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Insights from Teaching Sustainable Business Models Using a Mooc and a Hackathon

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Abstract

We provide two teaching approaches, developed to teach sustainable business modeling to Bachelor and Master students. First, we present a MOOC on developing "new business models" focusing on practitioners in society. Second, we describe an approach in which students develop sustainable business models using a Hackathon as the teaching format.

Introduction

This contribution reports on two courses concerning teaching sustainable business modeling (e.g., Boons and Laasch, 2019; Raith and Siebold, 2018) each crafted around a specific didactical approach. The first course, 'New Business Models - working together on value creation,' concerns a Massive Open Online Course (MOOC; Mazoue, 2013) at Master level that enables the provisioning of teaching on a global scale and thus reaching out to a broad audience. The second, 'sustainable entrepreneurship,' is a Bachelor level course shaped around the Hackathon model (Cobham *et al.*, 2017), which focuses on intensive learning with a limited audience, over a short period. Both courses are driven by the desire to strengthen the impact of our teaching efforts regarding the vital topic of business modeling for sustainability transitions.

The MOOC is designed in an instructional mode, inviting learners to translate the teachings into their ideas and practices. The Hackathon emphasizes active group-based learning and demands learners to apply the taught material in the products they create. The MOOC focuses on helping practitioner-learners to develop a community-based business model. We will provide a brief description of the history of this course, highlight the design, and provide figures about its use since its launch in May 2016.

The second course on sustainable business modeling aims to educate third-year Bachelor students from across academic disciplines how to develop a sustainable business model within seven weeks. In recent years, we have experimented with a variety of classical didactical models. Now we have made the transition to a combination of lectures and tutorials, leading to a 24-hour teaching Hackathon.

In both courses, we use three types of sustainable business models (BMs), namely: (1) platform (Tukker & Tischner, 2006), (2) community-based (Jonker, 2014), and (3) circular (Jonker *et al.*, 2018). Platform BMs are using the surplus capacity of assets (e.g., cars standing still 80-90% of the time, or self-generated energy wasted). Community-based BMs take shape around communities engaging in collective value-creation (e.g., neighbors starting energy, mobility or food co-operative). Circular BMs organize value-preservation when closing material loops. From our research since 2013, we state that these three BMs cover around 80% of the archetypical business models concerning sustainability.

In the following sections, we provide insights into these two courses at hand. The next section subsequently presents the courses and, per course, we will discuss (1) its history, (2) the course design, (3) what parameters have been used to give shape to the selected didactical approaches, (4) the effects of the chosen approaches on teacher-learner interactions, (5) the learning effects we have obtained and, finally, (6) a discussion on points for improvement. We will finally provide some critical insights from our experiences, followed by conclusions and discussion.

Course 1: Business Models for the Circular Economy MOOC

Approach

Course organization

In this course, students systematically explore and build their own New Business Model. Key is creating a community around a value-proposition. Regularly, a community-based business model is based on five building blocks. These building blocks are: (a) principles, (b) design structure, (c) offer, (d) community and finally (e) created values. Together, they constitute the Clover Leaf Business Model (Jonker, 2015) that guides students through the development of their own viable and valuable business model.

Based on the Clover Leaf Business Model, six design steps have been formulated that help the student through the MOOC (Mazoue, 2013; see figure 1 for the landing page of the MOOC). These steps are: (1) introduction to the course, (2) the concept of the WEconomy (Jonker and Faber, 2015), (3) the business model design using the Clover Leaf Model, (4) principles and the value proposition, (5) community-building, and (6) assessing the value that is created. These six steps are explicated in a course book and illustrated in a series of YouTube clips. For each step, a systematic elaboration in five to seven steps is provided in these clips. Besides, a wide range of publicly available material (text and visual) to each of the design steps is added.
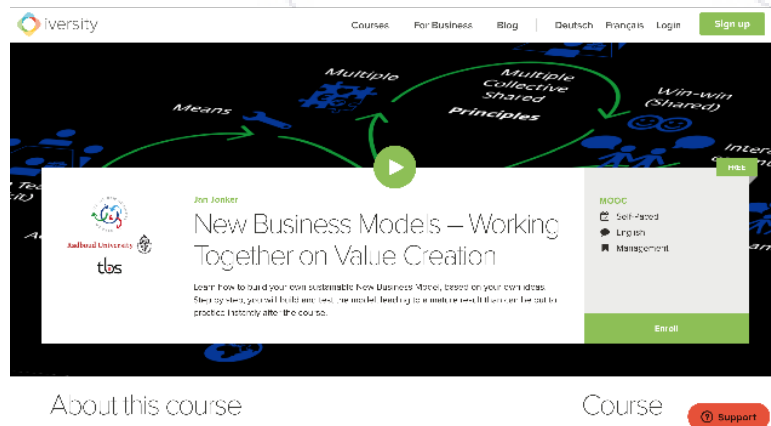
Figure 1: Screenshot landing page MOOC

Didactical design parameters

The course builds on the principles of peer learning (Boud *et al.*, 2014). Students enrolled in the same course utilize each other's know-how and experience. This materializes in the various assignments that are handed out throughout the course. To progress, students are required to provide feedback on each other's work. The MOOC platform facilitates this through discussion forums and a digital workspace. Peer learning enables the students to gain insight into what others are doing regarding the same assignments and to receive feedback on their work in progress. Step by step, participants build and test their model, leading to a mature result that can instantly put into practice. To demonstrate this applicability, students need to make a short YouTube video clip of their final result.

Teacher-student interactions

The basic design of this MOOC is such that it can run in a stand-alone mode. This design parameter has been selected since the MOOC intends to reach out to a global audience. Given this context, direct interaction between student and teacher is a costly and complicated feature. In the design stage of the MOOC, the idea of a weekly, interactive webinar has been explored. Eventually, this function was eliminated because it was rendered infeasible to gather a global audience at the same time.

Furthermore, because the MOOC is self-paced, students are at different levels of their learning journey and consequently face a variety of challenges at the same time. Instead, we implemented a weekly mailbox that students may use to submit questions about their specific issues. Additionally, the MOOC offers a continuous, mixed stream of information consisting of new videos, weblinks, written material, et cetera. This additional material aims to be proactive to the questions they might raise.

Thus far, 8,500 students have started the MOOC for three years. In developing the course, we had hoped to reach out to 10,000 students in the first year, based on estimations provided by the MOOC platform provider. The result of reaching 'just' 8,500 students for three years is somewhat disappointing. To our knowledge, the enrollment has not yet led to any drop-outs due to lack of interaction or information. As far as we know, approximately ten percent has completed the entire MOOC. Also, this was below expectations. We had hoped to be able to issue a more significant number of certificates to participants. These figures provide little insight into the way participants use the MOOC.

Key-insights

When we began to design the MOOC, we were naively optimistic due to a lack of understanding of the complexity and integration of this entails. Practically, this meant that designing on various levels (videos, content, assignments, linguistics, illustrations, additional materials, et cetera) and continuously going back and forth in order to encompass the entirety of this instrument of teaching has been challenging and time-consuming. In hindsight, it would have been more efficient to design the basic layout of the MOOC with experienced people. Such collaboration would have brought in the necessary knowledge and skills early in the process and would have resulted in framing this design process 'through the eyes of MOOC-design requirements.'

A second observation has been that we experienced a steep learning curve regarding the translation of the written text to videos and visuals such as schemes and animations. Considering the average length of a video clip of 90 to 120 seconds, messages must be brought back to their bare essence in order to be comprehensible. The same applies to animations. While a plethora of software applications are available to create animations, it is not immediately clear which style best suits the messages we aim to bring to the intended audience. The further the process of MOOC realization advances, the more prominent the entanglement of videos, animations, and other sources of information become. This demands the constant checking of coherence between all parts of the MOOC. Videos and other materials that have been produced at an early stage may need to be remade when progressing further.

Third, we deliberately designed the MOOC to operate independently of face to face teaching efforts. The consequence is that teacher-student interaction has been reduced to the absolute minimum. While this leads to an efficient process of using the MOOC itself, the live interaction with users is lost. As a consequence, the feeling of how students engage with the teaching material is missing even though they are regularly asked to provide feedback. This implies that it becomes nearly impossible to realize what the learning effects are for the participants and how they ultimately use the results.

Points for improvement
The positive experiences thus far with designing and executing this MOOC also show that using a specific technology quickly leads to the phenomenon of the 'elephant in the room.' In this case, the elephant is the technology that is very demanding on the cognitive, educational, and creative efforts of both the teacher-designer as well as the students. The technology continually stimulates the drive to add features, materials, side-steps, et cetera to the core for the learning experience. In retrospect, a piece of valuable advice is to keep the design simple. The current MOOC consists of almost 40 videos and animations, all of which are aligned towards the goal of designing your own, sustainable business model. To go through all of this material in a relatively short period, answering all of the questions, and fulfilling the complete series

of assignments is demanding. Despite this, a MOOC should be supplemented with national or local webinars, lectures, and workshops.

Furthermore, a gathering of people that have completed the course at a given moment in time would be an exciting feature. Last but not least, digital connectedness of people and the potential this brings to learning experiences have not been explored. Participation to the MOOC creates a dedicated global network of which the richness has not been utilized.

Reflecting on the development and use of the MOOC, we cannot deny it all started naively and intuitively. The efforts in making a professional MOOC are substantial. Still, we have reached a substantial number of students, globally, in a relatively short period. Our advice is to design a MOOC in parallel to regular teaching and build in cross-connections between these. This takes away some of the instructional parts of teaching. These then may be replaced by workshops in which students are invited into in-depth debates on their work in the MOOC, emphasizing more active and engaged teaching.

Course 2: Hackathon Sustainable Business Modelling

Approach

Course organization
The course 'sustainable entrepreneurship' consists of two stages, (1) preparation and (2) execution in which students work in teams. The preparation stage consists of a series of lectures and tutorials that run for six weeks. These provide students with all theoretical, conceptual, and practical information they require in order to develop a sustainable business model around a practical case. For every year, a variety of organizations is invited to provide live challenges on which students may work during the course. The practical case concerns a challenge that is provided by one or more sponsors. The case of 2018 came from a waste management organization, which provided a challenge on a specific fraction of dry household waste non-biotic, consumer waste stream. Sponsors are invited into the classroom to host guest lectures on the practical and organizational specificities of the case at hand. In this preparatory stage of the course,
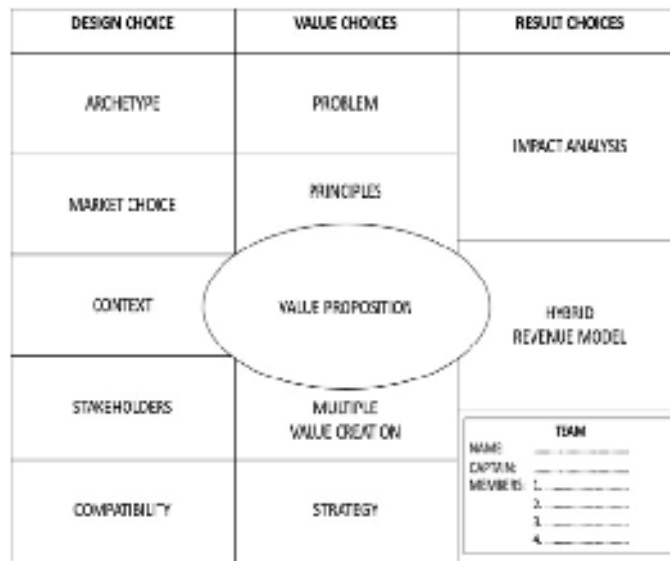
Figure 2: Business Model Template

students already make initial choices regarding their final business model. The execution stage is a 24-hour Hackathon (Cobham *et al.*, 2017). In this limited time frame, students develop their business model, using a predefined format (see figure 2). Support was offered by a group of external experts covering a variety of domains relevant to the case at hand, and the involved teachers during the whole of the Hackathon. Teaching assistants provided operational support (e.g., student administration, ushering the Hackathon venue, logistics of food and beverages), during both preparation and execution stage. The product student teams deliver consists of (1) the actual sustainable business model design shaped according to the provided business model template, and (2) a document in which they elaborate their choices and how these are aligned. The two combined are labeled the 'learning portfolio.'

Background
This course builds on a long teaching experience on the subject of sustainable business modeling. It began in 2011 and has been developed further in three stages. During the first stage, the course was set up as a conventional weekly design. It was provided as an elective in which third-year bachelor students were introduced to sustainability concepts from a management and business perspective. Students from all faculties of Radboud University Nijmegen (The Netherlands) were able to enroll without having any prior knowledge of these subjects.

After four years, during which popularity had been moderate, we made the first course-design changes. This led to a course in which students were invited to develop their sustainable business models in pairs for seven weeks. Every week, students attended thematic lectures followed by a tutorial in which they applied this theme in their business model the next day. Students were allowed to choose any business model as long as they were able to argue how this contributed to various aspects of sustainability. The exam consisted of a report on the developed business model using a strict format accompanied by a 90-second video clip explaining the content of the business model to a broad audience. This helped students to understand the notion of dissemination. These video clips were peer assessed in-class during a Beauty Contest. Students were invited to cast their votes on the various videos leading to a top three. This change of didactics quickly led to the affluence of students compared to the previous setup.

The last and third redesign has been realized most recently during 2018. We kept a compressed and iterative structure of lectures and tutorials while keeping the primary assignment of developing a sustainable business model. We added the 24-hour Hackathon at an off-grounds location at the end of this series. The off-ground location allows us to offer a dedicated teaching environment from which students cannot 'escape' and continuously are in the vicinity of their fellow students

and teachers. At the location, we arranged for digital infrastructure, around the clock catering, and took considerate care of health and safety aspects. During the Hackathon, students were not only supported by the involved teachers but also by a pool of specialists from various disciplines related to the case at hand. A digital, visual, and physical structure was created to enable teams to raise issues. The structure enabled allocation to the appropriate specialist and ensured being able to address these issues as quickly as possible to keep the momentum of the development process. This was reinforced by using a giant time clock ticking away the seconds and minutes of the 24-hour adventure. The expected outcomes of each of the teams of the Hackathon were explicitly stipulated. The end of the Hackathon was announced with the sound of a horn, forcing students to cease all activities. A jury of five independent specialists was brought in to assess each of the team results. A rubrics template was used to make an assessment in which the outcomes were announced in a festive plenary meeting. The top three winners received an award. The Hackathon and, thus, the course was officially closed with a festive dinner. The costs involved in this setup require substantial additional sponsoring. This last redesign was made such that the study-load matched the number of credits and teaching hours.

Didactical design parameters

From the beginning of the course, students worked in teams of four to five persons to create their sustainable business models. The creation of those teams has explicitly been part of the didactical approach of the course. Students needed to choose team members, a team captain, a name, and a mascot. The team captain was made responsible for internal team coordination and communication. The challenge for the individual team members was to take upon themselves a role outside of their comfort zone. Each team had to design and provide a presentation of the developed business model using the BMT and supported by a 90-second video clip. The team decided how to present the results to the jury. The presentation was strictly limited to a ten-minute time frame.

Regarding the contents of the course, instead of allowing any business model to be accommodated, a central theme (and material) was determined upon which students had to elaborate a business model. Three different archetypes of sustainable business models were allowed: (1) platform, (2) community, and (3) circular. For each of these types, ample documentation and teaching were provided. To guide the process of developing a sustainable business model, the BMT, was developed, including elaborate instructions. Also, the elements of this BMT were systematically addressed in the various lectures followed by several previous assignments. During the actual Hackathon, the BMT served as the guiding framework for developing the sustainable business model. At an earlier stage, students received precise written and oral instructions on the BMT and were offered the chance to experiment with its various building blocks.

We consider the Hackathon - based on teams of students working with the BMT - as a didactical instrument that was put to use to enable the smooth design of a sustainable business model. Crucial in the process leading towards the Hackathon was the creation of a collective, level playing field based on shared knowledge, teaching, and experiences. This and the choice for a specific constrained each team to develop a focus on one of the specific sustainable business model archetypes. Furthermore, this offered students a natural pathway to in-depth and content-wise elaboration on the challenge they faced. As a result, all sorts of possible side steps could not be avoided (this was even encouraged by the teachers); however, students quickly realized when they were approaching an impasse.

Teacher-student interactions

In contrast to the earlier described MOOC, this elective relies strongly on intensive teacher-student interactions inside and outside (i.e., during the Hackathon) of the classroom. During the six weeks of teaching, students develop a variety of relationships (a) amongst each other, (b) with the core teachers, and (c) with the specialists during the Hackathon. To maintain independence, the jury was not part of the teaching corps. Dedicated software was used (i.e., Slack) in addition to conventional teaching software (i.e., Brightspace) to facilitate communication within teams and between teams and specialists. This was provided in addition to regular teacher-student interactions during classes and was supplemented with dedicated consulting-hours.

Key-insights

The Hackathon model has shown itself as a powerful didactical approach. Specifically, when applied to a design challenge, it fosters creativity while a clear focus is developed step-by-step. Furthermore, students are guided by an increasing set of rules, conceptual models, time frames, social pressures (especially between-team competition), and the growing collective ambition to win. Two to three weeks into the teaching process, these competitive and social dynamics visibly come into play. Students begin to understand that the offered approach is a different concept compared to traditional teaching.

Second, collaborating with an external, non-profit organization brought in-depth knowledge about specific practices and the actual case into the classroom. This led to practitioners teaching in the classroom and sharing their experiential knowledge. The core-team helped the practitioners prepare their contributions and sort out their references. The latter is explicitly needed since this is not commonplace for practitioners. This amalgamation of core-teachers and practitioners resulted in a coherent set of assignments that became tangible to students. In this way, they experienced how theory and practice are intertwined in a current, real-life case.

Third, although ample instructions on the BMT had been provided, and students were offered the possibility to practice, it was realized that this was insufficient. When the results were presented at the end of the Hackathon, and more in particular when they handed in their final assignments, it became apparent that the aligned use of the different BMT building blocks did not meet expectations. The BMT consists of a set of building blocks that only make sense when they are used coherently. We observed that certain elements of the BMT, in particular compatibility (i.e., the connection to existing arrangements in practice), impact analysis (i.e., the expected impact of the business model in environmental, social, and economic senses) , and the use of a hybrid revenue model (i.e., the simultaneous use of a various values), were difficult for the students to grasp. Hence, there was little coherence on the elaboration of these specific building blocks. As a result, most assignments were in this respect, incomplete.

Points for improvement

The teaching we describe covers eight years. During these eight years, we changed the entire course design twice. From traditional teaching via pairwise business model development to a structured team-based approach framed by a Business Model Template. During this process, we moved from a more descriptive approach towards an (inter)active design approach. We also moved from frontal classroom teaching to an amalgamation of teamwork, frontal teaching, consulting hours, workshop, and learning through making a video clip. This led to a reorientation of the teaching model and the adjoining assignments. Compared to a conventional approach, the teaching systematically began to serve as stepping-stones towards the pressure cooker model brought about in the Hackathon. The experiences thus far provide ample justification to continue with this approach. The elaborate evaluation among students generally demonstrates keen appreciation for the offered elective. Students indicate that, despite their various backgrounds, they are facilitated in developing a sustainable business model to the best of their abilities. The period of seven weeks is perceived as an appropriate time frame (although not all students agree on this).

In retrospect, we have five observations. First, we have witnessed an unbalanced use of the provided resources (with a slight preference for sources used during lectures). Second, more time and effort need to be invested in not just explaining the BMT but also gaining experience with its different building blocks. This implies we will use the time allotted to the workshops to systematically discuss and practice the various building blocks of the BMT and their alignment. For example, we introduce the idea of hybrid revenues, provide examples, and then have the students exercise the design of their hybrid revenue model and pinpoint the alignment with the remainder of the BMT. Third, the screening of specialists involved in the Hackathon is crucial for the value of the information offered to students and, as such, the success of this part of the course. Fourth, the communication devices that were used correctly for public interaction with specialists need to be embedded in the entire course design. Fifth and finally, despite the practical and financial implications, a site-visit to an operational business model would aid students to grasp what is at stake.

Conclusions, recommendations, and discussion

Looking back, a first observation is that our adventures of teaching sustainable BMs and (re)designing our courses was initiated in 2013. In the beginning, the gist of the courses was not in the didactics but the contents. More, in particular, it started in an ill-defined, if not obscure, need to redefine existing BM logics. The BMs we focus on contributing to a transition of the economy towards more sustainability, circularity, and inclusivity. We consider this important not only as academics but moreover as engaged citizens who want to educate young thinkers and workers. This is crucial since it is this logic that drives our research and, consequently, our teaching. Our experiences with the MOOC and the Hackathon are that the use of both models is heavily sponsor-dependent. Additional funds are required to initiate and continue such didactics.

We conclude that it takes considerable time, effort, and creativity to design and test a course on a topic that defies mainstream economic and BM thinking until it is more or less stable. Even when workable-ready, continuous work is needed. Implementing this course in existing teaching contexts is not warmly received by colleagues. Second, designing a MOOC that is not physically institute-bound has resulted in a stream of criticism from the existing institutional order. Accepted revenue models and didactical approaches insufficiently fit the MOOC teaching model. It deviates from a controlled classroom situation in which the 'talking head' has full control of the educational content and program.

In contrast, a MOOC requires trust, stimulates extensive collaboration between participants, and operates from the premise that 'stealing knowledge' is a good thing. As a result, a massive number of people participate freely in a type of 'action learning' (e.g., Argyris and Schön, 1978; Vail, 1996). A third conclusion that we draw regarding the teaching is that introductory lectures and workshops are a prerequisite for the success of the Hackathon. Students are systematically confronted with the content that is core to it. The developed Business Model Template plays a crucial role that guides students through the content. Four, sponsorships offer the possibility to bring in real life cases represented by people with names and faces. Real actors enter into the classroom; students intuitively sense the authenticity of the matter at hand. Our fifth and conclusion are that, in both cases, we have witnessed that learning in collaboration is not the only key in our didactical approach but also has a lasting impact on their way of thinking and acting in their daily, professional lives.

In the near future, we would be pleased if the link to the world outside of the classroom is reinforced. New societal concepts that are rooted in the Community of Practice (COP; Wenger, 1998) such as Urban Living Labs, Innovation Work Centers, Regional Hubs, et cetera foster this collaborative learning process. As a result, we suggest the diminishing of classical, classroom teachings and instead favor the reinforcement of situated learning based on theory while addressing the complexities of practice. In hindsight, we conclude that a MOOC can stimulate learning on a global scale, while the Hackathon allows for the intensification of face-to-face learning. The choice between these depends on (1) available means, (2) educational setting, (3) resources available, (4) envisaged outreach, and (5) skills and capacities of the educational team. A clear-cut checklist cannot be provided in this respect.

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