Educating Entrepreneurship through Design

Jeroen Coelen and Frido E. H. M. Smulders

Abstract The early stage of new venture creation is highly undetermined, is high in uncertainty and requires action to progress. These characteristics overlap with the definition of what makes a problematic situation a design problem. In order to improve education for students to deal with this type of problem, this chapter builds on the paradigm of 'through' education and the new venture creation approach. It proposes a new paradigm, 'entrepreneurship education through design' with a strong focus dealing with design problems via designerly behaviour. This chapter highlights the design theoretical basis of this paradigm and shows how the course setup can contribute for students to display designerly behaviour, reduce uncertainty and ultimately successfully incubate new ventures.

Keywords Design · Entrepreneurship · Entrepreneurship education · Design problems · New venture creation

1 Introduction

Entrepreneurship is dominantly (83%) taught via two approaches, 'about' and 'for' (Pittaway & Edwards, 2012). In 'about' education, the most traditional format, the students get codified knowledge on entrepreneurship such as entrepreneurship theories and are tasked to reproduce it in a test. In 'for' entrepreneurship, students get simulated entrepreneurial tasks, such as the writing of a business plan and/or case studies. Where the goal of entrepreneurship education is the acquisition of true entrepreneurial skills, the third approach called 'through' education has become more popular. Here the course is designed so that the students engage in actual entrepreneurial behaviour, not only analysing and planning, but going out and acting on the ideas. As a result of this recent attention to 'through' education, experiential learning (Kolb, 1984) has become an upcoming learning philosophy in

J. Coelen (✉) · F. E. H. M. Smulders
Design, Organisation & Strategy, Delft University of Technology, Delft, Netherlands
e-mail: j.coelen@tudelft.nl; f.e.h.m.smulders@tudelft.nl

J. H. Block et al. (eds.), *Progress in Entrepreneurship Education and Training*, FGF Studies in Small Business and Entrepreneurship,
https://doi.org/10.1007/978-3-031-28559-2_26

entrepreneurship education (Lackéus, 2020; Baggen et al., 2021). A popular vehicle for this type of 'through' education is the venture creation approach, where a combination of education and incubation happens (Ollila & Middleton, 2011). Here, not only do the students learn through entrepreneurship, they also build real ventures, as they engage with the real world and not with a simulation, as 'through' as one could get. The ventures from courses like this can sustain after said courses and, for instance, join university incubators after the students graduate.

It sounds simple, but it is not. If we want to teach our students 'how to start a new venture', we should ask ourselves what the start of a new venture is like. We know that new venture creation is a process that is chaotic, complex and idiosyncratic for a variety of reasons. Firstly, entrepreneurship is contextual (Welter, 2011; Zahra et al., 2014), as in the variety in external forces that work on each start-up. Furthermore, the composition of the start-up, such the team's capabilities and their resources, varies per team, let alone which idea or opportunity they are pursuing and the market they aim at. This implies that what works for one team might not work for the other. Secondly, the process is riddled with uncertainty. Goals and processes are unclear and ambiguous. For each moment in the process, it is impossible to assess what information is truly relevant or have full certainty on what steps need to be taken. Next to that we cannot predict the future (Knightian uncertainty). Sarasvathy et al (2008) conclude that all these uncertainties allow the early stage of entrepreneurship to be characterised as a design problem, problems that are in part undetermined or ill-defined requiring action to solve them (Dorst, 2004). This observation made us choosing design theoretical principles as the basis of our teaching approach, hence the title of this chapter, educating entrepreneurship through design.

In this chapter we give you our position on entrepreneurship education that we have named after research as 'entrepreneurship through design' (van Oorschot, 2018). Firstly, we will focus on what the start of a new venture is about and what it entails if we are to see this as a design problem. From there we move to describe design theoretical perspectives by addressing the application and education of designerly behaviour as a prerequisite of our approach. This is followed by the practical implications of this approach in the course setup that enables designerly behaviour, combined with some illustrative examples from a course taught in this way.

2 Entrepreneurship as a Design Problem

At the start of any entrepreneurial journey, it is widely accepted that it can go in many directions. Upfront, it is extremely hard to tell which precise direction a venture will go. At the start of such a journey, a lot needs to be figured out. One of the key elements is to figure out what needs to be figured out. This is a layman's way of explaining what a design problem is. Design problems are problems that are undetermined. This does not mean that there is complete freedom to what the problem is, but the biggest part of the problem is undetermined (Dorst, 2004). Part

of the design process is getting to the (re)defined problem, as illustrated in many design process descriptions such as Design Council's double diamond (Design Council, 2007). Design problems sometimes are called wicked problems (Rittel & Webber, 1973), ill-defined problems (Maher et al., 1996) or ill-structured (Simon, 1973). In the end it seems that, theoretically speaking, design problems are hard to define (Dorst, 2006), but what they have in common is unclarity, undeterminedness and an interaction as a requirement for solving the design problem. The latter can be explained with this metaphor: Imagine finding yourself deep in a cave, with just a flashlight. Assume you want to leave that cave. You point your flashlight around and you discover three tunnels. The flashlight only allows you to see part of your current context; you do not have a map of the entire cave system. Without going into any of the tunnels, you cannot find your way out of the cave. This is what makes design problems require action for solving. You need to engage with and in a situation to solve the problem.

This is what we find in the early stage of entrepreneurship: high unclarity, high uncertainty and a requirement of action. Therefore, the early stage of entrepreneurship can be seen as a design problem (Sarasvathy et al., 2008). As stated before, entrepreneurship is highly dependent on the situation. To understand what the situated design problems of entrepreneurship are, we should look at how the designer (in our case entrepreneur) approaches the problematic situation (Dorst, 2004). The entrepreneur aims to break down the problematic situation and pick a way forward from the way he makes sense of that situation. To break open these undetermined problems, one needs to interact with the situation. This explains why 'through' education and not 'for' and 'about' education is most suited for letting students experience entrepreneurship by doing. However, there are no pre-defined paths of interaction to arrive at a solution from a design problem that the early stage of entrepreneurship entails. We call this fluid process design. The outcome of design is an interpretation to a problematic situation and potentially a solution to it. In other words, design processes move uncertainty towards more certainty; this goes for entrepreneurial contexts too (Berglund et al., 2020). Thus, design activities are seen as a way to deal with the uncertain fuzzy front end of entrepreneurship (Nielsen et al., 2017). In this early stage, the activities are not only characterised as design, yet also as effectual logic (Reymen et al., 2015). Effectual logic also is seen as a mitigator of uncertainty (Mansoori & Lackéus, 2020; Klenner et al., 2022), which seems to have strong relationship with design (thinking). In recognition of the uncertainty of the early stages of this process, design (thinking) has become a rising method within entrepreneurship education (Daniel, 2016; Sarooghi et al., 2019; Linton & Klinton, 2019).

However, design thinking (DT) and design are not the same thing. Design thinking is often referred to as the user-centred multistep solution generation method, dominantly the model proposed by Stanford D. School, or related variants (Sarooghi et al., 2019). Although more steps exist than ideation, within entrepreneurship education, DT is often reduced to ideation and focused solely on the creation of problem solution combinations in the shape of products or services (Sarooghi et al., 2019) and by that excluding a wider perspective of the new venture

beyond its product or service offering. Later we will refer to this holistic output of the entrepreneurial design process as the venture concept (Dimov, 2021). We see that DT is often taught as a linear process with limited cycles (Linton & Klinton, 2019) and lacks deep holistic cycles that include the interaction between designers and non-designers outside the 'discover/empathize/understand' phase. This reduces DT to a creative innovation method that creates product or service concepts and misses out on the integrated but still conceptual version of the whole venture. This comes to questions entailing elements from a target customer to a business model, from pricing to suppliers and from marketing channels to branding to financial models, to name a few (Afuah & Tucci, 2003; Osterwalder, 2004; Coelen & Smulders, 2020).

While interacting with the problematic situation, the entrepreneur slowly builds up a picture of the current situation and an idea of the ultimate venture, the venture concept (Dimov, 2021; Vogel, 2017). This venture concept is abstract and uncertain at the start of the journey. It is not clear from the start which elements reside within the venture concept and which of the many elements in the venture concept will require attention, if they require any attention at all. Such is only possible by interaction with the problem or the situation (market) in which the problem is believed to be found. Ultimately, student entrepreneurs aim to seek a profitable business opportunity by making satisfactory connection between a suboptimal market situation and a potential value proposition that aims to improve that situation. Navigating this fog is a cumbersome process and goes by trial and error, moving back and forth. If we wish to educate our students as entrepreneurs, we should equip them with the skills, behaviour and mindset to mitigate this early-stage entrepreneurial design problem.

This brings us to design, not the opposite to design thinking but a broader, less defined set of activities and mindsets. This includes design**erly** thinking (Cross, 2001; Cross, 1982) (which is not similar to design thinking (Laursen & Haase, 2019)) and design(erly) (inter)acting (Smulders & Subrahmanian, 2010). Designerly thinking is a discipline with abductive reasoning, design problems and contextual meaning making at its core, via approaches such as reflective practice and co-evolution of the problem and solution (Laursen & Haase, 2019). Design acting does not refer to the design activities such as sketching or model making, yet includes the social activities in relationship to non-designers. In our case, this would be the social activities of the entrepreneur in relation to external stakeholders such as customers and suppliers to ultimately create the change the entrepreneur envisions. In the remainder we will merge designerly thinking and designerly acting into designerly behaviour. If one is to focus entrepreneurship education at this fuzzy front end of the new venture creation process, we believe the courses should be set up to deal with the situation as a holistic design problem. For that purpose, we propose *educating entrepreneurship through design* as a didactic format. In the next section, we will explain what designerly behaviour entails in an entrepreneurial context.

3 Educating Entrepreneurship through Design

Now, we turn to our teaching practice. We have educated ***entrepreneurship through design*** for 10 years. In this section we explain designerly behaviour and some of its theoretical foundations. In the subsequent section, we will focus on our course and explain what elements of the course setup enable students to display designerly behaviour in an entrepreneurial setting.

3.1 Educating Designerly Behaviour

Designerly thinking and designerly acting, together designerly behaviour, cannot be taught from the book because we believe it is a tacit capability acquired in practice. At the Faculty of Industrial Design Engineering at Delft University of Technology, this tacit way of thinking and acting is educated by repeated experiential learning cycles (Kolb, 1984) in design challenges combined with a holistic theoretical base that moves beyond design theory only. Our school is well known for its strong research base in the domain of design practice as well as having a strong base (research and education) of the contributing domains like engineering, psychology, anthropology, economics, marketing and management. From the inception of the school in the late 1960s, the dominant focus of our school was on product innovation from strategy till use of the new product in the market (Roozenburg & Eekels, 1995). The above-mentioned multidisciplinary knowledge base finds its way to the students by means of theory classes as well as hands-on design projects that call for a holistic approach. These projects, in the form of challenge-based learning (Johnson et al., 2009), call for pragmatic integrations of the theory by students to arrive at resolution of the design challenges offered to them.

Based on the staged approach of product innovation activities, Smulders (2014; Smulders & Dunne, 2017) showed that the design as well as the engineering activities has a heterogenous character, meaning that design and engineering as human activities are not just applied to the product, but equally to all the other elements of a full-blown product innovation process (production, branding, marketing and sales, etc.). At some point it was realized that the holistic approach of product innovation as taught in our school could equally be of value for the design of the building blocks belonging to the venture concept as introduced by Vogel (Vogel, 2017). Building on these thoughts we started experimenting with entrepreneurship education ‘through design’. The students that follow our course are used to designerly thinking and (inter-) acting, but here are asked to apply these capabilities in a new context, that of designing a new venture concept. In the next two sections we will address some key ingredients from a design theoretical perspective.

3.2 Exploring the Situation through Reflective Conversation

Within our faculty, design as a reflective conversation (Schön, 1983) with and in the situation forms the dominant educational paradigm. Donald Schön (1983) coined this as a reaction on the dominant rational analytic way of problem-solving. Schön identified a type of rationality when analysing a variety of craft workers, such as doctors and architects. What these professions have in common is that the actors encounter new situations which do not have precise and predefined answers. The architect, in a reflective conversation with himself/herself, investigates the results of adding lines to a sketch. The sketch talks back, and he/she investigates permanently if the sketching actions improve the overall design. Reflections happen 'in-action' while sketching, or 'on-action' after a sketch. In this way, the architect learns about the solutions and the (problem) situation at hand. Perhaps he/she should adjust his/her view on the problem, a so-called reframe (Dorst, 2015) of the situation. Making a sketch in this case could be seen as an experiment. Designerly actions are to be seen as experiments that enable the reflective conversation with the situation that in parallel creates deeper understanding of situation and potential solutions.

Let us translate this to entrepreneurship education. The entrepreneur who immerses himself/herself in the market situation to do research there will experience through his/her inquiry that the situation talks back, as it were. We see that every interaction of the student entrepreneur with stakeholders in the market brings new information, to reflect on. Furthermore, when designing a business model, the conceptual model equally talks back. It is this reflexivity that is key for mitigating uncertainty of the fuzzy front end of the venture creation process. It ties in with Kolb's experiential model of learning, where reflective observation fuels the thinking that creates abstract conceptualisations, i.e., understanding of the situation. These abstract conceptualisations in its turn fuel action of which the results can be observed again (Kolb, 1984). Kolb and Schön both share a pragmatic philosophical background, where a key component is the epistemology of the designer (Dixon, 2020). This links back to design problems. Design problems are problems about which we do not have full information. This undeterminedness of design problems is partly epistemic, and an experiential episteme is what helps to build up understanding of the situation via this reflexivity.

3.3 Co-Evolution of Problem and Solution Spaces

A designer observes or senses an existing suboptimal situation. The current situation, external to the designer, is seen as the space that potentially holds a problem worth solving, the problem space in which problems 'live' (Maher et al., 1996; Dorst & Cross, 2001). Problems can and most likely will be implicit or latent, meaning not well-defined, if any form is defined at all. This space forms the context and provides constraints and requirements for the solution. The current situation is something that

at the start of the process is high in uncertainty: designers do not fully understand it and do not know whether the suboptimal situation has a solvable problem. How does the suboptimal situation manifest itself? Which actors are relevant and potential users? What are the driving forces among key actors? Why is the situation like it is today? All these questions relate to the problem space. By submersing the designer in the problem space, via design acting and reflective practice, the picture gets clearer. From this clearer picture, the designers open a solution space by imagining possible solutions. The mitigation of uncertainty happens through designerly behaviour within both the problem and solution space. This does not only happen via the reflective conversation, yet also by a co-evolutionary[1] process where the understanding of both spaces feeds each other. Spending time in the solution space feeds the understanding of the problem space and vice versa. Design research found that designers oscillate between the problem and solution space (Dorst & Cross, 2001) to come to the final solution. This interplay continues in cycles until a satisfactory fit between problem and solution has been reached. Co-evolution is seen from the perspective of a creative designer. However, often the problem space is not owned by the designer himself which introduces another key actor in the design process. For instance, Smulders et al. (2009) looked at the interplay between an architect and the client in the case of the design of a new crematorium. The client being the knowledge partner about the operations in the present building is holding all knowledge about the (potential) operational problems that could occur in a new building. The architect, on the other hand, owns the solution space in which deliberations and thoughts pass by on possible solutions for the new building. Criteria for choosing one option above another are in the architect's head (Dorst, 1997). Meaning, both partners hold implicitly parts of the problem and solutions spaces, respectively. The only way out here is through synchronizing these two diverse mental systems by designerly interactions (Smulders et al., 2008) in which problem and solution spaces co-evolve during the interactions (Smulders et al., 2009).

For the student entrepreneur we see a similar situation. The stakeholders in the marketplace, the situation for the entrepreneur's inquiring, own the problem space with implicit and latent problems. The student entrepreneur as a designer of the new proposition holds the potentialities related to the solution space. Again, only by immersing in the situation including frequent designerly interactions, the problem and solution spaces co-evolve until there is a promising match. It therefore not just becomes a reflective conversation with the situation, but more accurate a reflective conversation with key stakeholders.

[1] For more reading on co-evolution, Crilly (Crilly, 2021a; Crilly, 2021b) offers an extensive overview and critique.

4 A Course that Enables Designerly Behaviour

To enable designerly behaviour, we designed Build Your Startup (BYS), a masters elective of 15 ECTs. It spans 1 semester (18 weeks), where students work for 2.5 days per week on their start-up. The group size per venture idea is a minimum of two students and each batch contains around 8 start-ups. The students most commonly bring B2C ideas, but B2B or B2B2C ideas are not uncommon. One day is reserved for 1-1 mentoring, workshops on relevant theories, skills and frameworks including guest lectures by experienced entrepreneurs. In the remaining days, students are urged to ***build their start-up,*** by executing on their ideas discussed in the mentoring sessions.

4.1 Mentors to Help the Reflective Conversations

In the weekly mentoring sessions of 30 minutes, two experienced mentors (ex-entrepreneurs) help the students to interpret the situation. These are dialogical conversations, where the mentors bring an external view to the situation and are not directive, only suggestive as they think along with the students (Knight, 2017). The mentors help to clarify uncertain elements of the problem space, solution space and overall venture concept, along the lines of active mentoring focusing on the inquiry by the students. Here, they reflect on action (Schön, 1983) of the students, which allows for adjustments of goals, spontaneity, new themes and discussions and disagreement on strategy to emerge (van Oorschot, 2018) to refine the approach of the students. Besides discussing the past activities, the mentors help the students by connecting them with alumni of the course and their own network to broaden their community of inquiry (Shepherd et al., 2020). There are two fixed mentors that alternate each week between half of the groups. We have experimented with the weekly guest lecturers to additionally act as a mentor. This has benefits yet also downsides. The benefit is that students need to re-explain their start-up each week, refining their concept. The outside mentor would mitigate the bias from the two mentors and allow for new perspectives. However, having a completely new mentor each week is somewhat time-consuming; the guest speaker as mentor needs to get acquainted and create some deeper understanding of the student's venture. External mentors do not know what the team discussed last week or the week prior. For this they are less likely to call out the student's lack of action, something the fixed mentors can easily do. Furthermore, these fixed mentors, since they are up to speed, can dive deeper into the venture concept and their approach. Although the new perspectives are important, we prioritise pace and depth over this and nudge students to get new perspectives via their community of inquiry.

4.1.1 Example of the Deepening Mentor Role

In one situation, a start-up had talked with various potential users. They identified them as potential customers, a reflection on their action. However, for the mentor it seemed unclear if these users were the people that were going to pay for the solution. The mentor suggested that ultimately, for the venture to emerge and be profitable, this requirement needs addressing. This did not occur yet to the team. Subsequently, this sprouted a discussion on potential stakeholders that might have an interest and money to solve the problem. Two weeks later they executed on this challenge by talking to more customers and figuring out who would be their paying customer.

4.2 Out of the Building to Reduce Uncertainty

All start-ups in the course start out with an idea of a problem space. Very often, this problem space is broad, undetermined and high in uncertainty, such as 'something with food and sustainability' or 'current dating apps suck'. To make these problem spaces less broad, we enable our students to act designerly. In the first weeks of the course, the homework for each group member is 'Talk to 5 customers', the so-called 'get out of the building' mentality (Blank & Dorf, 2020). In that week, students get a workshop on 'talking to humans' with a focus on open conversations that do not focus on solution validation. This forces the students to build their understanding of the problem space, grounded in the experience of the customer. In our latest batch, 11 start-ups engaged with over 1200 customers and stakeholders over the course of 18 weeks. That is an average of 6 customers per week, enabling to continuously sharpen the understanding of the problem space. It is not only the problem space that gets explored. As designers are used to conceptualising solutions, many scattered ideas will surface in the first weeks. When the mentors sense that one solution is certain enough, they urge the students to do a validation experiment. Again, they need to go out of the building to generate evidence that their solution is truly valuable to the customer.

4.2.1 Example of Mitigating Solution Uncertainty

A recent team had the idea of a vinyl subscription service. After exploring the problem space by talking to customers they arrive at a solution, basically, Spotify's Discover Weekly, but for vinyl. That sounds great, but what next? The team did not know how to act, if to act. Talking to customers would not reveal new information. They did not realise they had mitigated enough uncertainty to execute on this solution. The mentor was able to see that the solution idea was concrete enough to experiment with. Therefore, the mentor urged them to try to sell this solution to 10 people. See if that works, if it sticks. With that little push, they suddenly became

extremely active. Within a week, they launched a pre-order website, and the first pre-orders came in. This lack of execution on a designed solution is something that occurs often in the course. We attribute this to the conceptual nature of most design courses in our school where the output is a product concept. It is this what students tell us they value about our course, the fact that you actually sell your solution.

4.3 Holistic Workshops

To enable the holistic development of a venture concept, workshops on relevant elements are giving throughout the 18 weeks. After a couple of weeks in the problem space, a value proposition workshop is given, followed by a business model workshop. In this way, students can experience the interrelatedness of all the elements of a venture. For instance, they experience the implications of their solution idea on the revenue model. The first quarter focuses on elementary stuff, such as making sure that the solution production price is not higher than the customer acquisition costs and the production costs. In the second quarter, a more detailed financial model is made for 12 to 24 months. In this way, students can calculate how many customers they would require making a living out of this start-up. They can use this to craft a marketing plan and run experiments on the effectiveness of each acquisition channel. In this way, students design their venture holistically, eventually arriving at what we like to call a 'rounded start-up concept', which means well-balanced reduction of uncertainty across the many elements of a start-up.

4.4 Deliverables and Assessment

BYS is a pass/fail course without grades. We do not have a guiding framework or canvas we show to our students at the start. Yet, we felt we wanted to capture the evidence generated by the students. We have experimented with creating our own canvas over two batches, as we felt the Business Model Canvas (Osterwalder, 2004) and lean canvas by Ash Maurya (Maurya, 2016) did not have the answers us educators found important. A key focus of our canvas was evidence; exemplary blocks were 'proof of willingness to pay' and 'value as reported by customer'. After two semesters, we experienced the canvas became more of an end rather than a means. Instead of having the canvas throughout the course, students are required to make an evidence slide deck at the end of each quarter. Here, they have one slide to put all evidence generated for each of the blocks, such as problem statement, job to be done, unit economics and business model. This evidence deck, combined with a regular pitch deck of a physically given pitch, makes up the team deliverables. The lack of guidance of explicit building blocks forces students to develop their own understanding of what is relevant and important. Combined with the implicit frameworks of the mentors, students are more challenged to develop their own

ideas. In a personal reflection, we ask students to engage with an article on 'Top 20 Reasons Startups Fail' (CB Insights, 2019), an idea adapted from a fellow entrepreneurship educator. We ask the students to reflect which of these reasons are apparent in their start-up and what to do to mitigate them. Furthermore, we ask them to add 1–3 reasons to this list, highlighting their own experience and synthesis of what makes building a start-up complicated. Also, we ask for five key learnings written in a blog post format. Throughout the 18 weeks we ensure that their learning is sufficient, and we reflect with them on the course in a debriefing evaluation.

5 Incubation through Design

The new venture creation approach is a combination of 'through' education and incubation (Ollila & Middleton, 2011). We believe the designerly behaviour of our students in this course contributes to educating of entrepreneurial behaviour in a truly entrepreneurial setting, as the students display entrepreneurial, designerly behaviour. Furthermore, we believe that designerly behaviour creates venture concepts that have a high fit in the market. The continuous immersing in the situation via the means of conversations, prototypes and other experiments leads to development of solutions that are desirable. In the latest batch (Fall, 2021), 8 out of 11 start-ups already achieved pre-orders within the first 8 weeks, and 100% of start-ups had sales/pre-orders by the end of the course. At that point, 5 out of 11 start-ups were able to realise actual revenue in bank with customers using the first versions of the solutions. That means turning an existing situation into a changed one by adding a new solution, generating and capturing value via a business model. They developed a venture concept that probably still has uncertainties, but at least much less than at the start. Over the decade-long existence of Build Your Startup, 105 start-ups were founded. In a 2021 survey executed by our teaching assistant, we discovered that 23 of these start-ups were still in operation (22% survival rate). This shows, for us, that designerly behaviour in the early stages of the new venture creation process not only allows to train entrepreneurs, yet also allows for real ventures to incubate. The course resonates well with students. In 2022, the course received 'the most inspiring masters elective' award as voted by all masters students and scores in the upper percentiles with 8.6 out of 10. We believe it is really 'through design' entrepreneurship as a student once summed up 'the only course where the one to bullshit is yourself'.

6 Future Areas of Development

For developing 'entrepreneurship through design' education further, we should gather and compare existing 'through entrepreneurship' courses to see how many of these already have design components and compare the effects on the process. We

have experience with predominantly (90%) design students; however, we would like to see how our course setup fares with students from other types of education, such as business and engineering. Furthermore, it would be interesting to compare these types of courses to incubator/accelerator programs and see what these programs can learn from each other. If you wish to adopt our 'through design' approach, it is important to understand that creating a venture takes time. Being able to work on the start-up for 18 weeks contributes hugely to their learning experience. This allows for teams at all paces to experience what it is like to get traction (or to get none of it). On top of that, the 2.5 days per week enable actual venture building. Students need time to get out of the building and to anticipate and plan to get out of the building. If you reduce the time available to 1 day, students are likely to start focusing more on the deliverables rather than designerly acting. For teachers, the workload is relatively high per student. The 30-minute mentor session plays a big part in that, while we believe it brings a lot of value, it makes a course like this harder to scale to triple-digit student numbers (our current max is ±35). For the students, one of the key challenges of this type of course is motivation. If motivation drops, the entrepreneurial intent is gone; there is no entrepreneurship (McMullen & Dimov, 2013).

References

Afuah, A., & Tucci, C. L. (2003). *Internet business models and strategies: Text and cases* (2nd ed.). McGraw-Hill.

Baggen, Y., Lans, T., & Gulikers, J. (2021). Making entrepreneurship education available to all: Design principles for educational programs stimulating an entrepreneurial mindset. *Entrepreneurship Education and Pedagogy, 2515127420988517*. https://doi.org/10.1177/2515127420988517

Berglund, H., Bousfiha, M., & Mansoori, Y. (2020). Opportunities as artifacts and entrepreneurship as design. *Academy of Management Review, 45*(4), 825–846. https://doi.org/10.5465/amr.2018.0285

Blank, S., & Dorf, B. (2020). *The startup owner's manual: The step-by-step guide for building a great company*. John Wiley & Sons.

Coelen, J., & Smulders, F. (2020). Startup kernels: Towards a teaching framework for fundamental elements of new ventures. *Proceedings of ECIE, 20*, 760–763.

Crilly, N. (2021a). The evolution of "co-evolution" (part I): Problem solving, problem finding, and their interaction in design and other creative practices. *She Ji: The Journal of Design, Economics, and Innovation, 7*(3), 309–332. https://doi.org/10.1016/j.sheji.2021.07.003

Crilly, N. (2021b). The evolution of "co-evolution" (part II): The biological analogy, different kinds of co-evolution, and proposals for conceptual expansion. *She Ji: The Journal of Design, Economics, and Innovation, 7*(3), 333–355. https://doi.org/10.1016/j.sheji.2021.07.004

Cross, N. (1982). Designerly ways of knowing. *Design Studies, 3*(4), 221–227. https://doi.org/10.1016/0142-694X(82)90040-0

Cross, N. (2001). Designerly ways of knowing: Design discipline versus design science. *Design Issues, 17*(3), 49–55. https://doi.org/10.1162/074793601750357196

Daniel, A. D. (2016). Fostering an entrepreneurial mindset by using a design thinking approach in entrepreneurship education. *Industry and Higher Education, 30*(3), 215–223. https://doi.org/10.1177/0950422216653195

Design Council. (2007). *11 Lessons: Managing design in eleven global brands*. https://www.designcouncil.org.uk/sites/default/files/asset/document/ElevenLessons_Design_Council%20%282%29.pdf

Dimov, D. (2021). *The distinct domain of (design science of) entrepreneurship* (Working Paper). Under Review. https://doi.org/10.13140/RG.2.2.23573.96489/1.

Dixon, B. S. (2020). Dewey and design: A pragmatist perspective for design research. *Springer International Publishing*. https://doi.org/10.1007/978-3-030-47471-3

Dorst, C. H. (1997). *Describing design: A comparison of paradigms* [PhD Thesis].

Dorst, K. (2004). On the problem of design problems—Problem solving and design expertise. *Journal of Design Research, 4*(2), 185–196. https://doi.org/10.1504/JDR.2004.009841

Dorst, K. (2006). Design problems and design paradoxes. *Design Issues, 22*(3), 4–17. https://doi.org/10.1162/desi.2006.22.3.4

Dorst, K. (2015). Frame creation and design in the expanded field. *She Ji: The Journal of Design, Economics, and Innovation, 1*(1), 22–33. https://doi.org/10.1016/j.sheji.2015.07.003

Dorst, K., & Cross, N. (2001). Creativity in the design process: Co-evolution of problem–solution. *Design Studies, 22*(5), 425–437. https://doi.org/10.1016/S0142-694X(01)00009-6

CB Insights. (2019). *The Top 20 Reasons Startups Fail*. https://s3-us-west-2.amazonaws.com/cbi-content/research-reports/The-20-Reasons-Startups-Fail.pdf

Johnson, Smith, Smythe, & Varon. (2009). *Challenge based learning: An approach for our time*. NMC, the New Media Corsortium ; EDUCAUSE Learning Initiative.

Klenner, N. F., Gemser, G., & Karpen, I. O. (2022). Entrepreneurial ways of designing and designerly ways of entrepreneuring: Exploring the relationship between design thinking and effectuation theory. *Journal of Product Innovation Management, 39*(1), 66–94. https://doi.org/10.1111/jpim.12587

Knight, J. (2017). *The impact cycle: What instructional coaches should do to Foster powerful improvements in teaching*. Corwin Press.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.

Lackéus, M. (2020). Comparing the impact of three different experiential approaches to entrepreneurship in education. *International Journal of Entrepreneurial Behavior & Research, 26*(5), 937–971. https://doi.org/10.1108/IJEBR-04-2018-0236

Laursen, L. N., & Haase, L. M. (2019). The shortcomings of design thinking when compared to designerly thinking. *The Design Journal, 22*(6), 813–832. https://doi.org/10.1080/14606925.2019.1652531

Linton, G., & Klinton, M. (2019). University entrepreneurship education: A design thinking approach to learning. *Journal of Innovation and Entrepreneurship, 8*(1), 3. https://doi.org/10.1186/s13731-018-0098-z

Maher, M. L., Poon, J., & Boulanger, S. (1996). Formalising design exploration as co-evolution. In J. S. Gero & F. Sudweeks (Eds.), *Advances in formal design methods for CAD* (pp. 3–30). Springer US. https://doi.org/10.1007/978-0-387-34925-1_1

Mansoori, Y., & Lackéus, M. (2020). Comparing effectuation to discovery-driven planning, prescriptive entrepreneurship, business planning, lean startup, and design thinking. *Small Business Economics, 54*(3), 791–818. https://doi.org/10.1007/s11187-019-00153-w

Maurya, A. (2016). *Lean Canvas | LEANSTACK*. Lean Stack. https://leanstack.com/lean-canvas

McMullen, J. S., & Dimov, D. (2013). Time and the entrepreneurial journey: The problems and promise of studying entrepreneurship as a process. *Journal of Management Studies, 50*(8), 1481–1512. https://doi.org/10.1111/joms.12049

Nielsen, S. L., Christensen, P. R., Heidemann Lassen, A., & Mikkelsen, M. (2017). Hunting the opportunity: The promising nexus of design and entrepreneurship. *The Design Journal, 20*(5), 617–638. https://doi.org/10.1080/14606925.2017.1349983

Ollila, S., & Middleton, K. W. (2011). The venture creation approach: Integrating entrepreneurial education and incubation at the university. *International Journal of Entrepreneurship and Innovation Management, 13*(2), 161. https://doi.org/10.1504/IJEIM.2011.038857

van Oorschot, R. (2018). *Entrepreneurship education through design: Exploring different design perspectives to understand and educate the business proposition development process in new high-tech ventures* [Delft University of Technology]. https://doi.org/10.4233/UUID:34A9A87C-E3ED-4EA4-B6D6-5460D38977E2.

Osterwalder, A. (2004). *The business model ontology a proposition in a design science approach* (PhD Thesis).

Pittaway, L., & Edwards, C. (2012). Assessment: Examining practice in entrepreneurship education. *Education + Training, 54*(8/9), 778–800. https://doi.org/10.1108/00400911211274882

Reymen, I. M. M. J., Andries, P., Berends, H., Mauer, R., Stephan, U., & van Burg, E. (2015). Understanding dynamics of strategic decision making in venture creation: A process study of effectuation and causation: Understanding dynamics of strategic decision making. *Strategic Entrepreneurship Journal, 9*(4), 351–379. https://doi.org/10.1002/sej.1201

Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences, 4*, 155–169.

Roozenburg, N. F. M., & Eekels, J. (1995). *Product design: Fundamentals and methods*. Wiley.

Sarasvathy, S. D., Dew, N., Read, S., & Wiltbank, R. (2008). Designing organizations that design environments: Lessons from entrepreneurial expertise. *Organization Studies, 29*(3), 331–350. https://doi.org/10.1177/0170840607088017

Sarooghi, H., Sunny, S., Hornsby, J., & Fernhaber, S. (2019). Design thinking and entrepreneurship education: Where are we, and what are the possibilities? *Journal of Small Business Management, 57*(S1), 78–93. https://doi.org/10.1111/jsbm.12541

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.

Shepherd, D. A., Sattari, R., & Patzelt, H. (2020). A social model of opportunity development: Building and engaging communities of inquiry. *Journal of Business Venturing, 106033*. https://doi.org/10.1016/j.jbusvent.2020.106033

Simon, H. A. (1973). The structure of ill structured problems. *Artificial Intelligence, 4*, 181–201.

Smulders, F. (2014). The Ider-Model towards an integrated vocabulary to describe innovating. *Proceedings from the 15CINet Conference*, 815–831.

Smulders, F., & Dunne, D. (2017). Disciplina: A missing link for cross disciplinary integration. In B. T. Christensen, L. J. Ball, & K. Halskov (Eds.), *Analysing design thinking: Studies of cross-cultural co-creation* (1st ed., pp. 137–152). CRC Press. https://doi.org/10.1201/9781315208169-8

Smulders, F., Lousberg, L., & Dorst, K. (2008). Towards different communication in collaborative design. *International Journal of Managing Projects in Business, 1*(3), 352–367. https://doi.org/10.1108/17538370810883819

Smulders, F., Reymen, I. M., & Dorst', K. (2009). Modelling co-evolution in design practice. *Proceedings of ICED, 09*, 335–346.

Smulders, F., & Subrahmanian, E. (2010). Design beyond design: Design thinking & design acting. *Proceedings of the 8th Design Thinking Symposium*, 355–367.

Vogel, P. (2017). From venture idea to venture opportunity. *Entrepreneurship Theory and Practice, 41*(6), 943–971. https://doi.org/10.1111/etap.12234

Welter, F. (2011). Contextualizing entrepreneurship-conceptual challenges and ways forward. *Entrepreneurship Theory and Practice, 35*(1), 165–184. https://doi.org/10.1111/j.1540-6520.2010.00427.x

Zahra, S. A., Wright, M., & Abdelgawad, S. G. (2014). Contextualization and the advancement of entrepreneurship research. *International Small Business Journal: Researching Entrepreneurship, 32*(5), 479–500. https://doi.org/10.1177/0266242613519807

Jeroen Coelen is a PhD candidate on the early stage of entrepreneurship, investigating how new ventures are designed

Frido E.H.M. Smulders is a full professor of Entrepreneurial Engineering by Design at the Faculty of Industrial Design Engineering. The emphasis of his research and education is on innovative and entrepreneurial behaviour in social settings like societies, companies and start-ups.