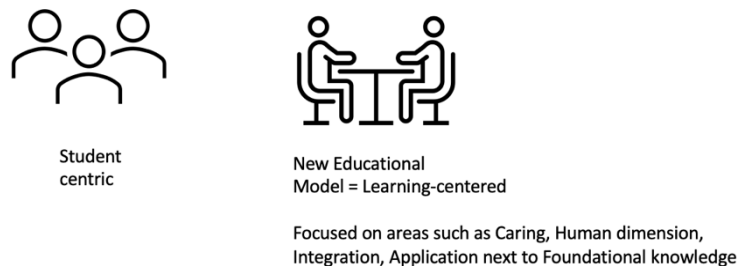


Figure 2. New Educational Model

- **Student level:** Students literally must ‘follow’ the educational programme, they are not empowered to play an active role in deciding what and how they will learn (C3). To develop an education module for students and lecturers in which students are agents in their learning, in which they can prepare for a role in society that is in shock (I3). Students tend to show greater motivation to learn and are more likely to define own objectives for their learning (M3). Students explore their emotionally intrinsic values, feel respected, appreciated, and acknowledged (M4). Students experience to a large extent the sense of responsibility (M5). Students have learned how to learn (O3). Authenticity of the students has been developed. They do things because they want to do them and not because it's expected of them (O4). They experienced how to orientate themselves on the major challenges facing the world and are more aware of the role they want to play (O5).

## 4 RESULTS

The innovation consultancy firm takes the form of a matrix organisation with expert teams and cross-functional project teams. Students and lecturers act as equal partners, and where possible as an expert and coach. In this paper, students/partners are referred to as students for the good understanding. Students first orientate themselves on the various societal challenges which have been appointed by the Dutch government [6]. These societal challenges are linked with the business community and knowledge institutions. This has resulted in 25 concrete Missions for the Future within four themes, namely (1) *Energy Transition and Sustainability*, (2) *Agriculture Water Food*, (3) *Health and Care*, and (4) *Safety*.

### 4.1 Organisation

The participants can follow their own interest and choose from the four themes and then from the underlying 25 Missions for the Future. After they have made their choice, they form expert teams with participants with the same interest. For example: a participant is interested in the theme *Health and Care* and wants to contribute to the Mission: “By 2040, all Dutch people will live at least five years longer in good health and the health differences between the lowest and highest socio-economic groups will have decreased by 30%.” This team of three or four partners can now specialize in this theme and the different missions. During the first phase, all partners are trained to use various methods and tools to carry out orientation at team level. Such as PEST-analysis, Scenario Planning, SWOT-analysis, and Business Model Generation. In this way they learn to look from the outside (macro and meso level) to the inside (micro level) and vice versa. As a result, lecturers and students are no longer content-centred and fixated on Foundational knowledge but learning-centred and focused on areas such as Caring, Human dimension, Integration, Application next to Foundational knowledge [5]. This promotes responsible design, and co-habitation.

Each team chooses a team leader every week, everyone has their turn one or more times. The team leader is responsible for ensuring that the team performs and delivers. Every week, team leaders together choose a 'managing partner' (or duo) from among their members who is responsible for the work in that week, good transfer to the successor managing partner and finally, the progress regarding the closing event. The managing partner can also make decisions about the entire consultancy firm.

Members of the different teams can also participate in cross functional project teams that are responsible for special activities such as 'developing corporate identity', 'designing and building the website', 'organizing closing events', etc. to successfully increase innovation, efficiency, and employee engagement in the firm.

Within the teams, we also expect substantive feedback on each other's individual behavior and results, the team results and collaboration, and on the performance of the consultancy firm as a whole.

### 4.2 Description of the stages

Below is a weekly description of the activities undertaken during the 10 weeks course 'Innovation Design'. Highlighted in blue is the activity of which the initiative lies with the lecturer/coach. Green marked are the activities of which the initiative lies with the students.

Table 1. Overview activities per week

	Week	Activity
	1	Kick-off by one of the committed lecturers (maximum 1 hour!)
	1	Immediately after this kick-off, the initiative is handed over to the students. Students and lecturers are transformed in equal partners in an innovation consultancy firm with a passion for engineering and product design, and with a focus on sustainability transition.
	1	Students organize themselves and kick start their innovation consultancy firm.
	1	Students organize themselves into cross-functional project teams to set up and execute projects to contribute to the office such as designing a corporate identity, logo, and plans for the design of a website, templates for presentations, videos, a closing event etc.
	2	Students orient themselves on the different themes and Missions for the Future appointed by the Dutch government.
	3	Students draw up a wish list of workshops and expert sessions to deepen their knowledge. Lecturers act as partners/experts in the field of Scenario Planning, and

		other methods and tools. They give workshops in this area, make materials available, and assist the other partners (students). This will be followed up in the other weeks.
	4	Based on their own interest, students choose a theme and a specific Mission for the Future. They investigate that theme and Mission, and they come up with 4 scenarios via 'scenario planning'. Students choose one scenario as a starting point for further research.
	5	The different teams work together to investigate the shared theme and Mission of the Future of their choice. This is in preparation for individual follow-up research.
	5	Teams submit their research report with a clear synthesis. These reports are peer-reviewed. The suggestions in the feedback are studied and reports are adjusted.
	6	Students hand in a 'teaser video' about their Mission of choice, scenario and what students will tell in their final video in week 9 for the event website. With that teaser video students will already approach people and organisations students want to invite to the closing event.
	7	Students will work out their own scenario, through more research and visualization, and create a storyboard for their final video. In addition, students work on their individual research report.
	8	Students submit their individual research report with a clear synthesis. The conclusion consists of a self-formulated concept graduation research proposal and a list of organisations that students will approach with that concept research proposal.
	9	Students work together on the last chores for the closing event.
	10	Closing event takes place, guests from the professional field and other interested parties are welcomed, students present their findings and proposals to their audience and the innovation consultancy firm is established.

### 4.3 Evaluation

Evidence from field testing is derived from the evaluations performed over different years among students and lecturers. Every year, the group of students and teachers unanimously appoints the enthusiasm that has led to 'electricity' in the entire project group. In the meantime, remarkable results have been achieved in the eyes of all those involved, and outsiders such as experts, guests, and fellow lecturers. Since the educational concept, the design of the curriculum, the learning objectives and the assessments for learning and the assessment of learning have changed radically, a comparison between the results of the 'traditional method' and the 'new method' is not possible.

The dissemination of knowledge is an important part of the module. This year it has taken the form of individual- and group presentations, workshops, videos, a YouTube channel with video's, a website, a publication of a book with the results by the students, and a closing event in which a very diverse group of guests participated. Final presentations of the outcomes of the groups at the closing events are always of a high level.

#### 4.3.1 Issues worth mentioning

**Responsibility and uncertainty:** Students often mention that they never worked in such a large group before. Most students didn't find it easy to just take responsibility as managing partners of an office of 30 to 60 students. Especially in a new situation with a lot of uncertainty, and freedom to act. As one student put it: *"In the beginning there was a lot of uncertainty because we have all the freedom got to determine things"*. Some lecturers find it difficult to let go of the traditional model. If they think that something is not going properly, they immediately intervene and correct students. This is at odds with the idea behind the new model in which the students themselves decide how they can act and experience learning moments. If it is really necessary, the lecturer can do suggestions for improvements as a coach.

**Communication and planning:** Immediately after the transfer of the initiative in the module by the lecturers, students discovered that communication is crucial. Another student said, *"Furthermore, I have my schedule skills improved by creating a clear schedule. With that planning, I was able to (along with other members of the planning committee) provide multiple individuals and groups with a clear guideline."*

*With that directive, they were able to achieve their goals and it helped them to be sharp during the project without losing the common thread. So, I have in a sense developed two skills, namely my communication skills as well as my planning skills for a large group.”*

Big picture and the details: Most students have struggled to develop an understanding of the major challenges facing the world and the individual contribution they could make to sustainable sustainability. One of the students put it this way: *“In this course you learn to analyse a social problem and convert it into a design proposal, in which a large group of equals must also achieve a joint result.* Responsible design: As a result, students are able to achieve balanced social, environmental, and economic development by embedding ethical decision-making in inclusive and sustainable design practice.

## **5 CONCLUSIONS**

This paper posits that increased understanding of the role of student agency in engineering education, in particular in two different ways, has been established. Firstly, to accomplish the objective of this study, to develop an education module for students and lecturers in which students are agents in their learning, in which they can prepare for a role in society that is in shock. Secondly, during the problem exploration it was established that in order to contribute to the solution to problems on three different levels, student agency and co-agency are important.

This paper expands on the methodologies commonly employed in the field by stressing the benefits of using *agency* in settings where change is a central aspect of transitions in general.

### **5.1 Limitations and future research**

A limitation of this study is its lack of generalizability, since it only consists of a single, in-depth case. Nevertheless, there is no indication that the applicability of the developed method is limited to larger groups of students (30-60) in their graduation year of the Department of Engineering at Technical Faculty of Amsterdam University of Applied Sciences (The Netherlands). This individual design proposition has already been used in smaller groups (4-12 students), in other years of the study programme (2nd year of study Engineering), and other programmes within Engineering (Sustainable Energy Systems). The evaluations among these students and lecturers show year after year that the results are without exception very positive.

This study provides numerous opportunities for future research. Firstly, this study identifies an opportunity for studying other factors and their effect on the development and motivation of students. For example, a more inclusive socio-technical approach through collaboration between students and lecturers of Engineering and other faculties/departments such as Society and Law, Fashion Institute, International Business, or Built Environment. Therefore, the authors propose applying the developed methodology with a strong focus on student agency using ‘Innovation Consultancy Firm Method’ in another educational programmes with significantly different academic areas, in order to determine its usability. Secondly, this study has now been conducted among students affiliated with one University of Applied Sciences in The Netherlands. It is in the context of the pursuit of sustainability, accelerating the sustainability transition, co-habitation, and co-existences to investigate an international collaboration. It is recommended to set up a virtual Innovation Consultancy Firm in collaboration with one or more Universities of Applied Sciences in other countries in Europe or even worldwide.

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