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INTRODUCTION

Entrepreneurship, as an important aspect of modern economic thought, is often described as facilitating innovation, job creation and national prosperity. Given the current economic climate, entrepreneurship and small business development are seen as vital for economic recovery and growth (Audretsch and Keilbach, 2005). Consequently, in recent years entrepreneurship has climbed steadily towards the top of political agendas in all developed countries (North *et al.,* 2001). In turn, entrepreneurship education (EE) has emerged as the most cost-effective and speedy way to increase both the quality and quantity of entrepreneurs entering an economy (Matlay, 2005a, 2005b; Pittaway and Cope, 2007a). Responding to this, many universities and business schools have increased their offerings of entrepreneurship courses over the past decades (Fayolle and Klandt, 2006) – ranging initially from electives to full master programs presently (Kuratko, 2005). This has resulted in a range of courses under the label EE that are based on widely differing conceptualisations of entrepreneurship (Jones *et al.,* 2014).

In this paper we examine a 'through', process course that rests on a definition of entrepreneurship as an everyday practice where the intended outcome is to create value for others (Blenker et al., 2012). One method increasingly used in 'through courses' is effectuation because it offers an alternative approach to traditional causation-based teaching like business planning which is not likely to have any strong and direct impact on the development of entrepreneurial knowledge (Politis, 2005). Effectuation theory (Sarasvathy, 2001) applies to entrepreneurial ways of dealing with bounded rationality and thus represents a paradigmatic shift in the way that we understand the practices of entrepreneurs. Consequently effectuation has become a corner stone to understanding entrepreneurial decision making and resource allocation and is widely applied in entrepreneurship research

and EE.[1] It is therefore not surprising that Fayolle and Gailly (2008: 584) argue that "the theory of effectuation could be a powerful mean to differentiate entrepreneurial 'action' and managerial 'action' and design education programs accordingly."

When designing courses and programs based on effectuation theory educators need to acknowledge that the current conception of effectuation arose out of a study of expert entrepreneurs (Sarasvathy, 2001; Perry et al., 2012). However, when we enter the classroom, we are teaching students, who are more likely to be novices than experts. In entrepreneurship education we can help novice entrepreneurs to become expert entrepreneurs (Krueger, 2007) by, for example, applying effectuation principles. However, understanding what mechanisms enable and hinders novices to become effectual agents remains to be defined (Engel *et al.*, 2014). We therefore advocate that bringing effectuation into practice in the classroom must be undertaken with care and consideration.

Given the limits of extant theory on effectuation in EE, we conduct an inductive theory building study of an undergraduate entrepreneurship course over the period of six months. This study explores barriers to entrepreneurial learning that students face when they are introduced to an effectuation-based process course at an Higher Education (HE) institution. The contribution of this study is threefold: first, to extend our understanding of the applicability of effectuation for HE students, second, we articulate the factors that hinder entrepreneurial learning when effectuation is used in a process course, and third, to shed light on the importance of contextual factors for entrepreneurial learning.

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[1] Ever since Sarasvathy's (2001) publication, which is today cited more than 1.900 times, there are conference tracks, books and special issues in leading entrepreneurship journals on effectuation. Furthermore, a Society for Effectual Action has been founded with a membership of over 1.000 entrepreneurship educators (Effectuation, 2012).

The remainder of this paper is structured as follows. In the following section, we give a short review of how EE has recently developed towards being processual and student-centered and how effectuation theory contributes to this development. In section three, we describe the context and methodological approach. In section four, we present three barriers to engaging students in an effectuation based entrepreneurial process. In the final section, we discuss our findings, offer some suggestions for scholars wishing to advance knowledge in this area, and discuss the implications of the findings for entrepreneurship educators.

EFFECTUATION AND ITS PLACE IN THE CLASSROOM

As entrepreneurship researchers we are aware of the burgeoning literature on enterprising behaviour, entrepreneurial traits and entrepreneurship for economic growth that feed into the rhetoric on teaching entrepreneurship (Robinson and Blenker, 2014). The rhetoric has been embodied by HE institutions, initially at the business school but increasingly throughout a range of disciplines. The research into whether entrepreneurship should be taught has given way to arguments about what should be taught and how (Blenker et al., 2012).

Jones et al. (2014) distinguish three main types of EE: (i) education *about* entrepreneurship, (ii) education *for* entrepreneurship and (iii) education *through* entrepreneurship. The former two represent the traditional teaching approach by focusing on the transmission of theory and skills (instructor and curriculum centric) that are required for *understanding* how to start a business. In contrast, through courses have a process character and emphasize the mindset, capabilities and knowledge needed to start a venture putting a premium on *experiencing* entrepreneurship (learner centric).

In EE there is increasingly acknowledgement that there is a need for a shift from transmission and re-production of knowledge (which is present in 'about' and 'for' courses) to a pedagogy that prepares students to take an active part in shaping the world (which is present in

'through' courses). The response from entrepreneurship educators has been to favour pedagogies that are processual and/or student-centered (Mäkimurto-Koivumaa and Puhakka, 2013). Processual 'through' entrepreneurship courses take the students from an idea to a market offering (i.e. the idea might be introduced by a company) while the combination of processual and student-centered courses take students from their own idea to their own market offering. Processual and student-centered approaches naturally embrace effectuation both as theory and practice in entrepreneurship teaching due to its focus on identity, action and commitment.

When using effectuation processes, entrepreneurs start with a generalized aspiration and then attempt to satisfy that aspiration using the resources they have at their immediate disposal (i.e., who they are, what they know, and who they know). Effectuation consists of a set of five principles: 1) bird-in-the-hand principle, 2) affordable loss principle, 3) lemonade principle, 4) crazy quilt principle and 5) pilot in the plane principle (Sarasvathy, 2008). These principles outline that the overall objective of an entrepreneurial endeavor is not clearly envisioned at the beginning, but rely on process and flexibility, taking advantage of environmental contingencies as they arise, and learn as they go (lemonade principle). This means that effectual practitioners must centre the process around their own competences, resources and networks and favor experimental and iterative learning techniques, where trial-and-error becomes a natural part of the entrepreneurial process. Furthermore, they believe strongly in shaping the future and controlling outcomes in conjunction with pre-committed stakeholders and customer-partners (crazy quilt and pilot in the plane principle). This sense-making technique incorporates reflection that can in turn help the entrepreneur to minimize potential losses while making the most out of the resources currently under control (bird-in-the-hand and affordable loss principle). The sense-making technique applied here is what we call entrepreneurial learning.

Another compelling and practical argument for processual and personalized entrepreneurial education comes from Rae's comprehensive body of work that put's the individual in the center of the entrepreneurial learning process (Rae, 2005; 2010). In his perspective entrepreneurial learning is shaped by context, an individual's personal and social development, and negotiation with critical others (Rae, 2005) which is well-aligned with the effectual process. An integration of effectuation in processual entrepreneurship education allows for personal learning, sense-making and development of self-awareness which are critical aspects of entrepreneurial learning (Middelton and Donnellon, 2014; Rae, 2000). While there are compelling arguments to include effectuation in entrepreneurship education in HE institutions we need to remind ourselves that Read and Sarasvathy (2005) argue that entrepreneurship is a form of expertise – a set of skills, models and processes that can be acquired with time and experience. There is a gap in the research that pertains to the relevance and effect of teaching effectuation to students who are novices rather than experts. We use the rest of this paper to analyse which barriers students face when working effectually in the HE classroom.

RESEARCH SETTING AND METHODOLOGY

We conducted an explorative single case study (Eisenhardt and Graebner, 2007) of a course offered to undergraduate students in a HE institution who are considered novice entrepreneurs. We follow Westhead et al.'s (2005: 73) definition of novice entrepreneurs as "individuals with no prior minority or majority business ownership experience either as a business founder or an inheritor or purchaser of an independent business." Development of an understanding about how novice entrepreneurs learn makes a university course relevant for a number of reasons. It provides (i) an opportunity to simulate and practice entrepreneurial skills and competences; (ii) a framework within which people and resources

can be explored, examined and developed; and (iii) a focus on learning. The course is an

information-rich and extreme case (Patton, 2002) characterized by 'rare' qualities

(Eisenhardt, 1989) that are seldom present in EE studies. The unique qualities are: (i) The

course is process and student-centered and was solely designed upon applying effectuation

principles and the effectuation process. This enables the researchers to observe how students

as potential (novice) entrepreneurs develop an understanding of the application of

effectuation principles in various phases of an entrepreneurial process. (ii) The course size of

141 students is a distinctively exceptional setting for a student-centered process course.

Student-centered process courses in entrepreneurship are often small scale. Small scale

mitigates a lot of core issues regarding uncertainty. In this particular case the instructors

could not step-in each time insecurities arose which enabled the researchers to access and

observe extreme reactions of the students. The students who were third semester

undergraduates were on average aged 20 and were novice as entrepreneurs and business

people.

Research Setting

The entrepreneurship course was a third semester inter-faculty elective offered to Bachelor

students. The course was offered as an introduction to entrepreneurial processes and

combined theoretical background knowledge (effectuation; Sarasvathy, 2001) with hands-on

tools (design process; Liedtka and Ogilvie, 2011) to stimulate active participation by the

students in such processes. The combination of effectuation and design thinking elements

was constructed to ease the progress of the students through their project development. The

instructors used elements of the design process that fitted with the effectuation process and

found that the phases of design thinking and some of the design thinking tools were useful to

facilitate development of creativity, ideas, potential stakeholders and to elicit learning

through, rather than about and for. The process began with identification of opportunities, continued with idea generation and examination of possible solutions, and finally concluded with a development of and testing of a business model for their potential market offering. Table 1 provides an overview of the course construction. Much of the design thinking process is in tension with traditional education and we are in agreement with Nielsen and Stovang (2015) that design tools are helpful in EE to engage with other people and real life problems. The course was credited 10 ECTS and structured over a period of 13 weeks with classes four hours once a week. The structure of the classes included a) de-briefing b) a lecture, c) team work, d) discussion which involved feedback from peer teams and e) preparation for the following week.

TABLE 1 SET ABOUT HERE

Strongly influenced by Gibb (2002), Blenker *et al.* (2012) and in accordance with Cope and Watts (2000) this structure aimed at engaging students in both learning by doing, by having a focus on a team project which was linked to reflection about their work and progress. The course requirements were that the students should work in entrepreneurial teams to produce a weekly team assignment and a concluding written team report. Although it was a requirement for the course the written work was not graded. However the students were graded at an individual oral exam which took departure in their team report.

A total of 141 students enrolled in the course with the ratio of male to female students at 9:5. On the first day of teaching the students were randomly assigned to teams of four or five making a total of 29 teams (the effect of random assignment to teams is discussed in the section on limitations later). These were the 'entrepreneurial teams' that the students were

required to work in. Due to the large enrolment for the course the university allowed two instructors to team-teach. Of these four instructors, two retained a role as instructor while the other two had a double role as instructors and researchers (and also as authors of this paper). As researchers we employed participant observation principles, a corner-stone of ethnographic methods (Hammersley and Atkinson, 2007). We were sensitized to our double role as insiders (instructors) – outsiders (researchers) that is acknowledged in participant observation. While we did not see ourselves being engaged in insider action research that is experienced by, for example, managers (Coghlan, 2007), we acknowledged our double role and used the other instructors as sparring in the outsider/insider role. We had no goal of accessing knowledge about a particular problem and possible solutions so in that respect we were not action researchers. Being part of the field and having easy access through our privileged position as instructors meant that 'putting on the research hat' was often something we had to actively engage with so as not to make assumptions about emergent themes or about the limitations of the data. In this respect having the two instructors-not-researchers to spar with was a useful element in focusing us on what was happening rather than on what we assumed to be happening (Coghlan, 2007).

Data sources

The data is derived from three sources i) participant/instructor observations including notes from instructor meetings (56 single-spaced pages), ii) individual formal and informal written evaluations of the course by the students (94 single-spaced pages) and iii) written work from the entrepreneurial teams in the form of weekly assignments and final team report as well as notes from the individual oral exams (698 single-spaced pages). None of the written work was graded. Grades were only given in the oral examination of individual students.

The participant/instructor observations were first iterated in note-taking during each teaching

session. The notes were then discussed in a reflective interview with the second instructor present at the teaching session and edited afterwards. The notes focused primarily on the ease and/or difficulty of concept work in a) the classroom setting b) for individual students c) with regard to team dynamics.

In addition, the student provided informal formative assessment, carried out weekly at the end of the lecture. The students were asked to respond to three questions that focused on particular elements of the week's teaching. The questions ranged from general open questions such as 'explain what you learned today' to process-specific questions for example; 'explain how your team worked with your ideas using effectuation'. Additionally, the individual students completed a summative assessment which is a requirement for all courses at the institution. The formal summative assessment was answered by 112 students and included closed questions (scale 1-5) about each instructor's performance and engagement and the structure and framework of the course as well as two open-ended questions giving the students the opportunity to provide praise and criticism.

The weekly written team assignments throughout the course provided information about the progress of the student's teamwork and the way in which students articulated understanding of the process and the concepts they were working with. For example in week 4 the students worked with the bird-in-the-hand principle and were expected to submit their individual and team resource profiles. Furthermore, four weeks after the course the concluding written team report was submitted in which the students answered the following questions: 1) *How did you research your field of interest as an entrepreneurial team?, 2) How did this step help development of your process?*, 3) *How did you move from your first to your second version of your business model?, and 4) How did this step help development of your process?* The answers to question 1 and 3 shed light on the extent of the application of effectual decision

making logics. The application of the bird in hand principle (question 1), and win partners (crazy quilt) and deal with unexpected feedback (lemonade principle) (question 3), are examined while the remaining answers give insights into the student's reflection and learning about the effectual process. Each entrepreneurial team was allowed to submit up to 10 pages. Finally, the instructors made notes during the 20 minutes individual oral exam. In the individual oral exams the instructors questioned the students about 1) effectuation, 2) the application and limitations of effectuation principals in the entrepreneurial process and 3) the transferability of their learning to other areas.

Data analysis

We analyzed the data in two main steps: First, we read through the data and developed a thick chronological description of the student' and entrepreneurial team's progression through the course. This enabled us to develop a better understanding of the development of the students and their projects as well as the obstacles they encountered and helped us in the following coding process to keep an overview.

Second, we undertook a rigorous coding and analysis process according to established inductive procedures (Glaser and Strauss, 1967; Miles and Huberman, 1994). The coding process followed three main phases. In the *first phase*, we used predominantly open and thematic coding. The former codes factual information about the students, the entrepreneurial teams and their pursued business idea such as field of interest, link of field of interest to student identity, link of field of interest to bird-in-hand (Lofland and Lofland, 1995). With regards to open coding, which is an initial systematic categorization of textual raw data (Miles and Huberman, 1994), we went through the raw data and asked the question "What is this passage/paragraph about?", thereby capturing the major thematic ideas in the data (Gibbs, 2008). Drawing on previous empirical investigations (e.g. Brettel *et al.*, 2012;

Chandler *et al.*, 2011) effectual decision making was understood as the application of the five effectuation principals.

Having an overview of the data and having organized it chronologically we moved to axial coding (Strauss and Corbin, 1990) in the *second phase;* starting interpreting the open codes by asking the question "What is this statement an expression/example of?". Our focus shifted towards understanding the student's reason for resisting the effectual process and their encountered barriers. To accomplish this, we cycled iteratively between data analysis and literature. For example, we explored how prior research could inform our first-order codes regarding noviceness. An overview of the main barriers and their coding can be found in table 2.

Finally, in the *third phase*, using matrix displays, we analysed how the derived barriers and sub-barriers impacted on the enactment of the five effectuation principals and entrepreneurial learning. Coding was completed when information, constructs and relationships were exhausted, as theoretical saturation was assumed (Eisenhardt, 1989).

TABLE 2 SET ABOUT HERE

FINDINGS

The data shows that students acknowledged and welcomed the introduction of effectuation for two main reasons (i) as a new (novel) framework for entrepreneurship and (ii) through the provision of a different pedagogy. However throughout the process and in the final individual oral exams, the students expressed difficulty in avoiding causal thought, decision making and action. In line with previous literature (Dew *et al.*, 2009; Dew *et al.*, 2011) we find that

novices seemed to prefer search and selection rather than creation and transformation and therefore readily apply a causal decision making framework in the entrepreneurial process. The following barriers were identified: noviceness, school project versus real life project, and perceived lack of legitimacy of instructors and process. We link these three barriers to the five effectuation principles (see table 3).

TABLE 3 SET ABOUT HERE

Barrier 1: Noviceness

Undergraduate students are novices in many ways: (i) as students, (ii) as persons, (iii) as business people and (iv) as team players. A novice is defined as a person who is new to a field and therefore has a lack of experience within the given area, in a similar manner to apprentices learning a new craft within communities of practice (Lave, 1996).

Noviceness as students: The students had just commenced their third semester. They demonstrated different levels of insecurity in their role as students, even though none of the written assignments were graded they were concerned about completing their tasks in the 'right way' as the following quote illustrates:

> "Maybe there should have been a bit more 'control' of whether what we did was correct and whether we were heading in the right direction." (Weekly formative evaluations)

Throughout the course we observed that students articulated a continued concern about 'right' and 'wrong' answers, about what outcomes the instructors 'wanted' and about the requirements for a good grade in the individual exams. These concerns were shared in team discussions, with the instructors and in the weekly formative evaluations. Three of the

students even made an official complaint about the unclear outcomes and the process course as a whole. This was their first encounter with a process course and the format of theory, practice and reflection was both confusing and strange. For their own group work this meant that the entrepreneurial teams struggled to make decisions. In one group work session for example an entrepreneurial team working on a content collection app approached one of the instructors and asked if they would choose between two alternatives for them. They believed that the instructors would favor one over the other and that they would thus get a higher grade. In this way the students were clearly effect dependent and articulating a belief that it was the teachers who should control the content and outcomes. This is in sharp contrast to the pilot-in-the plane principle where the 'innovator/entrepreneur' takes over control. The above mentioned students never committed to their project as they were constantly adjusting the project towards what they felt was worthy of a good grade but not a self-controlled entrepreneurial project.

Noviceness as persons: The majority of the students displayed a lack of awareness, for example, about what they were good at and what they were interested in. One oral exam question revolved around what competences the student brings to the entrepreneurial process. Only about 15% of the students were able to reflect on their strengths, learning from hobbies, experiences, stays-abroad and networks. This knowledge about self is a requirement to act in line with the bird-in-hand principle and lack of reflection makes it not only hard to identify privileged areas of knowledge but also which resources they possess and which they need to seek. For example, one entrepreneurial team read in a newspaper that the hospitality industry is in need of innovation. Based on this information they contacted three local hotels and found out that parking was an issue – so the students decide to create an app for that. None of the students had a particular connection to the hospitality or logistics industry nor had they network and contacts related to this area. Due to the distance between the task they had set

out to solve and their own means and networks, the students merely moved through the process and were never able to commit to the project.

Noviceness as business people: Another facet of noviceness became apparent when we introduced the students to various design and business tools (e.g. storyboarding and business modeling) and when we asked them to explore their field of interest. The students were inexperienced in gathering data from sources inside and outside their own networks. Some were unable to reflect on the implication and limitations of the information they gathered. For example an entrepreneurial team made a questionnaire to ask people if they would rent out their car while it was parked at an airport. In the responses only 20 % were positive. The students had problems interpreting the overall responses – for example most of the people who said that they would rent out their car actually did not own one. Despite this the entrepreneurial team interpreted the results as encouraging and made no adjustment to the initial assumption. They had pre-committed to a solution and sought to interpret the results favorably for themselves. Their commitment was mis-placed, they did not take account of the learning opportunity that the data provided them with and thus of the iterative aspect of effectual decision making logics.

Noviceness as team players: Finally, students were also novices as team players. The instructors observed during the in-class teamwork time that the entrepreneurial teams appeared motivated, actively engaged and worked together to complete their weekly tasks. However, insecurity about students' position in the entrepreneurial team including a lack of experience with team dynamics overshadowed much of the successful collaboration.

> "I personally don't believe very much in our idea and that makes me afraid of
> taking a negative/pessimistic position in relation to the further team work."
> (Weekly formative evaluations)

The tendency to hold back personal opinions from the rest of the group or even to agree to decisions made in the group, demonstrating a lack of self-knowledge about their role in the team, which they themselves were unsure about, and a lack of communication about the kind of resources that group members actually had available only came to light later – either in conversations between the instructor and the team when exploring resources, opinions etc. or in individual conversations between the student and the instructor after class. They seemed unable to pool together – as in the crazy quilt principle – and ended up distancing themselves from full commitment to their entrepreneurial team and their project.

Based on the above discussion, we offer the following:

Proposition 1: In entrepreneurship education programs targeted at novice entrepreneurs a lack of experience as (i) student, (ii) person, (iii) business people and (iv) team player a) hinders the student's application of effectual decision making logics and b) has a negative impact on student commitment to the entrepreneurial process.

Barrier 2: School project versus real life project

Many of the students pointed to the fact that they are students – expected to pass an exam and to demonstrate that they have read and understood the relevant literature. We observed discussions between students and also with instructors about the extent to which the students should engage and commit to their entrepreneurial project. This had a major influence on individual commitment to the course and also to the commitment from potential partners. For example when the students needed to contact potential external stakeholders to validate assumptions underlying their entrepreneurial project students articulated doubt, found the situation artificial and questioned why they should put in energy to this task. The external stakeholders recognized this lack of commitment from the students and reacted respectively as the following student reflection illustrates:

"Then we rang round different institutions and asked if they were interested. They were all positive about the idea (…). However, we did not ask them to commit to the idea seriously as we were not trying to sell the product at that time. It was difficult for us as a team to see the project as a real project. We regarded it as a school project and were always aware at the back of our minds that it was not something that would become reality." (Written team report)

The lack of commitment by the individual student, by the entrepreneurial team as a whole and by stakeholders stops the students at a very important point in the effectual process. They found it difficult to source real commitment from stakeholders and were therefore unable to access new means or new goals as the crazy quilt principle demands. These students could not invest in their project beyond the boundaries of a 'school project' and involvement in the project became solely focused on what they needed to do to get a good grade.

Proposition 2: In entrepreneurship education programs targeted at novice entrepreneurs the fictive character of the entrepreneurial project a) hinders the student's application of effectual decision making logics and b) has a negative impact on student commitment to the entrepreneurial process.

Barrier 3: Perceived lack of legitimacy of the instructors and process

In order to apply effectual decision making logics and commit themselves to a student-centered process course, the data indicate that the student's perception of instructors becomes important. The instructors seek to legitimize not only their roles as having expertise with venture creation and/or academics but also as practitioners with experience in initiating an entrepreneurial process as the following quote illustrates:

"This has nothing to do with evaluation. I am only curious to know –
what is your [instructors] background to stand there and teach us to be
innovative? Have you [instructors] yourself had success with
innovation?" (Weekly formative evaluations)

Questioning the legitimacy of the instructors, the validity of the underlying approach and process character of the course, was a constant source of discussion between instructors and students. Some students were repeatedly arguing that this is not how entrepreneurs work and therefore chose simply to ignore instructions. For example, in a brainstorming exercise we observed that some entrepreneurial teams ignored the instructions for the exercise. The brainstorming session was aimed at opening up for as wide a range of possible ways of dealing with their identified problem however the students had already jumped to a possible solution in a causal way. When we asked why they were not doing the exercise they told us that it was not relevant for them. Some teams fabricated the exercise in a superficial manner as they too had agreed on a solution prior to the exercise. This hindered their work with effectuation principles in two ways. First of all the exercise was closely connected to the bird-in-hand principle and later, following evaluation of their idea generation, to the affordable-loss principle. The students disabled themselves from both taking decisions that linked to their means and resources and considering which ideas they were willing to commit to. For example one team, who were dissatisfied with over filled university lecture theatres and not being able to find a seat, decided very quickly that an online booking system was needed and they would create an app to solve the problem. However none of them had programming or logistics skills and had to rely on contacting resources out with their own. They did not consider what their own resources and skills were and whether they had potential access to a different (more obvious) solution. The reliance on outside resources/networks meant that they never realized attachment to the solution only to the problem.

Proposition 3: In entrepreneurship education programs targeted at novice entrepreneurs a perceived lack of legitimacy of the instructors and process a) hinders the student's application of effectual decision making logics and b) has a negative impact on student commitment to the entrepreneurial process.

DISCUSSION

In this paper we report critically on a student-centered process course where the instructors primarily used effectuation theory and design process tools taking students from a field of interest to a business idea. Student-centered process courses that use effectuation are different from other entrepreneurship and other process courses primarily because effectuation starts with the (means of the) students and takes the students experience and network as an important anchor point throughout the process. This presents both a threat and an opportunity for EE. It is a threat as undergraduate students are novices in many ways and are challenged when applying effectuation. Although the literature articulates the difference between novice and expert entrepreneurs (e.g. Read and Sarasvathy, 2005) when we teach effectuation we need to acknowledge that students are novices in various ways: as students, persons, business people and team players, which causes insecurity at various levels. This multi-facetness of noviceness presents barriers for the application of the five effectuation principles that need to be recognized and addressed. Acknowledging noviceness means acknowledging insecurity and frustration that arise when students are pushed outside their comfort zone. Insecurities were triggered for various reasons and often caused disengagement. When facing an effectuation-based entrepreneurship process course students might be confronted with "identity-based threats" (Lund Dean and Jolly, 2012: 241) experienced as disequilibrium between their expectations (about teaching content) and understanding of their role (as goal-orientated students) and the course offered to them. Furthermore the student's uncertainty

about whether the process will work and whether it is robust enough to provide them with the results they are seeking meant that some disengaged from the process. As we confront students with their noviceness and push them outside their comfort zone with regards to their professional and student identity we must be prepared for a range of reactions.

Another reason why students struggle in the effectuation process course is due to the fictive character of the project. With regard to the outcomes at the end of the course we cannot ignore the goal of passing the exam and getting a good grade. However throughout the course the explicit goal is about creating a venture together in a team with commitment from outsiders in the real world. This disconnect between a real (authentic) project and the actual fictive nature of the project causes on the one hand constant frustration and insecurity and on the other hand manipulates them to play the 'entrepreneurship game'. As there is a sharp divide between effectuation which is grounded in the logic of identity and the project which is grounded in a 'logic of make-believe' this issue needs particular attention from instructors. Connected to this barrier is the perceived lack of legitimacy of the instructors (i) to facilitate the process and (ii) that the process course has a right in the university setting. Students are familiar and comfortable with 'about' or 'for' courses. So moving them to a 'through' course where they are asked to cope with instructors in a different role and to behave in a different way makes them suspicious of the validity of the course.

Therefore the question arises: How do we build legitimacy for a 'through course' that is based on effectuation? As long as content and methods are primarily causation-based in HE we advocate that entrepreneurship instructors might play an important role overcome this lack of legitimacy. The instructor may have to initiate and facilitate discussions about values and norms in the entrepreneurship classroom. As Lund Dean and Jolly (2012) point out, difficult conversations can be a tool to encourage students to participate. Setting up the classroom by preparing the students at each stage, making the tacit explicit, talking about

expectations for 'being a student' and 'performing as a student' help to re-shape and re-form the classroom environment towards one more suited to student-centered learning through effectual processes. Whether the students are working with the project, the process, other students or with the instructors, or are merely relying on their own competences, resources and networks, legitimacy might be build up that encourages students to engage in an effectuation-based process. However, it needs to be stated that this is only possible if students are willing and capable to take on discussions, share and shape values and accept co-ownership of their entrepreneurial process and their learning. A re-distribution of the balance of power within the classroom is only possible if both – instructors and students – are willing and able to do so. A "mutual student-teacher authority" (Shor, 1992: 16) culture needs to be created to build a culture that allows for an effectuation-based process. Facilitating class discussion about the course content and rational behind it may therefore be a good starting point to ease the students into the new situation and allow for an expression of concerns and worries.

But given our current education systems can we ask students to take on such an active and responsible role? Education systems are built on particular ways of trusting that are linked to the expectations we have of what will be provided and how those in it will behave (Cook-Sather, 2002). What we are proposing here is for instructors to question the values and beliefs that are at the root of their teaching, particularly when there is an (tacit) expectation that students are able to shift to other ways of performing. Educational systems that favor critical pedagogy with participatory, values-oriented, student-centered, experiential, research-minded and inter-disciplinary elements (Shor, 1987) are favorable for effectuation based processes. If our education systems views pupils and students as receivers of knowledge and that learning as a one-way street, even in an HE setting, it will be challenging to make students active co-owners of the process.

We advocate that it is worthwhile to overcome the displayed barriers and associated challenges as effectuation offers an unique learning opportunity, as it does not only bridge research and practice, but also allows for identity development. Nielsen and Lassen (2012: 374) point out that "the entrepreneurial effectuation process constantly gives rise to identity work". As discussed above, this challenges students to move outside their comfort zone and therefore enables students to develop their identity towards a potential entrepreneurial identity. At best the entrepreneurship classroom can provide students with the opportunity to experiment with and develop, to "try on new professional selves" (Lund Dean and Jolly, 2012: 241) – and to explore the potential of an entrepreneurial self. The entrepreneurial self is shaped through the learning that the students undertake during the sense-making process. In contradistinction this learning shapes the student's potential entrepreneurial identity. We suggest that effectuation may provide the key to open a door to 'entrepreneurship as a possible professional identity' for a broad range of students. In this way effectuation might not just be a key factor for entrepreneurship research but also for EE.

CONCLUSION

With the results presented in this paper we contribute to the EE literature with regard to not just what we teach, but also, how we approach teaching. The evidence from the presented single case study provides educators with an opportunity to consider (i) the extent to which their students are novices and (ii) what they need to consider when bringing effectuation into the classroom. By connecting what experts do with what and how we teach our students we contribute to the discussion of how novices can be enabled to enact effectuation principles (Perry *et al.*, 2012). Our paper has several implications for entrepreneurship educators and also opens up several avenues for future research.

Implications for entrepreneurship educators

The introduction of effectuation is important and welcomed by students in HE. Based on the insights gained in this paper we propose two leverage points for a better understanding and interaction with students and increase the student's learning and understanding of effectuation.

Instructors can use short-term assignments in the beginning of a course to reduce the noviceness of the students. This could for example be a one-week assignment where students need to enact a small version of an effectuation based entrepreneurial process with their entrepreneurial team and write a short report about their experience. Furthermore, instructors need to provide students with tools, literature and knowledge so reflection can be facilitated and enhanced. Although process courses tend to ask a lot of students this should not hinder instructors in providing their students with opportunities for reflection. Thus additional literature and lectures enable students to reflect and learn.

Additionally, instructors can consider whether they are able to facilitate the enactment of effectuation principles, for example the crazy quilt principle. The classroom already provides students with an initial network which can offer surprising opportunities. In this sense the classroom can be understood as a site for training, experimenting and, simulation of entrepreneurial action (Pittaway and Cope, 2007b), and in our case for practicing effectuation.

Future directions

Several new research questions emerged during the analysis of the data from this case study. The students – without exception – talked about the difficulty of solving problems using effectuation. Even when the students were committed to using effectuation they struggled with an ingrained tendency to be causal and, for many students, although they cognitively

acknowledged and understood effectuation, effectual behavior never became embedded. This brings us to our first questions, what are antecedents of being effectual – other than expertise? How can we as educators prepare students at all levels, from cradle to grave, to cope with a fast changing, unpredictable world? Student-centered process courses may be able to provide a training ground for our students to act in the modern world but, until we understand the mechanisms to enhance entrepreneurial learning fully, care must be taken with consideration to content, context and the methods we employ.

Furthermore, team formation must be considered as an element that influences the extent to which students will commit i) to each other in teams, ii) to the project as such and iii) even to whether they regard the project as a school project or real life. The random selection of students to teams in the presented course does not mimic real life. However this is often the preferred method by many instructors in EE. We regard the formation of teams as an important consideration in EE and particularly with regard to courses that are effectual and encourage researchers to actively engage with the team formation process as this may have an impact on entrepreneurial learning.

Last but not least, we have discussed that effectuation might provide an opportunity for EE to open the doors to entrepreneurial learning to more students. It might be worthwhile investigating in longitudinal studies if groups that are less prone to engage in entrepreneurial behavior (e.g. women) achieve more impetus to start up a company due to an effectuation-based EE.

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Table 1. Course elements and course progression

Lecture theme and design thinking phase	Debriefing	Main lecture elements	In-class group work	Home assignment
1. Introduction and team formation	Presentation of teaching team and course	Effectuation as a process/method Introduction of design thinking as a supportive structure	Team formation by random selection	Identifying individual field of interest
2. Effectuation – who am I? What can I do? Who do I know? **What is?**	Reflection on own skills and competences	Entrepreneurship as an everyday practice *Effectuation principle:* bird in hand *Design tool:* Resource mapping	Identifying a common area of interest	Exploration of field of interest
3. Exploring the field **What is?**	Reflection on qualifying a precise field of interest	Individual-opportunity nexus Identifying an anomaly *Effectuation principle:* bird in hand *Design tool:* journey mapping	Journey mapping and mind mapping	Make a plan for how to explore the field
4. Exploring opportunities **What if?**	Reflection on resources and networks	Creativity and entrepreneurship *Effectuation principle:* bird in hand and pilot in the plane *Design tool:* idea generation / brain storming	Idea generation	Chose ideas for testing that match group resources
5. Exploring ideas **What if?**	Reflection on creativity / opportunities	Concept development *Effectuation principle:* Affordable loss *Design tool:* concept development	From brain storm to concept development - Exploring potential ideas	Describe a world after
6. Exploring opportunities **What wows?**	Reflection on different perspectives / the world after	Creating value for others *Effectuation principle:* bird in hand and crazy quilt *Design tool:* Business modeling as a method	Creating a first business model	Chose and examine 3 underlying business model assumptions

7. Assumption testing – What wows?	Reflection on assumptions and learning from others	Stakeholders and buy-in *Effectuation principle:* crazy quilt and lemonade principal *Design tool:* Business model canvas	Explaining assumptions to others	Re-iterate assumptions and test with outsiders and create potential buy-in
8. New business model What wows?	Reflection on reformulation of assumptions	From new means to new goals *Effectuation principle:* bird in hand, crazy quilt and lemonade principal *Design tool:* Re-iteration of the business model canvas to new version	New version of the business model	Description of the iteration process and the new version of BM
9. Individual group sessions	Reflection on group work progress	Individual team group meetings	-	Group specific follow-up on group session outcome
10. Rapid prototyping – What wows?	Reflection on commitment from stakeholders	Prototyping *Effectuation principle:* bird in hand, crazy quilt and lemonade principal *Design tool:* Prototyping	Preparation of prototype	Building a prototype
11. Communication – persuading stakeholders What works?	Reflection on prototyping as a learning approach	Persuasion and communication *Effectuation principle:* crazy quilt *Design tool:* Pitch	Pitch preparation	Pitch recording
12. Customer co-creation What works?	Reflection on the importance of stakeholder involvement	Iteration, risk taking, learning from the prototype *Effectuation principle:* crazy quilt, pilot in the plane, affordable loss *Design tool:* Design kit	Pitch competition	Report writing synopsis
13. Reflection and exam preparation	Reflection on the effectuation process	Focus on exam requirements *Design tool:* Journey mapping	Presentation of team's entrepreneurial process	Individual preparation for oral exam

Table 2. Codebook excerpt and example of coding.

Code name	Barrier 1: Noviceness	Barrier 2: School project versus real life project	Barrier 3: Perceived lack of legitimacy of instructors and process
Type of code	Structural	Thematic	Thematic
Description of code	Code applies when students express lack of knowledge or awareness	Code applies when students express that they or their (potential) partners are not able commit more to the project because it is a class project	Code applies when students address how they perceive the teachers or their approach to the course
Exemplary quote	"It was so difficult to choose an area of interest where one feels that one has 'expertise' or privileged access."	"It was more time consuming and difficult to find the right people to contact. They gave us imprecise answers because we were part of a school project and a 'new' company. Furthermore we did not have a finished product and that made it difficult for ourselves to take our questions seriously."	"Your credibility as teachers disappeared at the first lecture, when you asked us to draw an entrepreneur. It was like going back to kindergarten class."
Data source	Weekly formative evaluations	Written group exam	Formal evaluation on conclusion of the course

Table 3. Obstacles for the application of the effectuation principles in the undergraduate classroom.

Effectuation principles	Requirements	Obstacles in the application of the principles
Bird in the hand	Being aware of and being able to articulate own competences, resources and networks.	Novice students have difficulties reflecting on their own competences, resources and networks.
Affordable loss	Being alert to what is valued and what they are prepared to lose.	Novice students usually have limited financial capital and therefore were not able to reflect on whether they have anything valuable to lose in the process. Their time is often perceived as free and endless. Other students tied their affordable loss closely to the exam.
Lemonade	Being able to cope with adversity and turn lifes' lemons into something advantageous.	Novice students were unable to reflect on and accept adversity choosing instead to stop the process or carry on as if there were no problems.
Crazy quilt	Being able to access other networks and bringing their commitment into the process adding new skills and engagement.	Novice students do not possess a range of networks. As they viewed the project as a school project they were unable to engage outsiders in the process.
Pilot in the plane	Having control over the process at each stage and being able to make decisions that affect future outcomes.	Novice students expect the instructor to be in control of the (learning) process as the focus is primarily on passing the exam.