# Education for flourishing: an illustration of boundary object use, peer feedback and distance learning

Francesca Ostuzzi
*Department of Industrial Systems and Product Design, Ghent University, Campus Kortrijk, Belgium, and*

Maya Hoveskog
*Department of Innovation Management, School of Business, Engineering and Science, Halmstad University, Halmstad, Sweden*

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## Abstract

**Purpose** – Teaching sustainable development at the higher education level requires that existing curricula are supplemented with multi-disciplinary (and sometimes multi-national) collaboration and integrated thinking. The purpose of this paper is to increase the understanding of a particular framework for business model innovation for sustainability-as-flourishing that is used as a boundary object in the context of interdisciplinary, peer-assessed distance learning. This study is positioned in the broader picture of enlarging curricular content so as to reflect the systemic and interconnected nature of socio-technical and economic developments. The motivation behind this study is the authors' wish to achieve a deeper understanding of how students engage with the complex concept of sustainable business modelling, while using the flourishing business canvas (FBC).

**Design/methodology/approach** – An experiment was conducted on the use of the FBC as a boundary object among 52 engineering students at two universities. Data were provided by the following: iterations of the FBC; oral and written peer feedback; and an online survey.

**Findings** – Based on an evaluation of the experiment, this study shows that the FBC supports the use of multi-disciplinary, multi-national peer and distance learning in sustainability education.

**Research limitations/implications** – This study used one test condition of multi-disciplinary, multi-national collaboration for peer and distance learning at one point in time. Additional tests, using the tools and approaches of this study, are needed.

**Originality/value** – Various tools and methods for use in education have been developed that support a new view of sustainability –sustainability-as-flourishing. Extant research focusses primarily on the development of tools and methods in this area. Not enough attention has been paid to the analysis of their implementation and use in higher education. This paper seeks to fill that research gap.

**Keywords** Sustainability education, Peer feedback, Engineering education, Sustainability-as-flourishing, Flourishing business model canvas

**Paper type** Research paper

## 1. Introduction

The work around sustainability done by industrial designers is both highly criticized and highly promoted. On the one hand, they are lauded as actors who are crucially important for

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their support of the transition to a more sustainable future (Yang and Giard, 2001). On the other hand, critics identify them as one of the "most harmful" actors in terms of sustainability (Papanek, 1971). Sustainability education, therefore, is needed to help industrial designers overcome this negative perception so that they can imagine and propose designs that promote sustainable consumption and production patterns. Universities have responded with new pedagogical approaches as practitioners and various types of organizations increasingly recognize society's demand for greater social and environmental sustainability. Teaching sustainable development at the higher education level offers unique opportunities to use integrated thinking, multi-disciplinary (and multi-national) collaboration which can enlarge traditional curricula. Sustainable education focusses on different fields of inquiry and uses various tools and methods that differ in both content and structure from those used traditionally in higher education. One particular field of inquiry is business model innovation (BMI) for sustainability which is in particular focussed on the integration of economic, social and environmental factors aimed at advancing enterprise performance towards tri-profitability goals (Upward and Jones, 2016). Throughout the BMI, visualization frameworks and tools are used to support the generation, interpretation and manipulation of information using images. These images facilitate, for example, problem-solving, communications and team building (Darren *et al.*, 2001). BMI in general and for sustainability in particular requires changing the shared mindset, and frameworks/tools are particularly useful in doing that and in supporting organizational decision-making (Prahalad and Bettis, 1986). The use of these visualization frameworks and tools can help organizations solicit and create shared understandings among diverse groups (Täuscher and Abdelkafi, 2017). Such shared understandings are very important in situations, such as working with sustainability, when a change of mindset and a new dominant organizational logic are required. Therefore, it is important that universities find pedagogical approaches to facilitate learning and understanding of those frameworks and tools for not only business students but also engineering design students.

Furthermore, a new view of sustainability has emerged – sustainability-as-flourishing – which proposes "the possibility that human and other life will flourish on Earth forever" (Ehrenfeld, 2000, p. 36). As Schaefer *et al.* (2015) explain sustainability-as-flourishing is a dynamic system construct and an aspirational ideal of a future state other than mere survival.

This paper explores *education for flourishing* in a study of BMI for sustainability conducted among 52 engineering students at two universities: Halmstad University in Sweden and Ghent University in Belgium. The aim of this paper is to increase our understanding of a particular framework for BMI for sustainability that we use as a boundary object in the context of interdisciplinary, peer-assessed distance learning. Boundary objects, as described by Star and Griesemer (1989, p. 393), are abstract or concrete objects (e.g. maps) that "can adapt to local needs and constraints of several parties using them". Boundary objects support the communication between different stakeholders during, for example, collaborative processes (Arias and Fischer, 2000).

This study is positioned in the broader picture of enlarging curricular content so as to reflect the systemic and interconnected nature of socio-technical and economic developments. Specifically, the flourishing business canvas (FBC) is the framework/tool used in this study. The FBC is a specific framework/tool for BMI *n* for sustainability that companies can use when they would create new or innovate their business models (BMs). The FBC framework/tool is used as a boundary object in this study to facilitate learning. The motivation behind this study is the authors' wish to achieve a deeper understanding of

how students engage with the complex concept of BMI for sustainability while using the FBC.

## 2. Teaching business model innovation as a social and experiential practice

BMI is the process of designing and implementing feasible BMs. According to Aversa *et al.* (2015), three cognitive actions are required in the creation and evaluation of alternative BM designs (thinking, articulating, doing). *Thinking* refers to understanding a business and its goals; *articulating* refers to designing a simplified BM; and *doing* refers to making decisions and creating the routines needed to implement the BM. New enterprises often create and experiment with visual representations of possible BMs. Demil and Lecocq (2015, p. 34) explain that these visualizations are "intended to synthesise and describe the way in which a business creates and captures value, and to make sense of and to portray it to the others".

Therefore, BMI is not a one-time event; rather, it is a complex, collective, co-creational and cyclical interactive and systematic process that emphasizes active and social experimentation and learning. An artefact, based on a common language that visually represents a BM, is particularly effective in BMI (Upward and Jones, 2016). Such an artefact (e.g. a matrix, a diagram) promotes a shared understanding of the factors an enterprise considers when setting its goals and considering the interrelationship among BMs, BMI and sustainability (Schaltegger *et al.*, 2016).

In discussions of BMs and BMI, enterprises typically take an economic perspective, in which they focus on achieving "profit-normative" goals. Thus, these discussions focus on the strategic choices that can promote the creation, delivery and capture of economic value (Upward and Jones, 2016). However, when enterprise goals have a broader perspective (e.g. flourishing for sustainability), BMI requires that strategic choices consider the importance of external factors such as the environment, society, the economy (markets), various stakeholders (including customers) and the value propositions that satisfy those stakeholders' needs.

Several researchers conclude that universities generally do not emphasize the flourishing perspective (Kurucz *et al.*, 2014; Laszlo *et al.*, 2014; Martin, 2007). These researchers call on universities to move beyond the traditional focus on financial performance and adopt curricula that focus on the world's many complex social and environmental issues. As a result of such criticism, the commentary on *sustainability-as-flourishing (*i.e. *sustainable) goals* has increased (B Lab, 2016; International Co-operative Alliance (ICA), 1995; Kurucz *et al.*, 2016; Missimer *et al.*, 2017a, 2017b). This logic contrasted with profit-normative goals, emphasizing the idea of doing good to do well, that is, enterprise goals that aim at the well-being of human and other life forever. This logic is also aligned with recent suggestions for refinement of the Brundtland (1987, p. 41) Commission's sustainable development definition. In this paper, we adopt Griggs's *et al.* (2013, p. 203) proposed refinement of this definition: "development that meets the needs of the present while safeguarding Earth's life-support system, on which the welfare of current and future generations depends". The exploration of flourishing stems from the field of positive psychology and is increasingly in focus in the field of organizational development (Bakker and Schaufeli, 2008; Compton and Hoffman, 2019; Cooperrider, 2017; Laszlo *et al.*, 2012). In the field of organizational development, it is related to the discussion of flourishing enterprise which can create value for society (all stakeholders, including shareholders) by a synergistic focus on environmental preservation, social value and economic viability. Hogeboom *et al.* (under review) defines this focus as the maximization for current, near-term and future enterprise (financial) viability that is compatible with scientific knowledge from relevant disciplines and is morally and ethically defensible.

However, at present, it appears BMI design tools for sustainability are still in the early stages of development and testing. Critics charge specifically that the tools needed to design and implement BMs aimed at achieving flourishing goals are inadequate (Bocken and Snihur, in press). Similarly, a common language for describing these tools is said to be lacking. Breuer *et al.* (2016), for example, conclude that the fundamental characteristics of BMs that promote achievement of flourishing goals are insufficiently identified.

One answer to this deficiency is the FBC. It has its roots in the strongly sustainable business model ontology presented by Upward and Jones (2016). Kurucz *et al.* (2016) explain that it is an emerging strategic sustainability management innovation. The framework/tool itself is a significant extension to the earlier profit-normative BM ontology by Osterwalder (2004). As described by Elkington and Upward (2016, p. 131), the FBC is:

> [...] a collaborative visual design tool that, by providing a common language for an organization's stakeholders, allows them to effectively work together to describe their enterprise's business model and imagine future preferred ones.

In *open education for flourishing* (OE*f*F), the term coined in this study, the FBC is used to create an artefact as a boundary object (Kurucz *et al.*, 2016; Upward and Jones, 2016). Boundary objects, as described by Star and Griesemer (1989, p. 393), are abstract or concrete objects (e.g. maps) that "can adapt to local needs and constraints of several parties employing them". The multi-disciplinary, multi-national peer feedback and distance-learning sessions of this study use the FBC as a boundary object. Figure 1 depicts the four perspectives represented in the FBC: process, value, people and outcomes that produce the costs, goals and benefits. Detailed description of the FBC tool is available in Elkington and Upward (2016). The focus on this framework/tool when teaching BMI for sustainability is important and is aligned with the recent call for a normative and systems perspective that extends well beyond short-term financial viability that would enable a sustainable future (Bansal *et al.*, 2019). Bansal *et al.* (2019, p. 9) writes:


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**Figure 1.**
Flourishing business canvas, v2

> [. . .] [this] requires multi-level, multi-disciplinary, and dynamic analysis. Business models, financial systems, and economic markets are expected to serve society within natural resource limits. [Thus, research and practice must] recognize the interconnection among natural and social systems not just in the moment, but over time.

As Bansal *et al.* (2019) conclude, there is an increasing demand for frameworks/tools for BMI for sustainability that helps companies to work in this way and their wide application. Therefore, we have chosen to use the FBC as a boundary object in this study and build on the previous research that have also used the FBC to facilitate learning both in pedagogical setting and in industrial contexts (Hoveskog *et al.*, 2018).

## 3. Teaching sustainability in engineering courses

Education for sustainable development (ESD) is the umbrella term for various forms of learning and teaching associated with sustainability education. Olsson and Gericke (2016) describe two ESD teaching approaches:

(1) fact-based teaching; and

(2) teaching that empowers and equips students with decision-making competence towards sustainable development.

As the authors explain, in the first approach to ESD, students gain knowledge, which is expected to lead to change of their values and in turn students' behaviour thus solving environmental or social problems. In the second approach, students take ownership of their learning (Gremler *et al.*, 2000) as they acquire competences and decision-making skills applicable to sustainability issues (Kurucz *et al.*, 2014). This is characterized by a focus on highlighting the contradictions inherent in sustainability related issues. This approach allows students to develop capacities needed to deal with dilemmas, nurturing both cognitive and affective aspects (e.g. attitudes) to empower decision-making related to environmental, economic and social issues (Littledyke, 2008).

Universities "are intended to be spaces where ideas are expressed freely, paradigms are challenged, creativity is promoted and new knowledge is produced" (Moore, 2005, p. 326). Thus, higher education can be considered an appropriate location for introducing new models for teaching sustainability. These models can be used to promote the acquisition of essential cognitive skills needed for thinking critically and designing for sustainability (Gatto *et al.*, 2015; Häfner *et al.*, 2013). Nevertheless, many challenges must be faced when sustainability issues are taught in the university industrial design and engineering curricula. Among others, two of the following challenges pose risks to the success of such curricula: focus and methods.

(1) The need to extend the focus from the current emphasis on eco-design and eco-efficiency (primarily addressing technical and environmental issues), to eco-effectiveness as integrated to social innovation. This becomes possible by adopting a systemic view on sustainability that promotes interconnectedness and multi-perspectivism. This shift challenges academics to embrace the sometimes "wicked" nature of the sustainability challenges introduced in the curricula.

(2) The need to apply different managing and teaching methods. Firstly, by clarifying the policies for sustainability implementation in curricula, answering, for example, to the sometimes-inadequate systemic structures for multi-disciplinary collaboration. Secondly, by improving the way sustainability is taught, understanding the importance of factors such as the learning environment, the course content and set-ups (i.e. practice-based and process-oriented) and the

inclusion of human and individual dimensions (Braungart *et al.*, 2007; Boks and Diehl, 2006; DuPui and Ball, 2013; Manzini, 2014; Moore, 2005; Pappas, 2012; Ramirez, 2006; Redman and Larson, 2011; Segalàs *et al.*, 2010; Warburton, 2003; Lönngren, 2017).

In this context, *sustainability-as-flourishing* well aligns with the aforementioned understanding of ESD that aims at more eco- and social-effectiveness strategies, rather than only limiting unintended negative impact. This study takes a constructive and community-oriented approach for teaching sustainability (Segalàs *et al.*, 2010), in which peer feedback learning and distance learning are emphasized.

## 4. Peer feedback learning and distance learning

In general, institutions of higher education today compete for faculty, students and funding in highly competitive environments. Given such internal and external competitiveness, there is often little incentive to create multi-disciplinary or multi-national collaborative structures, in which actors share a common purpose. Because sustainability issues have no disciplinary or country borders, universities need to engage with sustainability education in ways that create learning environments favourable to multi-disciplinary and multi-national learning (Moore, 2005; Redman and Larson, 2011). These open, collaborative university spaces can contribute positively to the sustainability design process and to the students' learning process (Redman and Larson, 2011).

Peer feedback has been recommended as a useful collaboration strategy for university courses including those courses that deal with sustainability issues. According to Koring and Campbell (2005, p. 11), peer feedback is "an educational process in which students are intentionally connected with other students to support learning and success" (Griffin *et al.*, 2015). Peer feedback benefits both feedback providers and feedback recipients because it allows them to take more active roles in the learning process. Knowledge is more easily retained, and satisfaction with academic programmes increases (Griffin *et al.*, 2015; Topping, 2005). Peer feedback thus empowers students.

Distance-learning universities, such as the two universities in this study, are at the forefront of this movement. Given their multi-disciplinary and multi-national approach to learning, combined with the use of modern technology and an emphasis on student empowerment, they are well suited to support education for sustainability. Bell *et al.* (2017, p. 101) conclude:

> [. . .] the struggle to master the challenges of technology and the need to meet the aspirations of the student body in a rapidly changing world will surely mean that issues of global sustainability will move up in the distance learning agenda.

The two engineering courses described in this paper (see Section 5) used peer feedback learning and distance learning as pedagogic methods. Students from two universities engaged at a distance (electronically) in two feedback sessions. In these sessions, students increased their topic-related knowledge, improved their communication skills and expanded their vocabularies as they interacted with students from another country and incorporated their peers' comments into revisions of their work (Lam, 2016; Topping, 2005). In courses that use peer feedback sessions, instructors begin by explaining the purpose of these sessions. They then coordinate the sessions in which students critique each other's assignments. In the final stage, students prepare revised assignments that reflect the opinions and suggestions of their peers.

This study focusses mainly on the content and categories of the feedback, in its relation to the chosen boundary object, followed by a brief look on the nature of the feedback themselves. The study addresses neither how students perform in the peer feedback session nor how they evaluated the sessions.

## 5. Methodology

In total, 52 students in engineering programmes (at the master's level) participated in a multi-disciplinary peer feedback and distance-learning research experiment. Two peer feedback sessions were held (one oral and one written). Group A consisted of 20 students from Halmstad University who had previous knowledge of business modelling and the FBC. Group B consisted of 32 students from Ghent University who lacked this knowledge. Thus, this was a cross-ability experiment, in which the students had different skills and educational backgrounds: industrial product design vs industrial management. The students from both universities worked on creating flourishing BMs with a focus on the circular design economic model (sustain and re-use) rather than on the linear design economic model (make and throw away).

### *5.1 Experiment*

In the two peer feedback sessions, the students communicated with each other using the FBC as the main tool and boundary object. Figure 2 illustrates the flow of the experiment.

Because Group B students had no previous knowledge of business modelling or the FBC, online educational materials were used to introduce them to the concepts. (See the website: flourishingbusiness.org). They were also given a one-week, so-called quick and dirty, assignment on these concepts to prepare them for the experiment.

In five iterations, the two groups mapped three existing businesses that they could use as benchmark business canvases and two business canvases using their own BM ideas. Group B sent a FBC using their fictional BM to Group A, who responded with online feedback in audio format. This feedback consisted of the following: a 15-min presentation of the BM idea using the FBC, a 15-min Q&A and a 15-min presentation using the FBC as a tool. A week later, Group A sent written feedback to Group B. Group B then prepared its final BM. The two groups communicated electronically.

Table 1 presents data on the organizational variables for the experiment adapted from Topping's (2005) recommended list.

At the conclusion of the experiment, the students were invited to participate in an online evaluation survey (anonymously). The survey, which asked 12 open questions, 4 closed questions and 7 Likert-scale questions, was in three sections:

(1) general information such as business background and previous experience with the FBC;

(2) the usability of the FBC; and

(3) evaluations of the experiment (expectations, usefulness, impact and suggestions).

Pittaway and Cope (2007) and Case and Selvester (2002) justify students' reflections as useful and valid data sources in management learning.

### *5.2 Data collection and analysis*

Table 2 presents an overview of the five data sources in this experiment:

(1) iterations on the FBC before feedback;

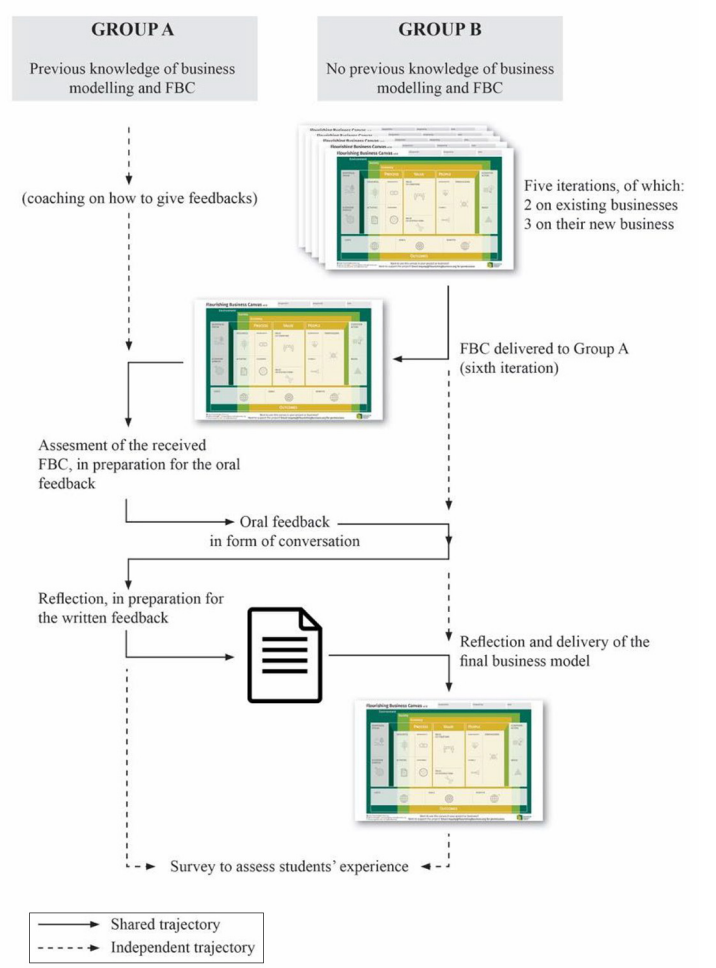



**Figure 2.**
Graphic depiction of the experiment's flow

(2) oral feedback;
(3) iteration on the FBC after feedback;
(4) written feedback; and
(5) responses to the online survey.

Eight teams of students from the two universities were formed for the experiment. Of these, two teams were paired and studied in this research – Group B1/Group A1 and Group B2/ Group A2. Groups B1 and B2 were from Ghent University; Groups A1 and A2 were from Halmstad University. The analysis examined the students' learning, their facility with the FBC and their use of peer feedback in the implementation of the *OEfF*. Both authors of this paper analyzed the data from the experiment.

| Variable | Designed experiment UGent/HU |
|---|---|
| Curriculum content and materials | Design of flourishing business models. The FBC was the main tool used to create the outcome (UGent) and to provide the feedback (HU) |
| Contact constellation | Teams of two to four students were paired |
| Within or between institutions | Between institutions |
| Year of study | 1st year Master's (UGent)/1st year Master's (HU) |
| Ability | Cross-ability format: industrial product design (UGent) and industrial management (HU) |
| Role continuity | Yes (cross-ability roles were not switched) |
| Time | Throughout the semester, not necessarily in normal class contact time (owing to scheduling differences in courses at UGent and HU) |
| Place | Online: Zoom Video Communications was used as the platform |
| Helper characteristics and helped characteristics | Helpers with expertise in industrial management assisted with industrial design engineering. Both groups worked in teams. UGent and HU teams were randomly matched |
| Objectives | The main objective of the peer feedback was to trigger multi-disciplinary conversations around the complex topic of designing sustainable BMs and flourishing business models |
| Voluntary or compulsory | Compulsory |
| Reinforcement | The peer feedback sessions were integrated with a course for Group A. Therefore, the motivation can be defined as *extrinsic* |
| Helping technique | Oral feedback on a proposed BM, followed by written feedback on the FBC |
| Assessment of students' experience | A voluntary student survey was used |

**Source:** (adapted from Topping, 2005)

**Table 1.** Organizational variables for the UGent and HU experiment

*5.3 Analysis of the flourishing business canvas iterations (data sources 1 and 3)*

Groups B1 and B2 produced three benchmark business canvases and four business canvases related to their own idea (three FBC iterations and the final FBC). The steps in the analysis were as follows:

(1) identify the missing elements;

(2) count the ideas per canvas building block;

(3) identify the clear ideas;

(4) identify the keywords that relate to sustainability; and

(5) review the presence and significance of the visuals.

*5.4 Analysis of feedbacks (data sources 2 and 4)*

Qualitative analysis was used for the oral and written peer feedback data. The following elements were analyzed:

- peer feedback categories; and
- correspondence between the peer feedback data and the FBC

The peer feedback categories (sourced to the literature) were the following:

- clarification (structure and explanations of the problem, remarks, solutions and others' formulations);

**Table 2.**
Overview of data sources in the experiment: HU stands for Halmstad University; GU stands for Ghent University and FBC stands for flourishing business canvas

| Data type | Focus | Used to analyze | Total no. of characters | Response rate |
|---|---|---|---|---|
| (1) Six FBC artefacts per group created before the feedback session | Quantifying the ideas in the FBC building blocks; identifying clear and unique ideas for a new BM for sustainability | The focus of the FBC ideas | n/a | n/a |
| (2) Oral feedback, ca. 30 min each | Providing specific feedback on the FBC | Building blocks of the FBC in focus for the students | n/a | n/a |
| (3) One FBC artefact per group created after the feedback session | Quantifying the ideas in the FBC building blocks; identifying clear and unique ideas for a new BM for sustainability | Change in ideas; use and value of the feedback with FBC as the basis for evaluation | n/a | n/a |
| (4) Written feedback, ca. 500 words each | Providing specific feedback on the FBC | Building blocks of the FBC in focus for students | 15 940 | n/a |
| (5) Online survey after completion of the course | Combination of open questions, closed questions, and Likert scale questions: three main themes –general information; usability of the FBC; and evaluations of the experiment | Students' learning and experience in terms of ease of use of the FBC and giving/receiving feedback at a distance | 24 021 | ca. 46% (24 students) HU: 40% GU: 50% |

- content-oriented comments (constructive suggestions, positive comments, negative comments, questions for reflection);
- completeness (summaries and external examples); and
- additional items ("naive" words, general comments/disconnected from topic, references to video call, reference to the FBC) (Gielen *et al.*, 2010; Lam, 2016; Nelson, 2007).

Textual fragments were linked by codes to the categories, in some cases, new codes and categories were created as needed. The correspondence between the peer feedback data and the FBC was analyzed using the 16 building blocks of the FBC (Figure 1) that are grouped under process, value, people and outcomes. The categories were used as codes in the data analysis. After the analysis of the written and oral peer feedback data, comparisons were made to highlight the relationships between:

- written feedback and oral peer feedback data;
- Group B1 and B2 results; and
- BMs before and after peer feedback.

## 6. Results

### *6.1 Reflections on the experiment*

The survey (Data Source 5) was a voluntary exercise. In total, 24 of the 52 students in the experiment participated in the survey: 8 students from Ghent University and 16 students

from Halmstad University (Table 3). The students from both universities thought that the oral peer feedback was more useful than the written peer feedback. They disagreed most on how much they had learned about the FBC building blocks. Students offered a number of improvement suggestions.

*6.2 Overall impression of the artefacts of the two groups*

Students were asked to create BMs using the concept of the circular economy. Group B1 developed a new product service: 3-D printed headphones that could be personalized and repaired at a specific design shop. Group B2 created a service for festivals that allowed participants to rent a tent on site. The service also repaired broken and/or old tents. Figure 3 presents the students' final canvases. Table 4 presents an overview of the overall impression of these artefacts.

*6.3 Easy to understand and use flourishing business canvas building blocks*

Both groups were very creative. They produced final canvases with more than 65 clear ideas. It was easiest for them to generate ideas from two FBC building blocks: value co-creation and stakeholders. The peer feedback data confirmed this perception. The students also used value co-creation as an entry point, which is also confirmed by the peer feedback data.

Value co-creation is the essential building block of the FBC. Group B1 described their value co-creation building block as *expressive, personal, with sustainable electronics* (FC) and as *a web shop where customers can buy pointing devices and make their delivery orders (Iteration 3).* Group B2 described their value co-creation building block as a *festival offering with a circular waste management system that reduces camping trash, guarantees the certainty of a safe place with a rental service and creates a community* (FC). Students attained a deep understanding of the importance of this building block because *the value proposition is the centre of the whole canvas that will affect all other areas.* Nevertheless, in some peer feedback sessions, students sometimes overlapped value co-creation with actual company activities.

The stakeholder building block refers to the actors who are involved with the particular value co-created by the company. This block expands the value focus from the customers as the only relevant actors to all stakeholders. Both groups embraced this idea judging by the number of clear ideas in all canvases. Some examples of these ideas are the following: *customers: high-end headphone enthusiasts (16 years and older); companies that recycle plastic; government* (Group B1, FC) and *employees (people with disabilities/refugees); charity collection points; and investors* (Group B2, Iteration 3). Nevertheless, some confusion emerged when students were asked to distinguish between ecosystem actors and stakeholders.

> I'm not sure if this is an ecosystem actor or if it is more a stakeholder. The difference between the stakeholders and the ecosystem actors is not clear. We think the stakeholders are directly affected by this business (oral peer feedback session, Group B2).

Finally, the value co-destruction building block revealed the negative value propositions. Both Group B2 and Group B1 understood that value could be destroyed. Group B1 example: *destroying the current phone markets by pushing them to go further with sustainability* (Fairphone). Group B2 example: *cotton farmers in developing countries who make their own fabrics in Europe are counter-productive for Asian farmers* (Freitag).

*6.4 Difficult to understand and use flourishing business canvas building blocks*

The students found the following three FBC building blocks difficult to understand and use: governance, ecosystem services and biophysical stocks. These building blocks were almost

| Item | Main insights and comments |
|---|---|
| State what was positive in working with the canvas | The *broader view* and link between building blocks (e.g. "It's important to learn not only the economic side of a business model, but also learn how society and the environment can be integrated into the business model"; "The broader look at the business rather than just at product, price, and production")<br>The *overview* of the building blocks (e.g. "You get a good overview of the sustainable aspects and can easily see where you have to put in some extra work")<br>The *examples* (e.g. "The canvas has some good examples that give you a general idea of each block") |
| State what was challenging/unclear in working with the canvas | *Complex structure at the beginning* (e.g. "I think it was hard to understand how to work with the canvas at the beginning when trying to sort out what information has value to the canvas, etc."; "Sometimes there was no clear explanation of what should be in this box or how deep you should go")<br>*Complex and sometimes confusing concepts* (e.g. "It is hard to understand all the definitions and boundaries for the different constructs, which could lead to some confusion"; "The exact meaning of each component is not always clear")<br>Some *specific blocks.* (e.g. "Governance"; "Some blocks seemed the same such as relationships, stakeholders, and partnerships. We just did the same thing three times"; "Differences between partners and stakeholders plus the biophysical stock"; "The biophysical stocks, ecosystem services, and ecosystem actors were hard to fill in"; "The parts in the darkest green. Sometimes it seems a bit too far-fetched"; "The difference between stakeholders, partnerships, and relationships was confusing"; "Some parts are hard to fill in, such as ecosystem services and needs"; "Some of the aspects were irrelevant to our project so we had to twist our business project to fit the canvas. However, we did manage, but it may not have been an optimal solution") |
| State what would you improve in the format of the canvas and its building blocks | *Specific building blocks (*partnerships, stakeholders and human resources)<br>*Clearer instructions* (e.g. "A more comprehensive explanation of what is expected in each block and an example of an existing case. Maybe in some blocks, a list of possibilities where you just need to check off what's useful for your case")<br>*Design related improvement* (Dimensions and interaction) (e.g. "Resources and activities cover all three layers and the post-it notes can be placed accordingly. The problem is that the size of the post-its doesn't allow you to do this. The layout is smart, but it isn't very usable in practice when working with the canvas"; "I think it would be great if the relationship between the components were clearer"; "It wasn't clear in the beginning that the colours in the background state in which domain you were in"<br>*Colour-related doubts (e.g.* "Be clearer about what you have to add in the darkest green parts"<br>*Connections between blocks (e.g.* "Show the possibility of interference of other blocks and connections"; "Make the "overlapping" squares clearer so you can see which part of the sustainability they belong to") |
| To what extent did you learn about circular economy from the peer feedback sessions on the FBC and its application? | Average: *2.8/HU: 2.6/UG: 2.9* |
| To what extent did you learn about the | Average: *3.4/HU: 2.6/UG: 3.7* |

**Table 3.**
Insights from the survey

(*continued*)

| Item | Main insights and comments |
|---|---|
| different building blocks of the canvas from the peer feedback sessions on the FBC and its application? | |
| To what extent did you learn how to present your ideas from the peer feedback sessions on the FBC and its application? | Average: *3.1/HU: 3.1/UG: 3.1* |
| To what extent did you learn about business and management terminology from the peer feedback sessions on the FBC and its application? | Average: *2.4/HU: 2.5/UG: 2.4* |

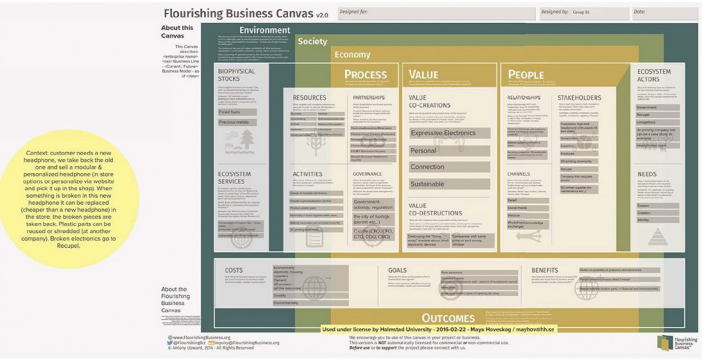
**Table 3.**

never addressed because students thought they were not very relevant. Additionally, they had difficulty in distinguishing the goals building block from the benefits building block.

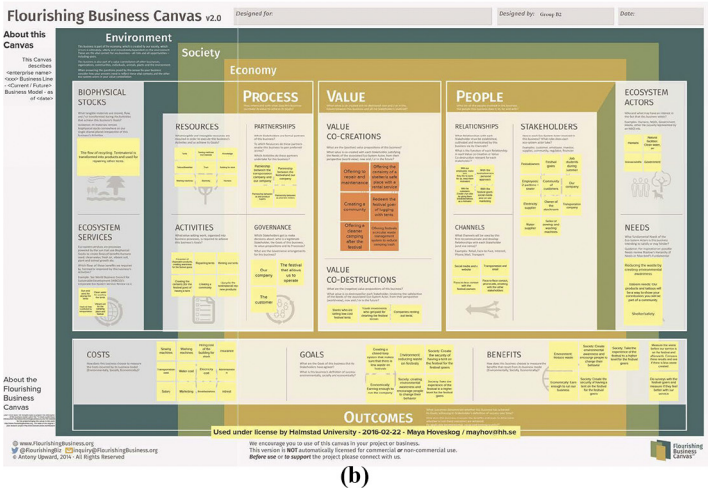
Both groups struggled with generating ideas for the governance building block. They referred vaguely to *our company* (Group B2, FC), to *fablabs – organising workshops* (Group B1, Iteration 3), to influential actors outside the company with no legitimate decision-making power, to *shipping companies* (Group B2, Iteration 2) or *to a city for permits* (Group B1, FC). The governance building block was very rarely mentioned in the oral peer feedback session. The block was only mentioned specifically in oral peer feedback with Group B2 in the phase *politicians as stakeholders*.

The students' ideas about the ecosystem services and the biophysical stocks building blocks were unspecific or misplaced (in the wrong building blocks). They described *the flow of recycling: tent materials are transformed into products and used to repair other tents* (Group B2, FC); *fuel for transportation* (Group B2, DYI); *plastics*, (Group B1, Fairphone); and *real estate (offices)* (Group B1, Iteration 2). Some of these ideas were better placed in the resources building block. Other ideas, such as the following, were better placed in the benefits or costs building blocks: *fresh air that is polluted by transportation* (Group B2, FC); *e-commerce emissions increase* (Group B2, Iteration 2); *preservation of marine life plus clean water (reduction of the plastic soup)* (Group B1, Iteration 2); and *CO2 emissions* (Group B1, Fairphone).

The goals building block also posed a challenge for the students. They struggled with distinguishing it from the benefits building block. In the peer feedback sessions, students referred to a goal only once. They used the word "focus" and did not directly link it to the goals building block. For example, Group B2 wrote: *society: take the experience of the festival to a higher level for festival attendees* (FC); *environment: reduce materials and reuse old materials to provide new, fashionable bags*; *partner with local repair shops or make repairs at home* (Group B1, Iteration 1). The students also revealed a rather short-term, operational perspective as far as economic sustainability: *organisation of workshops* (Group B1, Iteration 1)*; economics: earning enough to run the company* (Group B2, FC).




**(a)**




**(b)**

**Figure 3.**
Final canvases: (a) Group B1 and (b) Group B2

The peer feedback sessions revealed that the students used value co-creation as their entry point. They then followed no specific order, as they repeatedly returned to related building blocks. As the students from one university explained their building blocks to the students at the other university, they acquired insights on their own projects. They said: *By doing this, we actually figured out the Ecosystems services building block in our own system* (oral peer feedback, Group B1). The students also explained that some blocks were very difficult to use. The challenges were with connecting the block name with a definition and/or related concepts and accepting that the FBC *forced* them to begin a conversation on specific concepts.

### *6.5 Comments on the peer feedback sessions*

The peer feedback sessions primarily consisted of the following: constructive suggestions; direct questions; project explanations; and interpretations of students' remarks. Thus, the sessions took a practice-oriented approach rather than a theoretical approach. The students were most specific when they referred to the difficult to understand and use FBC building blocks. The lack of summaries and structures in the sessions revealed that the instructors

| Item | Main insights and comments |
|---|---|
| Indications as depicted in the artefacts | *Short-term* focus when creating ideas with the help of the FBC with *no* explicit indication of the *profit formula*<br>*No sense of "ownership"* of the business idea beyond its use as a university project. The "designed for" and the "designed by" fields were not used<br>Iterations helped *move from a general level to a more concrete level* (e.g. in the building block of goals, Group B2 began with "reuse clothing with sentimental value in a high quality bag" [Iterations 1, 2, 3] and formulated "creating a closed-loop system that makes sure that there is less waste on festivals" as its final statement) |
| Visual use of the canvas | Students *did not consider* explicitly the role of the *visual look* of the artefact when/if used as a communication tool (e.g. both groups introduced the formatting of the ideas as post-it notes only in their final canvases)<br>Students did not use the visual aids by placing their ideas in the correct context in the benefits and costs, FC |
| Keywords | Most of the text related to *environmental sustainability and circular economy*. (E.g. "Offering festivals a circular waste management system to reduce camping trash" (Group B2 in Value co-creation, FC) and "better recyclability of polymers and electronics" (Group B1 in Benefits, FC)<br>Text related to *social sustainability* was *less present* (e.g. "esteem", "identity").<br>Additional theme is *consumer behaviour* (e.g. "creating environmental awareness and encouraging people to change their behaviour" (Group B2 in Goals, FC)<br>*Economic sustainability* was *least used* (e.g. "Break even within two years of opening the shop" (Group B1, FC); "Earn enough to run our business" (Group B2 in Benefits, FC) |

**Table 4.**
Overall impression of the artefacts (FC = final canvas)

needed to spend more time on the peer feedback preparatory phase. In general, however, the sessions (especially the oral peer feedback session) provided an opportunity for the students to communicate with each other in a mutually beneficial relationship.

## 7. Discussion

Ideally, classrooms become settings in which students can use integrated thinking, engage in multi-disciplinary collaboration and develop their ability to generate new knowledge and to experiment in new ways. In such classrooms, students can learn to manage "real-world" situations and their challenges (Kurucz *et al.*, 2014), as they nurture "the seeds of change" (Geels, 2002). However, researchers and educators disagree on how to engage students in multi-disciplinary and/or multi-national groups for sustainability learning (Bilodeau *et al.*, 2014; Rampasso *et al.*, 2018).

The experiment of this study is an example of an instructional method that other distance-learning universities may wish to imitate while at the same time build better understanding on the available framework/tools for sustainability (in that paper the FBC) (Guerra, 2017; Mochizuki and Fadeeva, 2010). For the following reasons, distance-learning using peer feedbacks based on the FBC could be a strong framework for sustainability instruction:

- The framework facilitates conversations between students.
- The framework gives students a broader perspective on issues under discussion.
- The framework helps students learn and think about concepts related to *sustainability-as-flourishing*.

- The oral feedback session is valuable for both parties as they "think together" and process information in a shared manner. More value is anyhow given perceived when receiving the feedback.
- The comments, suggestions and opinions in the feedback sessions can result in improvements of students' ideas, as they acquire a better understanding of the FBC.
- The comments, suggestions and opinions in the feedback sessions can result in directions for improvement of the tool itself.

In sum, the experiment shows that students who are members of multi-disciplinary, multi-national groups can, supported by the adoption of the FBC as boundary object, work jointly to solve a problem and co-create solutions. They may achieve better results working cooperatively than by working individually. Through open inquiry and dialogue, the students created new configurations for sustainable BMs and reached broader understanding of the FBC and therefore of *sustainability-as-flourishing*. As Laszlo *et al.* (2014, p. 65) suggest, open inquiry and dialogue "allow a group to learn its way through complexity to sustainable action". The students also developed practitioner skills that are essential for sustainability efforts (Holman, 2000). As Guerra (2017, p. 437) concludes: "The curriculum for ESD should be open, negotiated and co-constructed [. . .] and create spaces for reflection and transdisciplinary education, flexibility and adaptability".

When it comes to the particular framework for BMI for sustainability (FBC) which students used as a boundary object in the context of interdisciplinary, peer-assessed distance learning, the experiment highlighted certain limitations with respect to the FBC:

- Connections between different building blocks were not always clear, possibly because of the graphic design.
- The name and purpose of certain building blocks were not always clear.
- The time dimension was difficult to implement because ideas were short-term.
- It was difficult to take a holistic perspective in addressing the three contexts at the same time.

Limitations with respect to the experiment itself also emerged:

- The students did not fully understand their roles and responsibilities.
- The students who gave feedback were not asked to follow up on this feedback.

The experiment was presented as a one-time activity – with a limited time frame and with no budget. Thus, it was an add-on to the existing curriculum at both universities. As Guerra (2017) states, even when universities have incorporated ESD into their curricula, there are still challenges such as ensuring the institutionalization of long-term, well-funded opportunities for students to learn and practice critical, holistic and systemic thinking applied to real life situations. In this study, although the students were encouraged to take ownership of their learning, the time frame of the experiment was too short. Moreover, it was difficult for them to take a fully systemic approach and to define different types of benefits in this one-time activity. The economic benefits were easier to describe than the social and environmental benefits. The literature on ESD confirms the existence of such challenges (Guerra, 2017; Hogeboom *et al.*, under review; Palacin-Silva *et al.*, 2018).

## 8. Conclusions

This paper describes an experiment, in which 52 engineering students from two universities (one in Sweden and one in Belgium) provided feedback to each other related to the FBC. Using education for flourishing as its theme, the paper aims to increase our understanding of a particular framework for BMI for sustainability that is used as a boundary object in the context of interdisciplinary, peer-assessed distance learning. Main idea is to illustrate how universities can create a more open educational environment in which multi-disciplinary and multi-national learning promotes the key ESD component of integrated thinking (Guerra, 2017).

The experiment contributed to better understanding in terms of the usability of the tool (the FBC) and of the accessibility of its format. The results show that the students found some FBC building blocks easy to understand and use and others difficult to understand and use. The results also show that the experiment's format helped students engage in dialogue and offer feedback on sustainability and flourishing and on shared meaning and learning.

This study has several implications for research and practice. When it comes to implications for practice, this research can support higher education institutions that are interested in adding (or strengthening) *sustainability-as-flourishing* instruction to their educational approaches. The implications for the society then would be the increased potential to provide future decision-makers who are equipped with competences to tackle wicked challenges in a cooperative and discursive manner. The following instructional advice is offered:

- Depending on students' educational backgrounds, educators should provide targeted training in the FBC building blocks.
- Educators should emphasize the time perspective (artefacts for the near-, short- or long-term).
- Educators should help students think about the relationships among the building blocks (systemic view).
- Educators should introduce word clustering in the goals, costs and benefits building blocks to encourage students to generate ideas related to the environment, society and economy.
- Educators should use more peer feedback sessions (especially oral sessions) in their courses. These sessions help students collaboratively create meaning and apply the concept of sustainability-as-flourishing in real-world contexts.

When it comes to implications for research, there is a need to carry out more work on the use of boundary objects to enhance learning and understanding in ESD. Furthermore, more research is needed that leads to the creation, testing and evaluation of the tools for BMI for sustainability and their inherited complexity (in the case of FBC building blocks such as ecosystem services actors and biophysical stocks). Furthermore, the effect of additional student coaching and training should be also investigated. More research is also needed on other approaches to sustainability learning and distance learning at the university level. Another fruitful avenue for future research is conducting a comparison experiment with more extended engagements from distant peers to compare the results with the current study. Furthermore, a comparison among our pedagogical approach, focussing on using collaborative distance learning, with other ones would be useful to determine their effectiveness in different contextual settings (e.g. industry sectors, student populations).

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## About the authors

Francesca Ostuzzi holds a PhD in Industrial Design Engineering Technology from Ghent University (Belgium) and a master's degree in Industrial Design Engineering from Politecnico di Milano (Italy). She currently works as a Teacher and a Researcher for Ghent University, Campus Kortrijk, in the Department of Industrial Systems Engineering and Product Design. Both teaching and research activities focus on the overall topic of design for sustainability, meaning the design processes and outcomes aiming at triggering more sustainable futures. Specific topics of her research are open-ended design, cybernetics, systems-oriented design and circular economy (with specific focus on the biological streams, as in their adoption in design faculties) with insights on the related flourishing business models. Francesca is affiliated to two research groups: Design Nexus and the Center for Sustainable Development of Ghent University. Francesca Ostuzzi is the corresponding author and can be contacted at: francesca.ostuzzi@ugent.be

Maya Hoveskog is an Associate Professor in Innovation Management at Halmstad University. Maya Hoveskog's PhD was awarded from Rousse University, Bulgaria, in 2009. She has more than 10 years education experience on bachelor's and master's level. In her research, Maya focusses on innovation processes with special interest in sustainability-oriented business model innovation and value creation and teaching and learning in higher education in collaboration with colleagues from different disciplines (e.g. environmental studies, design studies). She has co-authored over 50 different articles/book chapters/conference papers. Some of which are published in *Journal of Cleaner Production, Journal of Corporate Social Responsibility and Environmental Management, Sustainability Science* and *Industrial Marketing Management*. Maya is an individual endorser of Responsible Research in Business and Management Network. Maya is also a Member of the Flourishing Enterprise Institute Advisory Committee – an emerging global initiative for knowledge mobilization on sustainability and enterprises.