Comparing the impact of three different experiential approaches to entrepreneurship in education

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Comparing the impact of three different experiential approaches to entrepreneurship in education

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Abstract

Purpose – Three different pedagogical approaches grounded in three different definitional foundations of entrepreneurship have been compared in relation to their effects on students. They are: (1) "Idea and Artefact-Creation Pedagogy" (IACP), grounded in opportunity identification and creation, (2) "Value-Creation Pedagogy" (VaCP), grounded in value creation and (3) "Venture-Creation Pedagogy" (VeCP), grounded in organisation creation.

Design/methodology/approach – Data were collected at 35 different sites where education was deemed to be entrepreneurial and experiential. A quantitative, smartphone app-based data collection method was used alongside a qualitative interview approach. 10,953 short-survey responses were received from 1,048 participants. Responses were used to inform respondent selection and discussion topics, in 291 student and teacher interviews. Comparative analysis was then conducted.

Findings – The three approaches resulted in very different outcomes, both in magnitude and in kind. VaCP had strong effects on entrepreneurial competencies, on student motivation and on knowledge and skills acquisition. VeCP had weaker effects on knowledge and skills acquisition. IACP had weak effects on all outcomes probed for. Differences were attributed to variation in prevalence of certain emotional learning events and to variation in purpose as perceived by students.

Research limitations/implications – VaCP could serve as an escape from the potential dilemma faced by many teachers in entrepreneurial education, of being caught between two limiting courses of action; a marginal VeCP approach and a fuzzy IACP one. This could prompt policymakers to reconsider established policies. However, further research in other contexts is needed, to corroborate the extent of differences between these three approaches.

Originality/value – Most impact studies in experiential entrepreneurial education focus only on organisation-creation-based education. This study contributes by investigating entrepreneurial education that is also grounded in two other definitional foundations. Allowance has been made for novel comparative conclusions.

Keywords Enterprise education, Entrepreneurship education, Entrepreneurial education

Paper type Research paper

1. Introduction

Educational impact assessment is about searching for causal relationships between educational *causes* and their *effects* on students (Cook, 2002). A trend towards accountability in society makes it increasingly important for policymakers, teachers and other stakeholders in society to go beyond opinions and fashions and move towards robust evidence around the effects of different pedagogical [1] approaches on students (Ball, 2013; Slavin, 2002). Teachers need input on how to produce effects of interest, and education policymakers need to know which education "works". But education is an ontologically challenging phenomenon. Causes and effects are often internally related (Biesta, 2009). Causal regularities are also weak in education, since the main object of study is meaning-making humans, with a will of their own, acting in an open-ended system (Sayer, 2010).

In terms of entrepreneurial *causes*, there are many different pedagogical approaches to entrepreneurship in education. Students can be asked to: (1) start a real-life business venture (Ollila and Williams-Middleton, 2011); (2) start a simulated mini-company (Dwerryhouse, 2001; European Commission, 2005); (3) start a social venture (Rae, 2010; Young, 2014); (4) write a business plan (Honig, 2004; Neck *et al.*, 2014); (5) sit around a table and brainstorm ideas (Gibb, 2008); (6) listen to a successful entrepreneur telling war stories from the entrepreneurship trenches (Katz, 2008); or (7) spend time working for an entrepreneur (Kubberød and Pettersen, 2017). There are also many different entrepreneurial *effects*. In addition to increased knowledge about entrepreneurship, students can also develop a broad variety of skills and attitudes, such as leadership, creativity, self-insight, self-efficacy, school engagement, learning orientation, proactiveness, perseverance, uncertainty tolerance and increased intention to start a venture (Bacigalupo *et al.*, 2016; Fisher *et al.*, 2008; Moberg, 2014a).

While causes and effects are numerous and contextual in entrepreneurial education, impact assessment is more simplistic and macro-level-focused (Brentnall *et al.*, 2018). In terms of *causes*, most assessment studies have adopted a narrow, business-orientated view of entrepreneurship as "starting new organisations" (Pepin and St-Jean, 2018). There is also widespread confusion around different, largely incommensurable pedagogical approaches being compared alongside each other (Fayolle, 2013). Traditional lecturing about entrepreneurship is often compared to highly experiential learning-by-doing approaches, without explicitly acknowledging the fundamental pedagogical differences (Kozlinska, 2016). This has led to contradictory and inconclusive findings (Nabi *et al.*, 2017). In terms of *effects*, most assessment studies rely on a narrow view of entrepreneurship, assessing the resulting intention and perceived ability among students to start a new organisation (Kozlinska, 2016). The strongest effects are believed to emanate from experiential hands-on and learning-by-doing-orientated approaches (Barr *et al.*, 2009; Gielnik *et al.*, 2015; Günzel-Jensen *et al.*, 2017; Nabi *et al.*, 2017). But what "works" is still an unresolved debate (Hägg and Gabrielsson, 2019).

Therefore, recent calls have emerged for assessment studies that pay more heed to different pedagogical choices. Fayolle (2013, p. 696) calls for studies that "set out to compare the effectiveness and efficiency of different teaching methods". Kozlinska (2016, p. 38) states that there is a need for "explicit comparisons between different forms of interventions in entrepreneurship". Nabi *et al.* (2017, p. 292) call for assessment research that "rigorously isolates the impact of a pedagogical intervention", stating that it is "the only way for us to understand entrepreneurship education impact in an incremental and meaningful way." Moreover, it is important, in educational research, to value not only that which is easy to measure (in this case, entrepreneurial intentions and self-efficacy) but to also engage in more challenging attempts to measure that which we value; including, more broadly, students' development of entrepreneurial competencies and the underlying causal learning mechanisms which produce these broad effects (cf. Biesta, 2009; Ylikoski, 2019).

As a response to these calls, the purpose of this study has been to investigate what difference it makes for students when teachers apply one of three different, experiential, pedagogical approaches, grounded in three different definitions of entrepreneurship. These three different approaches have been compared empirically: (1) idea and artefact-creation pedagogy (IACP) grounded in an opportunity-based definition of entrepreneurship (Shane, 2003), (2) value-creation pedagogy (VaCP), grounded in a new value-creation-based definition of entrepreneurship (Bruyat and Julien, 2001), and (3) venture creation pedagogy (VeCP) grounded in an organisation-creation-based definition of entrepreneurship (Gartner, 1989). All three approaches are examples of experiential entrepreneurial education, that is, when teachers apply action-based pedagogy that is deemed to be "entrepreneurial" as a formal part of education. What is deemed "entrepreneurial" depends upon which definitional stance teachers have taken on entrepreneurship, implicitly or explicitly. To investigate the effects on students, the three approaches have been compared in regard to: (1) developed

entrepreneurial competencies, (2) learning of subject matter knowledge and skills and (3) engagement and motivation. The study thus explores the following key question: how do IACP, VaCP and VeCP compare, in terms of their effects on students? The objective is to produce better guidance for teachers considering which pedagogical approach to opt for, given their context and the effects they want to achieve.

In an attempt to overcome the incommensurability challenge when comparing vastly different pedagogical approaches, an emotion-centric and longitudinal mixed-methods research design was applied. Anchoring the comparison in emotionality made a cross-case analysis possible, despite significant pedagogical variation. Six data collection and analysis waves were conducted, from 2012 to 2016, by the same team of researchers and with the same methodology. In a quantitative and longitudinal phase, 10,953 emotional learning events were collected through a digital app from 1,048 students, in 35 different settings, across three countries and from all levels of education. In a subsequent qualitative phase, 291 interviews were conducted, transcribed and analysed.

The article is structured as follows. Firstly, the three experiential pedagogical approaches are presented and related to entrepreneurship theory and learning theory. This is followed by a review of previous work on assessment in entrepreneurial education. The data collection and analysis methods applied in the six waves are then described. Next, the findings are presented, both in terms of what happened at the 35 sites studied and what effects on students could be observed. Finally, the discussion elaborates on the patterns and addresses possible explanations and implications, based on the findings.

2. Three pedagogical approaches to entrepreneurship in education
To assess the effects of an education intervention, it is important, first of all, to be able to classify and define it (Pring, 2010). Many attempts to classify and define entrepreneurial education are grounded in pedagogy. One of the most-used classifications in the field, teaching "about", "for" or "through" entrepreneurship, is based on pedagogical differences (Aadland and Aaboen, 2018). The "about" approach is primarily connected to traditional passive teaching, through lectures, case studies and group discussions. The "for" and "through" approaches are connected to various active and self-directed learning modes (Hannon, 2005; Pittaway and Cope, 2007). Another widespread pedagogy-based classification specifies five aspects of entrepreneurial education that contribute to differentiation: objectives, target audiences, contents, pedagogical methods and intended outcomes (Fayolle and Gailly, 2008).

However, pedagogy-based classifications might risk diluting entrepreneurial education into yet another synonym describing variation already covered by other terms from educational researchers (Hägg, 2016; Leffler, 2009; Neck and Corbett, 2018). Therefore, rather than relying on pedagogy-based classifications, this article will use the multi-faceted definitional core of entrepreneurship to bring theoretical rigour to the comparison. Three different pedagogical approaches have been selected for inclusion, based on whether they are dominant or promising.

A dominant classification of entrepreneurial education is a British dichotomy, dividing the field into a narrow approach, termed "entrepreneurship education" and a broad approach, termed "enterprise education" (Gibb, 2002; Hannon, 2018). The former is defined as learning about and through business start-up, the latter as education aiming at developing the competencies necessary to generate and realise ideas (Hannon, 2018; Jones and Iredale, 2010; QAA, 2012, 2018). According to Dal *et al.* (2016), the dichotomy has siblings in many other European countries. The catch-all term "entrepreneurial education" is sometimes used of both approaches (QAA, 2018).

2.1 The organisation-creation approach: entrepreneurship education
As entrepreneurship education relies on a business start-up logic, its definition is grounded primarily in an organisation-creation view of entrepreneurship (Neck and Corbett, 2018). This

leans on Gartner's (1989, p. 62) classical definitional assertion that "Entrepreneurship is the creation of new organisations". One approach to organisation creation in education is mini-company programmes, provided worldwide by Young Enterprise and others. Students run a business for one or two semesters, then liquidate it (Dwerryhouse, 2001; European Commission, 2005). Another approach is the full-venture-creation approach provided by some universities. Students learn by creating a real-life venture, with the intention of incorporating it after graduation if it succeeds in its market (Ollila and Williams-Middleton, 2011).

2.2 The opportunity-creation approach: enterprise education

The definitional foundations of enterprise education are more contested (Draycott and Rae, 2011; Jones and Iredale, 2010). Enterprise education might even be viewed as relying on an inverted definitional foundation, concerning all the remaining pedagogies deemed "entrepreneurial" once organisation creation has been ruled out (Hägg, 2016). Still, if there is one definitional perspective which dominates pedagogical discussions around enterprise education more than others, it would be opportunity identification and creation. Gibb (2008, p. 105) states that an enterprising person is "seeking and exploiting opportunities". Jones and Iredale (2010, p. 13) state that "the emphasis of enterprise education pedagogy is on the freedom of the individual to change, grow, develop, act on and adapt to opportunities". Draycott and Rae (2011, p. 138) have stated that enterprise education is about "the development of self-knowledge and self-efficacy to be able to investigate, develop and act on ideas and opportunities". In line with these statements, the Quality Assurance Agency for Higher Education in the UK has defined enterprise education as teaching that is "enabling students to be more opportunity-focused" (QAA, 2012, p. 8–9). This definition was later refined into enterprise education being about "the generation and application of ideas" (QAA, 2018, p. 7). Enterprise education is thus definitionally well-aligned with Shane and Venkataraman's (2000, p. 218) well-known claim that entrepreneurship can be defined as "the nexus of two phenomena: the presence of lucrative opportunities and the presence of enterprising individuals".

2.3 The value-creation approach: entrepreneurship viewed as new value creation

An emerging and promising definitional perspective, increasingly being discussed in entrepreneurial education, is that of viewing entrepreneurship as new value creation (Blenker et al., 2011; Fayolle, 2007; Jones, 2011; Vestergaard et al., 2012). This leans definitionally on work by Bruyat (1993, p. 63) and Bruyat and Julien (2001, p. 174), who proposed that: (1) when someone creates something that is both novel and valuable for others and (2) when that person also learns and develops profoundly from the undertaking, people tend to label it as entrepreneurship. Creating new kinds of value is a much broader activity type than creating a new organisation or a new business opportunity and can be seen in many people's "everyday practice" in all societal sectors (Blenker et al., 2011). Viewing entrepreneurship as new value creation is thus both a broader and more learning-orientated definition of entrepreneurship than the more established organisation-creation or opportunity-creation definitions. Such a view, therefore, comes with important educational implications; for example, a need to involve all students in entrepreneurial education (Blenker et al., 2011). Value-creation methods may even need to become "an essential part of basic education" so that all students are taught entrepreneurial methods that can unleash the value-creating "potential of human nature"; just as scientific methods are taught to all students (Sarasvathy and Venkataraman, 2011, p. 120 and p. 129).

Applied to teaching, an experiential, value-creation approach can be about "letting students learn by applying their existing and future competencies to create something
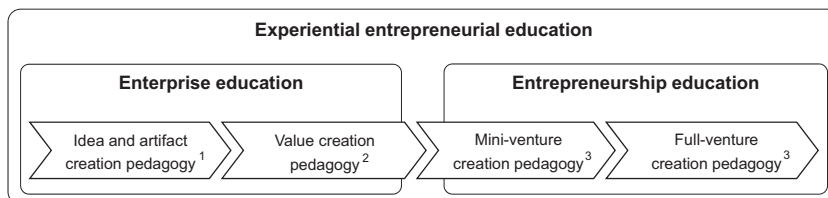
preferably novel of value to at least one external stakeholder outside their group, class or school" (Lackéus *et al.*, 2016, p. 790). Students can be given an opportunity "to conceive value, to attempt to create value, to attempt to capture any such value, and finally, to critique their efforts to do so" (Breslin and Jones, 2014, p. 438). The value that students create for others may be economic, social, ecological, mental, physical, etc. (cf. Hindle, 2010; Korsgaard and Anderson, 2011). Even if the main purpose of education is not letting students create value for others, it can still constitute a useful means of fostering deeper student learning and engagement (Sagar, 2015). The value-creation approach represents an altruistic and relational turn in entrepreneurial education, in which adopting a "students-as-givers" perspective can help mitigate problematic neoliberal [2] tendencies in entrepreneurial education (Berglund, 2013; Komulainen *et al.*, 2011; Lackéus, 2017).

2.4 A typology of experiential entrepreneurial education

The emerging new value-creation approach to entrepreneurship in contemporary entrepreneurial education illustrates a potential problem. Has the implicit definitional assumption of enterprise and entrepreneurship education (interpreted primarily as opportunity identification and organisation creation respectively) become problematic? Has its emphasis on two main definitional perspectives led to a silent narrowing of people's minds, leaving other definitional perspectives curtailed? An illustration of this potential problem is the recent and somewhat dichotomised discourse around an "overly broad" and dangerously diluted enterprise education approach versus an "overly narrow" and exclusionary, business-orientated entrepreneurship education approach (cf. Draycott and Rae, 2011; Jones and Iredale, 2010; Jones *et al.*, 2019, p. 1174; Neck and Corbett, 2018, pp. 29–30). While dualistic frameworks offer compelling simplicity, they can also trigger impoverished and shallow thinking (Barrett, 1979; Damasio, 1994; Tobias and Duffy, 2009).

Therefore, this study uses a more fine-grained and four-pronged typology of experiential entrepreneurial education, recently proposed by Lackéus and Sävetun (2019). In this typology [3], enterprise and entrepreneurship education are each split into two sub-categories, as illustrated in Figure 1. The four approaches shown form a four-step progression model, illustrating the importance of teachers adjusting their pedagogical approach as students progress through the entire education system (Blenker *et al.*, 2011; Gibb, 2008; Rasmussen and Nybye, 2013). Figure 1 represents an ideal situation, in which students get to experience the full progression in convenient succession. In reality, most students only get to experience a single, isolated pedagogical approach (Pepin and St-Jean, 2018).

The first step in Figure 1 involves an opportunity identification or creation process, in which students come up with ideas and create artefacts in the classroom, such as plans, reports, concepts, artwork, presentational materials or prototypes. This step is therefore termed *"idea and artefact creation pedagogy"* (IACP). In the second step, students apply their ideas and

Figure 1.
A pedagogical progression model for experiential entrepreneurial education, based on definitional foundations of entrepreneurship.

Note(s): 1: Definitional basis in opportunity identification/creation, as defined by Shane
2: Definitional basis in new value creation, as described by Bruyat
3: Definitional basis in organisational emergence, as defined by Gartner

artefacts as they attempt to create different types of tangible, real-world value for potential stakeholders outside their group, classroom or school; termed "*value-creation pedagogy*" (VaCP). The third step focuses on establishing a new organisation around the value-creating endeavour. Since a dominant approach is mini-company programmes (Dwerryhouse, 2001; European Commission, 2005), this step is termed "*mini-venture creation pedagogy*" (mini-VeCP). The fourth step represents a more full-fledged, and often innovation-based, venture-creation approach, in which students incorporate their venture, if it proves successful (Ollila and Williams-Middleton, 2011) and termed "*full-venture creation pedagogy*" (full-VeCP). In this article, mini-VeCP and full-VeCP are discussed collectively as "VeCP" [4], since they are both grounded in an organisation-creation-based definition of entrepreneurship.

2.5 Relating the three pedagogical approaches to learning theory

To form a foundation for subsequent analysis of findings, the typology in Figure 1 will now be used to relate the three pedagogical approaches (IACP, VaCP and VeCP) to extant learning theory. It is often recommended that entrepreneurial education should include learning-by-doing or experiential learning (Pepin, 2012; Ramsgaard, 2018). While there is little consensus around exactly what experiential learning is (Roberts, 2012), many associate it with active, hands-on, learning-by-doing, in the classroom or outside of it (Fayolle, 2013; Hägg and Kurczewska, 2016). Thus, an examination of what students should do, more specifically, allows for different entrepreneurial education approaches to be linked to different experiential traditions in learning theory (cf. Biggs and Tang, 2011).

In IACP, students frequently learn from a self-directed, team-based creative process, in which they analyse problems and then design some kind of artefact that may or may not solve a problem. This links IACP to problem-based learning (Savery and Duffy, 1995; Tan and Ng, 2006), project-based learning (Blumenfeld *et al.*, 1991; Gibb, 2002), cooperative learning (Hytti *et al.*, 2010; Johnson *et al.*, 2000), constructivist learning (Löbler, 2006; Tobias and Duffy, 2009) and design-based learning (Neck and Greene, 2011; Puente *et al.*, 2013). It also links IACP more generally to progressive education (Erkkilä, 2000; Leffler, 2009), a centuries-old tradition that emphasises student-centric pedagogy (see further Egan, 2002; Labaree, 2005) and with roots in the work of Rousseau (1762), Montessori (1912) and Dewey (1938).

In VaCP, students direct their activities outward, as they attempt to create tangible value for external stakeholders, preferably in the surrounding community. In addition to the previously mentioned learning theories, this also links VaCP to: service-learning (Furco, 1996; McCrea, 2009), socially situated learning (Kubberød and Pettersen, 2017; Lave and Wenger, 1991), pedagogy of work (Carlin and Clendenin, 2019; Freinet, 1993) and work-integrated learning (Dhliwayo, 2008; Kaider *et al.*, 2017). VaCP also has centuries-old roots, as illustrated by the apprenticeship model which emerged in the Middle Ages, when guilds of artisans and merchants started to organise work-integrated learning (Harris and Deißinger, 2003; Richard, 2012).

In VeCP, students organise their creative and value-creating activities into a legal entity. While this also triggers many of the activities associated with IACP and VaCP (and thus relates to most or all of the above-mentioned learning theories), it is arguably more difficult to anchor the creation of a legal entity in a particular tradition of learning theory.

3. Previous work on assessing the effects of IACP, VaCP and VeCP

In assessing entrepreneurial education, it is not uncommon to see IACP being assessed alongside VeCP, without acknowledging the substantial pedagogical and entrepreneurship-grounded definitional differences (for a recent example, see Chatzichristou *et al.*, 2015). Such compounding is challenging, since listening passively to a teacher will not produce the same

effects on students as engaging them in generating business ideas and writing business plans (IACP), or letting them start a more-or-less real venture (VeCP) (Aadland and Aaboen, 2018; Nabi *et al.*, 2017). This incommensurability between different pedagogical approaches could be one reason why meta-studies on the effects of entrepreneurial education have so far turned out to be largely inconclusive (Bae *et al.*, 2014; Martin *et al.*, 2013). Conducting comparative or meta-studies on the effects of different pedagogical approaches can be a futile endeavour, without a fine-grained definitional or pedagogical framework to guide the work (Nabi *et al.*, 2017).

At the level below meta-studies, many individual studies have shown strong positive effects of VeCP on students' entrepreneurial knowledge, skills and attitudes (for example, Barr *et al.*, 2009; Elert *et al.*, 2014; Johansen and Clausen, 2011; Peterman and Kennedy, 2003; Rasmussen and Sørheim, 2006). Mini-VeCP is the most-assessed type, especially the mini-company programme provided by Young Enterprise. A consensus is emerging among scholars that action-based approaches produce the strongest effects, since authentic and real-life mastery experiences build higher-level behavioural competencies (Barr *et al.*, 2009; Gielnik *et al.*, 2015; Günzel-Jensen *et al.*, 2017; Nabi *et al.*, 2017). When students get to create real-life value for external stakeholders, in a full-fledged business startup process embedded in a supportive and sharing environment, it triggers a powerful, emotional roller-coaster that develops entrepreneurial self-efficacy, passion, identity and a personal career vision (Haneberg and Aadland, 2019; Lackéus, 2014). Alongside individual studies showing that some VeCP programmes do seem to produce strong effects on students, there is an ongoing discussion (mainly among quantitative research methodology scholars) around whether or not entrepreneurship education "works" (Kozlinska, 2016; Longva and Foss, 2018; Martin *et al.*, 2013). To summarise the assessment situation for VeCP, there is an abundance of qualitative accounts of strong effects on students in selected programmes, but a paucity of rigorous quantitative and longitudinal impact studies based on randomisation and control groups (an exception is Gielnik *et al.*, 2015).

Impact assessment of IACP is rare. Jones and Iredale (2010) have even claimed that, due to definitional ambiguity, there is no robust way to assess enterprise education. The few attempts made have been both difficult and disappointing (Pepin and St-Jean, 2018). Moberg (2014b) used a pedagogical definition base to circumvent the definitional challenge and then found that entrepreneurial intentions were reduced by IACP. Another attempt to assess IACP, with a definitional base grounded in entrepreneurship, found the effects to be disappointing (Lackéus and Sävetun, 2019). The scarcity of evidence does not, therefore, support the idea of IACP having strong effects on students. When it comes to VaCP, there seems to be no record of studies establishing its impact.

Assessing entrepreneurial education has thus remained a scattered and challenging endeavour, both within and between different types of entrepreneurial education. To date, none of the four pedagogical approaches to entrepreneurial education in Figure 1 seem to have been adequately assessed, and a rigorous and definitionally fine-grained comparison between them is lacking.

4. Methodology

According to a centuries-old classification, the human mind may be divided into three different parts: thoughts, actions and emotions (Hilgard, 1980). This became the unusual starting point of an innovative approach to comparative impact assessment of experiential entrepreneurial education. Many existing assessment approaches involve surveys probing for people's thoughts or actions before, during or after an intervention. To overcome the incommensurability challenge of assessing entrepreneurial education, an emotion-centric approach was opted for instead, since not only entrepreneurial learning (Cope, 2003; Gibb,

2002; Kyrö, 2005; Pittaway and Cope, 2007; Souitaris *et al.*, 2007) but also all learning contains, and thrives on, emotions (Boekaerts, 2010; Jarvis, 2006; Postle, 1993). Indeed, emotions help students learn cognitive material more effectively; so much so that the presence of emotionality may be viewed as an indicator of learning (Jones and Underwood, 2017). Further, since emotions are omnipresent in learning (Chabot and Chabot, 2004), an emotion-centric analytical lens could be a particularly powerful tool in a comparative study. Similarities and differences observed may be anchored in emotionality, thus allowing for robust cross-case comparisons, despite significant pedagogical variation.

All empirical data in this study were collected with this key methodological idea in mind, leaning on the concept of critical learning events (Cope, 2003; Cope and Watts, 2000; Flanagan, 1954; Rae, 2013; Snell, 1992). Such events are highly emotional and offer researchers a methodological "way in to studying entrepreneurial learning" (Cope and Watts, 2000, p. 108). Emotional learning events were therefore captured via both quantitative and qualitative research methods, to support the comparative analysis. Whenever an emotional learning event was captured empirically, it was posited as indicating that something significant and impactful was going on in the learning environment being studied and thus worthy of further comparative inquiry.

An emotion-based research approach allows for the establishment of a more fine-grained causal model than the common, idealised, two-component deductive-nomological model, in which the cause is (1) entrepreneurial education and the effect is (2) either the developed entrepreneurial competencies or other favoured effects, such as student motivation and deep learning (cf. Little, 1991, pp. 14–15). Rather, a three-component causal model is relied upon here. Links are identified and analysed among (1) different experiential pedagogical approaches, (2) triggered emotional learning events and (3) the resulting outcomes in terms of developed entrepreneurial competencies, deeper student learning and increased student motivation (see Figure 2). This allows for a detailed analysis of those causal mechanisms that mediate between cause and effect and potentially opens up the black box of how, when and why any desired effects are produced through experiential entrepreneurial education (Hedström and Ylikoski, 2010). Competencies that are deemed entrepreneurial include: knowledge of how entrepreneurs create value; skills in marketing, resource acquisition and opportunity identification; and attitudes such as entrepreneurial passion, self-efficacy, proactiveness and tenacity (Bacigalupo *et al.*, 2016; Fisher *et al.*, 2008).
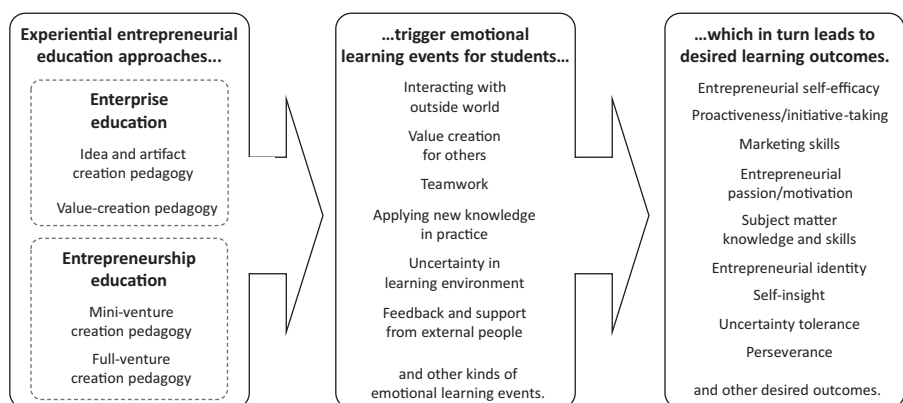
Figure 2.
Three-component causal model (adapted and developed from Lackéus and Sävetun, 2019)

Source(s): adapted and developed from Lackéus and Sävetun, 2019

4.1 The 35 learning environments studied

The data in this study were collected at 35 different sites in six waves [5], as summarised in Table 1. An internal report was written after each wave, allowing the research team to elucidate and summarise the findings thus far and to inform the sampling decisions and design of subsequent waves. The study design, research tool construction, data collection and analysis took seven years and involved a large number of people. To facilitate comparison, a balance was struck between different approaches to entrepreneurial education and different student ages (see Table 2). VaCP was the least-assessed pedagogical approach of the three investigated here. It was, therefore, more thoroughly investigated than IACP and VeCP, by including more VaCP sites and participants. Similarly, since compulsory [6] education was the least-studied age level in previous work, more focus was given to younger students than in previous research, by including more compulsory education sites and participants. Consequently, no data were collected on IACP in higher and adult education.

Learning environments [7] were included that applied one of the three studied approaches to experiential entrepreneurial education. Purposive and emergent reference-based sampling was the overall sampling strategy, but there were slight variations in sampling strategy both between and within waves. In wave 1, site 1 was chosen, based on convenience sampling since the author is a teacher at a full-VeCP known for producing strong effects on students. In wave 2, sites were chosen which the author had come across through networking, as they were found to constitute rare and interesting examples of VaCP in compulsory education. The sampling strategy for wave 3 involved a collaboration with Swedish National Agency of Education and 30 contacted experts, who were asked to name particularly good examples of entrepreneurial education. In wave 4, sampling was based on discussions with Region Skåne, a major public funder for entrepreneurial education on all levels of education. It wanted to assess the impact of some of its most important funded initiatives. In wave 5, sampling was based on the preferred partners of Gothenburg Municipality; ones it trusted would perform well in an EU-funded project. In wave 6, sampling was based on a call for VaCP participants through social media and through a national network based around entrepreneurial education. A short survey was conducted to ensure that each school worked with VaCP. Schools already known to use VaCP were encouraged to apply. All 35 learning environments chosen for inclusion were categorised according to a classification scheme shown in Figure 3.

4.2 Data collection and analysis method

The data collection and analysis method consisted of three different steps: (1) collecting emotional learning events from participants through a mobile app; (2) preparing, conducting and transcribing interviews with carefully selected students; and (3) analysing the generated app and interview data. These three steps are briefly explained below.

4.2.1 Step 1: deploy a mobile app that collects students' emotional learning events. Short surveys have been used since the 1970s to capture respondents' experiences directly in their natural environment (Hektner *et al.*, 2007). This method is called the "experience sampling method" (ESM). Capturing subjective experiences with previously unattained precision allows a high level of validity to be obtained (Stone *et al.*, 2003). A smartphone app [8] was developed so that ESM could be used for the empirical study described in this article. All participants in the 35 learning environments were instructed on how to use this app to submit emotional learning events experienced in their education. One "app report" was submitted for each emotional learning event.

Each app report started with a mandatory free-text reflection, describing the emotional event that had occurred. Then the participant categorised their emotions using a seven-step Likert scale from −3 to +3, with −3 representing a very negative emotional event and +3 representing a very positive one. The participant also categorised the event by choosing one or several items from a set of predefined metadata tags, illustrating salient themes. Finally,

Site	Focus	City	Age	Year	Participants	App reports	Interviews	Examples of what students did that teachers deemed "entrepreneurial"
1	Full-VeCP	Göteborg	20-25	2012-13	13	556	55	Start a real-life company based on a technological innovation from the University.
2	VaCP	Kungsbacka	13-14	2013-14	4	22	14	Produce and broadcast a radio show to listeners in the local community. Sell radio commercials.
3	VaCP	Härryda	13-14	2013-14	3	11	12	Produce and broadcast a radio show to listeners in the local community. Sell radio commercials.
4	IACP	Söderhamn	10-12	2014	17	506	9	Write fairytales. Draw illustrations. Give theatre play in English for class. Group work about a county.
5	IACP	Åtvidaberg	13-15	2014	16	41	9	Build a spaceship in group work and present it.
6	IACP	Lerum	10-12	2014	50	511	10	Write a book chapter. Make a poster about a political party. Do interviews outside school. Build a robot.
7	Mini-VeCP	Malmö	16-20	2014-15	17	86	5	Start and then liquidate a mini-company based on own idea.
8	VaCP	Göteborg	16-20	2014	27	111	6	Help a company with a tricky problem. Compete with other students in finding solutions.
9	VaCP	Göteborg	45-65	2014-15	8	159	5	Participate in business idea development workshops. Interact with potential customers to test the ideas.
10	Full-VeCP	Lund	20-25	2014-15	9	129	7	Start a real-life company based on own idea.
11	IACP	Skurup	11-12	2014-15	14	43	4	Use different apps on a tablet; drawing, maths, writing.
12	IACP	Skurup	11-12	2014-15	21	306	7	Write a letter. Give feedback to a classmate.
13	IACP	Landskrona	11-16	2014-15	22	237	10	Give feedback to teacher on how class is. Students are tricked as a way to teach fact-checking.
14	Mini-VeCP	Sarpsborg	14-15	2015-17	103	361	16	Start and then liquidate a mini-company based on own idea.
15	VaCP	Torslanda	10-13	2015-17	168	1,383	32	Make a boardgame. Manage a lesson. Give a massage. Give a concert. Programme games and share.
16	VaCP	Istanbul	12-14	2015-16	75	596	14	Collect waste oil. Make toys for orphans. Teach refugees Turkish. Manage own family's finances.
17	VaCP	Varberg	11-12	2016	46	254	5	Collaborate with architects to design a new playground.
18	VaCP	Varberg	14-15	2015-16	33	188	4	Help elderly at a care centre to use iPads in various ways; YouTube, Facebook, games, messaging etc.
19	VaCP	Varberg	13-14	2015	31	64	-	Help elderly at a care centre to use iPads in various ways; YouTube, Facebook, games, messaging etc.
20	VaCP	Varberg	11-12	2015	5	12	-	Help elderly at a care centre to use iPads in various ways; YouTube, Facebook, games, messaging etc.
21	VaCP	Varberg	11-12	2015-16	18	181	5	Help architects build a digital prototype of a new building.
22	VaCP	Kungsbacka	13-14	2015-16	27	2,328	4	Present a news "scoop" to class. Write a theatre play for preschool kids. Publish videos about gods.
23	VaCP	Kungsbacka	10-13	2015-16	27	461	5	Create texts on health for display at a health centre. Participate in the Lego League competition.
24	VaCP	Kungsbacka	13-14	2015-16	18	109	5	Write a fire safety plan for home. Help climate researchers collect data. Publish debate articles.
25	IACP	Kungsbacka	16-17	2015	6	43	-	Read and discuss a text in class. Present group work about a country. Watch a movie and discuss.
26	VaCP	Sundsvall	8-10	2015	24	284	3	Programme a robot and show to others. Create and send a video that helps a former classmate.
27	VaCP	Sundsvall	13	2015-16	15	169	-	Publish instructional videos on YouTube; how to draw an eye, play chess, make chocolate etc.
28	VaCP	Sundsvall	12	2015-16	25	167	9	Publish a book. Create and sell a magazine on religion. Help society with integration issues.
29	VaCP	Växjö	13-16	2015-16	23	55	3	Host open-house for parents and relatives to come and see what students have been doing in school.
30	VaCP	Växjö	10-13	2016	22	336	3	Create a video about magnetism and show to younger students.
31	VaCP	Växjö	10-13	2015-16	59	700	6	Arrange a music festival. Produce book review videos and share. Teach programming.
32	VaCP	Göteborg	10-12	2015-16	25	-	5	Produce a theatre play showing a trial. Learn about various professions.
33	VaCP	Huddinge	12-13	2015-16	25	191	8	Lobby to save a TV programme. Create and give out a magazine on child soldiers. Publish debate articles.
34	VaCP	Skövde	10-11	2015-16	33	311	9	Create an experience day on the human body for older students. Arrange a science fair. Arrange a party.
35	VaCP	Nacka	10-11	2016	19	42	5	Write stories and read them to younger kids. Arrange a fair about refugees. Write a sketch.
					1,048	10,953	291	

Table 1.
The 35 different learning environments studied

	Compulsory education (9–15 years old)	Upper secondary education (15–18 years old)	Higher and adult education (18 years and older)
Idea and artefact-creation pedagogy (IACP)	190 respondents from six schools in Sweden, submitting 1910 app reports. 49 interviews conducted and analysed	Six respondents from one school in Sweden, submitting 43 app reports. No interviews conducted	(No data collected)
Value-creation pedagogy (VaCP)	725 respondents from 21 schools in Sweden and one in Turkey, submitting 7,907 app reports. 148 interviews conducted and analysed	27 respondents from five schools in Sweden, submitting 111 app reports. Six interviews conducted and analysed	Eight respondents from an unemployment training programme in Sweden, submitting 159 app reports. Five interviews conducted and analysed
Venture-creation pedagogy (VeCP)	103 respondents from a school in Norway, submitting 361 app reports. 16 interviews conducted and analysed	17 respondents from a school in Sweden, submitting 86 app reports. Five interviews conducted and analysed	22 respondents from two universities in Sweden, submitting 685 app reports. 62 interviews conducted and analysed

Table 2.
Number of respondents, app reports and interviews from each of the three pedagogical approaches
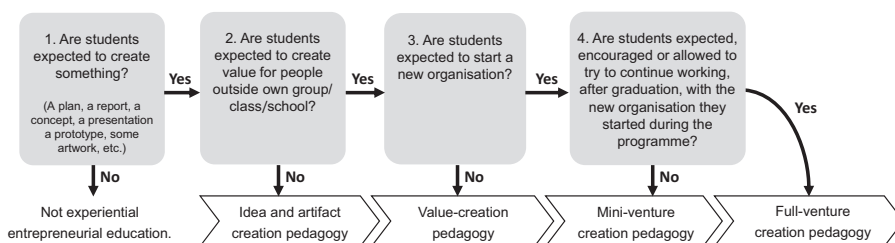
Figure 3.
A classification scheme used to categorise the main pedagogical approach of each studied learning environment

the app report was sent to their teacher and was visible to the teacher but not to other study participants. All app reports from all participants were also made available to the research team, in accordance with their written consent (or that of their parents, if the participant was younger than 15). When receiving a report, the teacher or coach could also interact in real-time with the participant through a chat function, producing additional empirical data.

4.2.2 Step 2: Prepare, conduct and transcribe interviews. The mainly quantitative data collected in step 1 using the ESM-based app report approach was fed into a more qualitative phase in step 2, with interview respondents as well as discussion topics largely chosen based on app reports. Thus, this was an app report-based sampling strategy as well as an app report-based interview template. These two steps acted as amplifiers, increasing the data quality of subsequent steps in the research process. The purpose of the interviews was to uncover links between the pedagogical approach, the triggered emotional learning events and the resulting effects on students. Each interview was prepared by compiling a summary of the most interesting and relevant app reports made by that participant. A semi-structured approach was used for the interviews: introduction, general lessons learned, app-induced questions around specific emotional learning events, other crucial emotional events in general, what had motivated the students, similarities and differences between this and other learning environments and recent important decisions made by the participant. Each time an emotional learning event was discussed, the participant was immediately and repeatedly asked to link that event to any learning outcomes, in terms of developed knowledge, skills and

attitudes. These links between events and learning were later harvested for comparison in step 3 by coding the transcribed text. Each interview lasted around 45–60 min and was recorded and transcribed verbatim.

4.2.3 Step 3: Analyse the collected data. All of the data transcribed from interviews was analysed with the support of the NVIVO interview coding software. Open coding and axial coding were applied (see Corbin and Strauss, 1990, p. 98). Two coding frameworks were applied [9], one for emotional learning events and one for the resulting effects of interest (see Table 3). The emotional learning events coding framework was based on a framework constructed by Arpiainen *et al.* (2013). The effects framework was inspired by a framework for entrepreneurial competencies constructed by Fisher *et al.* (2008).

The open-coding procedure led to the addition of two important effects alongside entrepreneurial competencies. Many instances of increased student motivation and passion were observed as a consequence of entrepreneurial education, as early as in the first wave of interviews. This effect type was thus added to the effects coding framework. Students also frequently said that they learned curricular content in more depth as a consequence of emotional learning events. This effect type was also added to the coding framework for effects appearing in the first wave.

Once all interviews had been coded, tables were generated to enable comparative analysis, such as app reports per metadata tag, common emotional learning events, common developed competencies, other effects of interest and common links between emotional learning events and developed competencies. While these tables gave a general overview of data and causal links within it, they did not replace in-depth qualitative comparative analysis of patterns and mechanisms, or a search for generalisable insights. They were merely the entry point for deeper analysis. Therefore, all generated tables informed a subsequent phase of thematic comparative analysis.

A pattern analysis method that was used was to search for causal mechanisms in the data by using a "matrix coding query" function, available in the NVIVO software package (cf. Hutchison *et al.*, 2010). The resulting matrix table showed, in condensed form, the prevalence and frequency of causal links in the interview data between emotional learning events and effects on students.

Similarities and differences between the three pedagogical approaches were identified and quantified by comparatively analysing the coding frequency of important topics being mentioned in interviews. All interviews were based on emotional learning events and all respondents were asked, in a similar and structured way, about their most important emotional learning events and what they learned from them. Such a structured interview approach facilitates a comparison of differences in experience and effects on respondents. Further, since all interview respondents were chosen for inclusion based on the most relevant emotional learning events found among all participants in each learning environment, these reported differences should extrapolate to the entire population in each setting. Thus, not only is the presence of a key topic in interviews important and illustrative in the comparison, but its absence is too.

5. Findings
Through the "matrix coding query" procedure in NVIVO, around 700 link types were identified between 23 emotional learning event types and 32 different types of effects on students. Many links were rare while some were more frequent. By way of illustration, the resulting NVIVO coding matrix for study wave 6 is shown in Table 3. Each cell in Table 3 indicates the number of links found in the interview data, between an emotional learning event and a corresponding effect. Further, each of the 16,436 links in study wave 6 was associated with qualitative interview data, in which a respondent talked about something

Emotional learning event \ Student learning outcome	Entrepreneurial identity	Entrepreneurial passion	Entrepreneurial self-efficacy	Innovativeness	Perseverance	Proactiveness	Uncertainty/ambiguity tolerence	Entrepreneurial self-insight	Declarative knowledge (entrepreneurial)	Procedural knowledge (entrepreneurial)	Learning skills	Marketing skills	Opportunity skills	Resource skills	Social skills (leadership)	Strategic skills	School subject knowledge	School subject skills	Changed attitude	Deeper learning	General passion (motivated)	General self-insight	Made an important decision	Other	Relationship to friends	Self-efficacy in general	Self-esteem	Some motivation	Strong motivation	Study skills	Take personal responsibility	Collaborating skills	Insight about others/society	Total
Teamwork experience	0	204	90	27	22	77	87	26	6	1	39	79	7	4	29	23	159	104	19	43	16	23	12	30	4	4	0	62	151	4	45	65	15	1480
Support from outside of learning env.	0	105	50	20	9	39	48	12	3	1	42	42	3	3	23	10	67	53	13	16	7	11	8	27	2	7	0	14	88	1	15	24	9	750
Theory into practice	0	216	97	36	22	79	90	12	5	0	44	77	7	6	32	25	175	124	22	46	29	23	12	36	3	4	0	65	176	5	44	56	14	1597
Uncertainty & confusion in learning env.	0	204	94	32	22	81	94	24	6	1	37	76	7	5	29	24	139	103	23	39	15	16	12	37	3	6	0	55	156	3	34	55	15	1448
Interacting with outside stakeholders	0	207	94	25	24	80	93	24	6	1	39	73	6	6	28	21	142	97	22	38	26	18	2	39	5	2	0	63	160	0	36	49	21	1457
Leadership and managing people	0	28	16	3	0	13	12	0	0	0	10	9	0	0	22	3	10	12	0	0	0	1	2	8	0	0	0	7	22	0	0	11	0	211
Overcoming competency gaps	0	169	65	27	20	60	68	23	4	0	39	56	7	5	26	21	182	105	19	46	45	25	11	36	5	5	0	56	151	6	38	47	19	1390
Time pressure	0	48	18	10	4	18	23	15	1	0	14	21	2	2	5	7	42	26	5	7	8	9	6	11	1	7	0	24	32	5	18	23	2	420
Information from outside world	0	47	15	4	4	15	17	3	1	1	22	14	3	3	3	12	59	23	3	10	7	10	2	8	0	8	0	25	30	3	14	11	8	350
Presenting to others	0	158	83	18	15	73	86	14	4	0	36	72	2	3	29	12	124	98	15	35	13	15	12	19	3	7	0	53	115	5	32	41	14	1207
Encouragement from teachers	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Get feedback on own performance	0	116	56	15	10	52	57	12	3	0	37	54	4	4	18	9	96	85	12	26	11	13	10	19	2	7	0	36	87	3	23	26	12	915
Grades	0	1	1	0	0	3	2	0	0	0	1	1	0	0	0	0	6	3	1	0	12	2	3	0	0	3	0	2	9	1	3	2	1	55
Investment of self into object	0	14	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	18
Iterative process	0	110	21	11	13	58	65	17	2	0	27	60	4	4	18	11	79	67	12	25	1	6	7	16	2	2	0	31	76	0	21	26	7	839
Leadership over oneself	0	14	6	1	1	6	7	0	0	0	2	8	0	1	1	1	7	4	0	0	0	2	2	12	1	0	0	7	8	2	14	4	0	102
Meaningfulness, create value for oneself	0	56	21	5	4	14	15	3	2	0	12	15	4	2	3	2	64	44	8	12	42	18	4	12	2	2	0	29	60	1	11	12	6	490
Meaningfulness, create value for others	0	221	96	28	24	81	96	22	4	1	43	75	5	4	31	19	146	111	19	42	5	13	13	29	1	4	0	63	156	3	40	52	16	1465
Other	0	4	3	0	0	3	2	2	0	0	4	1	0	0	1	0	8	0	0	1	0	5	1	2	1	0	0	3	8	0	1	5	0	59
Reflective interaction with teacher	0	3	3	0	0	2	3	1	0	0	4	1	0	0	1	0	7	8	0	3	0	5	1	2	0	1	0	3	8	0	1	1	1	53
Some control over the process	0	90	38	12	6	25	28	4	1	0	18	32	4	1	4	8	81	61	8	15	13	16	4	14	1	1	0	46	54	1	18	17	7	634
Strong control over the process	0	118	51	20	15	48	57	21	4	0	22	42	4	3	19	17	84	63	13	30	5	9	11	14	2	1	0	19	99	4	28	41	6	870
Break or spare time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Getting to know the object intimately	0	45	31	9	5	22	33	9	3	0	9	33	1	1	5	3	34	32	4	10	1	1	2	5	0	0	0	9	34	0	4	13	3	361
Total	0	2194	1003	308	229	863	996	266	58	6	474	851	74	59	337	245	1730	1236	228	453	276	245	151	370	41	76	0	678	1702	52	458	596	181	16436

Table 3.
NVIVO coding matrix for study wave 6, showing number of links between emotional learning events (left) and student learning outcomes (top)

that was later coded with one or more emotional learning events as well as one or more effects of interest here. Table 3 also shows that the most frequent causal link found in study wave 6 was between the emotional learning event "Interaction with outside world" and the effect "Entrepreneurial passion", with 221 coded links in the 76 interviews.

The links between emotional learning events and effects on students in the interview data indicate potentially interesting patterns of causal mechanisms. Twelve such links are shown in more detail in Table 4. Two important emotional learning event types were found to be "Interaction with outside world" and "Value creation for others". These were linked to many of the most wanted effects in entrepreneurial education, such as entrepreneurial self-efficacy, proactiveness, marketing skills, entrepreneurial passion and also, at times, entrepreneurial identity.

Entrepreneurial passion [10] played a central role in many of the causal mechanisms that produced the effects being probed for. Antecedents to entrepreneurial passion were: value creation for others (364 links), teamwork (346 links), interaction with outside world (307 links) and feedback and support from external stakeholders (231 links). In the interviews, entrepreneurial passion was also strongly linked to other coded effects, such as: strong motivation to learn in school, increased entrepreneurial self-efficacy, increased responsibility towards self and others and deeply personal development such as changed attitudes, increased perseverance and self-insight (see quotes in Table 4).

A more in-depth account of the findings will now be reported, wave-by-wave on an aggregate level and illustrated by a selection of quotes. More detailed empirical data and analysis are also available in Swedish or English for five of the six waves (see Supplementary material).

5.1 Findings wave by wave

The first wave of data collection showed strong effects of full-VeCP on higher education students' entrepreneurial competencies and engagement. Table 4 shows effects frequently mentioned in the interview data to be: entrepreneurial self-efficacy, marketing skills, entrepreneurial passion, motivation, entrepreneurial identity, self-insight, uncertainty tolerance and perseverance. The ability of an emotion-based assessment methodology to uncover micro-level causal mechanisms was also confirmed. A key causal mechanism uncovered was that letting students interact with external stakeholders to create something of substantial value to them triggered not only a strong development of entrepreneurial self-efficacy but also passion and sometimes even identity. A student in biotech entrepreneurship explained:

> We had a meeting with a hospital manager. He said, "OK, I know what you do, it's fantastic, I need your instrument, I'd love to work with you". (. . .) It was high-on-life there for a while, I can tell you. Experiencing that people take you seriously. People no longer see you as a student. I think it's cool to feel that they actually listen to us. I think it gives self-confidence, I'd say. I've found this small area where I know things. We trust our own ability more now. (VeCP site 1)

Informed by the first wave, the second wave focused on two compulsory schools using VaCP by letting students produce and broadcast a one-hour radio programme. The students' production phase involved numerous external stakeholder interactions, through interviews and sponsorship recruitment. The radio programme was also expected to be perceived as valuable to a broad audience in the region. Even if venture creation was absent, similar causal mechanisms to those found in wave 1 were also present (see Table 4). A student explained:

> Some things in school do not feel so serious. I've taken this quite seriously because it's radio and everything. It's not just for us in the class to see and hear, but it's for others, externals, too. Then if it's a hundred, or a thousand, or a million, it does not matter. It's still others than the class. (VaCP site 2)

Emotional learning event...	...triggering competence development	Conceptual description of causal mechanism found in interview data	Illustrative student quotes in interviews	Link intensity† in wave						Links
				1	2	3	4	5	6	
Interaction with outside world	Entrepreneurial self-efficacy ("I can")	Unexpected friendliness of external people boosts one's self-efficacy ("They actually wanted to talk to me")	"Once I stood there, things went so well. I noticed, wow, I'm good at this, it feels awesome!" (Wave 6). "Even I myself was surprised that I could go talk to them" (Wave 5) "Hell, we could probably do this" (Wave 1).	6	4	1	2	3	5	201
	Proactiveness / initiative-taking ("I do")	Asking students to interact externally requires them to take action/initiative ("I must act now")	"I've learned to not be afraid to fail, but to do things at once" (Wave 4). "It's not just sitting calm in the classroom. You must do something out there too" (Wave 5). "Nowadays I just get going and start doing things" (Wave 6).	-	6	1	2	2	4	164
	Marketing skills ("I communicate")	Talking with and presenting to others improves social/communicative skills ("I want to make a good impression")	"I've also learned to talk to people, because you talk to adults in another way. It is very important to be able to talk with adults I think" (Wave 2). "I learned how to market, to take contact, how to best email" (Wave 6).	4	8	1	3	3	4	195
Value creation for others*	Passion / motivation† ("I want")	Many people find it surprisingly good fun and engaging to create value for others. ("This was fun!")	"This is 10,000 times more fun than ordinary class" (Wave 6). "I've taken this pretty seriously, it's not just for us in the class, it's for others too" (Wave 2). "What do you really means something" (Wave 1).	3	6	2	2	4	9	364
	Subject matter knowledge ("I know")	When others care about one's work, acquiring knowledge is easier and more important. ("I want this to work")	"Personally for me I have become extremely much more eager to spend a little more time on finishing my education" (Wave 4). "The project helped us to more easily understand what was in the books" (Wave 5).	-	7	2	5	5	7	325
	Entrepreneurial identity ("This is who I am")	After long-term exposure, some people start seeing themselves as value-creators. ("I want to be more like this")	"I want to continue to work like this" (Wave 1). "I think this is extremely stimulating, it's among the best I've seen in my life, the opportunities to both make money and do good, it's pretty big" (Wave 4).	3	1	2		-	-	23
Teamwork	Self-insight ("I know myself")	Listening to others' views exposes one's own tacit assumptions ("I'm different from him/her")	"The greatest source of learning has been the situation the group has been in more self-awareness perhaps. I know myself better" (Wave 1). "It can be difficult when all have different ideas, thoughts, views" (Wave 6).	5	9	4	3	3	2	197
Applying new knowledge in practice‡	Subject matter knowledge ("I know")	Applying knowledge in practice makes people learn knowledge more in-depth ("Now I understand and remember")	"It becomes more lasting, permanent, it remains in our memory" (Wave 5). "I think it's better to learn by doing, it's easier to learn, you remember it better" (Wave 5) "The grades I got, I was positively surprised!" (Wave 6).	2	7	4	3	7	8	441
Uncertainty in learning environment	Uncertainty tolerance ("I dare")	People get used to and dare to confront uncertainty if having to tolerate it ("This is not so scary after all")	"No one understands what we're doing, still in the end you have something to submit. It has built a peace of mind; it always turns out with something" (Wave 1). "I've learned to manage difficult situations" (Wave 6).	5	3	2	3	3	5	221
	Perseverance ("I overcome")	When people repeatedly try hard under uncertainty, they eventually succeed ("I'll try again until I succeed")	"I've learned that you can get over difficulties. Earlier, when disappointed, I have given up. But not anymore" (Wave 5). "You do impossible things all the time. So then, you learn that nothing is impossible" (Wave 1).	3	3	1	1	2	2	81
Feedback and support from external people†	Passion / motivation† ("I want")	It is motivating to get feedback and support from people you don't know. ("They actually liked us!")	"You want to get the best feedback possible. It's much more fun if people think it's good than if they think it's not good" (Wave 2). "You get a feeling in your stomach that you want to do better until next time" (Wave 5).	2	4	2	2	3	7	231
	Entrepreneurial self-efficacy ("I can")	External feedback and support boosts people's self-confidence/self-efficacy ("I could actually succeed in this!")	"You get a proof that you've helped someone" (Wave 6). "I learned that the world has started to rely more on teenagers. Many companies have agreed to work with us. It's like getting recognition" (Wave 2).	3	3	1	2	2	4	152

Note(s): * In the first two waves, "Interaction with outside world" was also coded when students created value for others. † As these constructs were captured through more than one code in NVIVO, only the most frequent link was picked for inclusion here. This was to avoid counting a single empirical link in interview material more than once. + Link intensity from 0–9 was calculated as number of coded interactions in relation to number of transcribed interviews in each wave: in wave 1, 6 interviews; wave 2, 14 interviews; wave 3, 17 interviews; wave 4, 49 interviews; wave 5, 62 interviews; wave 6, 63 interviews

Table 4.
Main causal links uncovered in the interview material in the six waves

The interview coding in wave 2 also showed that value creation for others can trigger the development of subject matter knowledge (see link intensity for wave 2 in Table 4). When students get to apply new knowledge in value-creation practice, they understand and remember it better.

The third wave was an attempt to study whether the mechanisms found in waves 1–2 were also more broadly present in compulsory education, when teachers had worked with entrepreneurial education. Three schools deemed success cases from three leading support actors in entrepreneurial education were chosen for study. In these schools, the chosen pedagogical approach was IACP, as this is the Swedish policy strategy for entrepreneurial education (Hoppe *et al.*, 2017). The classroom practices were primarily traditional, but also included the occasional thematic group work and study visit outside school. However, the third wave was largely a disappointment in terms of the effects on students' entrepreneurial competencies and motivation (see the low coding intensity for wave 3 in Table 4). Only a few exceptions were found in which students developed some level of entrepreneurial competencies. While many students were generally appreciative of the variation offered by IACP, one student summarised the situation in an app report:

> That we are going to build those spaceships and skip a lot of good lessons is really bad! (IACP site 5)

The fourth wave involved a comparison between four concept suppliers in entrepreneurial education, focusing on VeCP and VaCP in upper secondary, higher and adult education, plus three different schools using IACP in compulsory education (according to the state-financed teacher training received in entrepreneurial education). Results from waves 1–3 were corroborated. VaCP and VeCP led to strong development of entrepreneurial competencies and student motivation, while IACP had weak if any effect on the development of student entrepreneurial competencies and motivation. Coding intensity was therefore somewhere between that seen in previous waves (see Table 4). VaCP and VeCP had many coded links, whereas IACP had few.

The fifth wave was undertaken through an EU project initiated by a municipality wanting to build upon the promising findings around VaCP from previous waves. Two schools in Sweden and Turkey received training in VaCP for two consecutive years and one school participated with a mini-VeCP-based approach provided by the regional branch of Young Enterprise Norway. The study showed that, in terms of triggering student engagement and developing entrepreneurial competencies, VaCP may be as powerful, or perhaps even more so, than mini-VeCP. It also illustrated strong connections between VaCP and deeper learning of curriculum knowledge and skills (see the high coding intensity for wave 5 in Table 4). A student in Turkey explained:

> Actually, I realise what I have. I possess so much knowledge, but I do not think about it. It's like I did not know it. For example, I have learned something, I forget that I know it, but when someone asks something about it, I remember it again. Suddenly it comes up. (VaCP site 16)

The sixth and final wave was an attempt to corroborate the small-scale findings around VaCP from previous waves, but on a broader scale. Eighteen of the 19 participating schools used VaCP. Some were given training in VaCP, while others were already working with VaCP for other reasons. In some cases, the effects on students were among the strongest found among all six waves. Two students and a teacher said:

> I will never forget this. I will remember it for my whole life. This feels like the best school ever. (Student at VaCP site 28)

> I had never thought that so many in my class could succeed with so much. It was really cool to see how huge it could become. I never thought that I could manage as much technology as I did. (Student at VaCP site 23)

I get a lot for free. I never need to say why what we do is important; they understand that it is important. You win a lot and the enthusiasm is gigantic! And I save a lot of planning time. Now I plan together with my students. (Teacher at VaCP site 33)

Acting on the task of creating something of value to external people made students passionate about creating value and triggered a strong desire to: learn more, put more energy into schoolwork, take responsibility for oneself and others, to own the learning process to a greater extent and learn knowledge and skills in more depth (see Table 4). There were also many cases of students and teachers being fully convinced that VaCP results in higher grades for many students, due to the increase in student engagement and perceived meaningfulness of schoolwork. Two teachers said:

If they're engaged and motivated the effect is that they learn more too, that's my experience. (VaCP site 34)

Yes, it's been a huge difference. Above all, every student has now passed. Earlier I had five to seven who did not pass in either subjects, but now all are up there. (VaCP site 33)

VaCP also had the unexpected effect of leading to a better social climate within classes and fewer conflicts between students; thus relieving the teacher of time-consuming conflict-management issues. A teacher explained:

It's quite difficult to go out and be mean to someone out there and then you are supposed to go inside and write a diary together five minutes later. There are far fewer conflicts in this group than I have experienced in previous groups.(VaCP site 34)

5.2 Differences between IACP, VaCP and VeCP

The outcome of the coding frequency analysis is shown in Table 5, illustrating salient differences found between the three pedagogical approaches.

The most salient difference was found in students' developed entrepreneurial competencies [11]. The VaCP and VeCP interviews had many examples of strong development of students' entrepreneurial competencies, whereas IACP interviews did not. Link analysis showed that two event types accounted for much of this difference: "Interaction with outside world" and "Value creation for others". These two event types were common in VaCP and VeCP, but rare in IACP. This might largely explain why IACP did not affect students so much in this regard.

The second most salient difference was found in levels of engagement and motivation, coded as entrepreneurial passion and general passion/motivation. Here, the coding frequency percentage figures in Table 5 do not fully reflect the differences in engagement and motivation between the three pedagogical approaches. According to the interview respondents, this is because general passion is not felt as strongly as entrepreneurial passion. VaCP and VeCP both showed a strong increase in engagement and motivation among participating students, whereas IACP showed only some increase (see quotes on passion in Table 5). Interviews revealed that VeCP triggered strong engagement, primarily by being about real-life entrepreneurship, in terms of starting a company, earning real money and trying to create a profitable business. VaCP did not rely on economic value to trigger engagement at all. Rather, it achieved strong effects through the power of students' passion for making a real-life difference to others and to society at large. IACP triggered some engagement, primarily through the inherent pleasure in pedagogical variation of the everyday school experience, in the joy of learning and joy of working with school subjects. Thus, according to the interviewees (see quotes in Table 5), there was a similarity in effect but a difference in how it was produced.

Table 5.
Nine salient differences between the three approaches in terms of impact on various outcome variables coded in the interviews

Impact area	Observed differences	Coding frequency VaCP	IACP	VeCP	Example app report text/interview quotes from students
Entrepreneurial competencies (8 codes summarised)	VaCP and VeCP impact students much more here than IACP	46.5%	15.1%	44.1%	"I've learned to know what other people need. Someone needs to take this responsibility, and we are taking it" (VaCP site 33). "I've learned to be more curious about things and test more things" (VeCP site 18). "One has become more responsible. How to treat people, how to approach people" (VeCP site 7). "I've learned that everyone can make an impact, age does not matter" (VaCP site 35). "I've learned to think in a different way, to be inventive" (VaCP site 33). "No-one knows, I do not know. What to do? Keep walking, and it becomes less and less uncertain. Time will tell." (VeCP site 1). "I've learned that you can get over difficulties." (VaCP site 16)
Entrepreneurial passion (motivated by value/venture creation)	VaCP impacts students the most here. VeCP quite much too. IACP almost not at all	17.6%	0.7%	6.9%	"It was very fun to help someone else" (VaCP site 24). "I do not know why it's so immensely motivating that it's real, but it really is." (VeCP site 1). "When I do responsible things, I feel adult. I try to do something for others and not just myself." (VeCP site 14). "We have not worked so much with what others think before." (VaCP site 3). "After a while we felt that we had earned money, and, this goes great. It was really fun, it was insane." (VeCP site 7). "If the money is there, that feeling of acknowledgement can be so much bigger in some way" (VeCP site 10). "If you get a kick by helping other people to feel better, then you feel better and they feel better, and there's nothing bad with that" (VaCP site 33). "If you're going to show your work to others, you want it to be good" (VaCP site 21)
General passion (motivated in general)	IACP impacts students the most here. VaCP some. VeCP little	4.6%	13.4%	1.3%	"It's fun that you get to come up with the story yourself, not just do what [teacher] says" (IACP site 4). "In the spaceship project when we were sketching, all in the group were very motivated. We were brainstorming ideas, that was very fun" (IACP site 5). "You get to come up with the English yourself" (IACP site 4)
Deeper learning of curriculum content knowledge/skills	VaCP and IACP impact students here, and VeCP does not	14.6%/9.7%	9.8%/5.9%	1.1%/0.9%	"I learn more when I do things for others than when I do not do things for others". (VaCP site 34). "Even if it's not such a fun subject, if it's fun to work with it, you remember it" (VaCP site 2). "My school results were not lowered, but on the contrary I got better results. "You become curious and want to know more. You become curious about how it works. (VaCP site 15). "I think that it's more fun, and if it's more fun I learn better" (IACP site 12). "When more people than just the teachers [look at my work], I work harder and do it better." (VeCP site 28)
Self-insight	IACP impacts students the most here. VeCP some. VaCP a little	4.3%	16.1%	8.8%	"I think I learned something about myself. I often take a leading role, but I do not fight for the role" (VeCP site 1). "I've learned that I am not so shy but that I dare to take space" (VaCP site 33). "I've wanted to become a police officer since I was 3 years old. As I get more information I realise that it is what I want. (IACP site 6) "You get insight into how difficult it is to run a business. It is not as easy as it seems" (VeCP site 7). "You learn a little more about work life and how business works and stuff. A little different. I think that's fun." (VeCP site 14). "Pitch template, another great tool to even more understand one's value proposition (VaCP site 9)
Knowledge about entrepreneurship	VeCP impacts students much more here, VaCP and IACP do not at all	0.5%	23%	15.1%	"I think one learns to talk in front of others a lot and so. And present. Because we never do that otherwise in school." (VaCP site 21). "Let's keep selling, I must find more people who become as happy" (VeCP site 7). "The first thought is – go, let's call and try to sell this" (VeCP site 1)
Marketing skills	VeCP impacts students the most here. VaCP some. IACP very little	5.8%	1.3%	9.9%	
Social skills in leadership	IACP impacts students more here than VaCP and IACP	2.4%	8.2%	3.2%	"Before it was a bit difficult for me, perhaps I did not dare to tell people to shape up. Now I've been a bit more forthcoming, being the one deciding more." (IACP, site 5). "Now we were supposed to work like an engineer does. It was a different level of co-operation. Everybody concentrated, kind of." (VaCP, site 24)
Entrepreneurial self-efficacy	VeCP impacts students the most here, VaCP a lot too, IACP a little	5.4%	1.6%	7.3%	"This entrepreneurial learning has made me much stronger and courageous as a person" (VaCP site 33). "When I graduate I might be able to start my own company, because I've experienced this whole process and contacted so many external people. (VeCP site 7)

The third most salient difference was found in the effects on students' deeper learning of curriculum content, knowledge and skills. VaCP showed the strongest effects, followed by IACP. Apart from entrepreneurship as a subject, VeCP did not make students learn the curriculum content, knowledge and skills in more depth. According to the students who experienced VaCP and IACP, it was the increase in engagement levels among students that made them work harder, pay more attention and learn in more depth than they otherwise would have. This causal mechanism was corroborated by the teacher interviews. On many of the VaCP sites, students said that they had worked harder in school than they ever had before. They reported transformative, deeply emotional experiences that changed their perspectives on many aspects of life; experiences they would remember for the rest of their lives. They said that, as a result, they had gained deeper knowledge and skills in maths, languages, social sciences, natural sciences and other core subjects.

5.3 Challenges found with the three pedagogical approaches

Challenges of the three different pedagogical approaches also surfaced from the data. When it comes to IACP, many student teams struggled with becoming productive. This was often due to a lack of engagement among certain students within a team. Some had difficulty understanding the purpose of, and seeing the connection between, theory and practice. One student said:

> First, I understood kind of nothing; why are we doing this? But then I understood more (. . .) Then the teacher suddenly said, "well, now we're going to build our spaceships". Then we did not understand anything; why the fact-gathering assignment and the spaceship had any connection whatsoever. (site 5)

For VaCP, some subjects were found to be more difficult to work with than others, especially natural science. Some teachers also mentioned that VaCP necessitates collaboration across subjects, making it challenging for a single teacher to work with VaCP in isolation. Some teachers also said that VaCP demands more from both teacher and students. Teachers lose some sense of control over the class and students lose some of the emotional security coming from doing things in a very similar and routinised way. A teacher explained:

> I think that the main challenge has been to un-schoolify the students a bit. They do not have to sit in their seats and do what the teacher tells them to do, but sometimes they can actually come up with their own ideas, and it's okay to be creative. Give students that responsibility, kind of. (site 33)

Data from the VeCP sites confirmed a previously articulated challenge, stemming from a strong focus of VeCP on economic value-creation and capitalist values (Johannisson, 2010; Leffler, 2009). In the past, this focus has made it difficult to embed VeCP into non-business subjects (Handscombe et al., 2008; Komulainen et al., 2011; Korhonen et al., 2012; Smith et al., 2006). The current study adds empirical evidence showing in more detail how and why VeCP is unable to integrate well into non-business subjects. VeCP's focus on making money (see quotes in Table 4), rather than on applying curricular knowledge and skills, makes it less effective in strengthening student learning of core curricular knowledge and skills.

The data also illustrated that taking the step from IACP to VaCP can be straightforward in many cases (cf. Figure 1). In particular, wave 3 showed that many examples of IACP could have been transformed relatively easily into a more impactful VaCP-based practice. This could be done by simply adding an opportunity for students to use their knowledge and skills to interact with people outside their own group, class or school and to try and create some value for them. What students already do and create in class can often be connected to an external audience or recipient, who can get some potential value out of what the students do

and what they create. When this is done regularly, it establishes a new culture in class. A teacher explained:

> When the value-creation bug gets stuck into me and my students, it is difficult to start up a single piece of work without any one of us raising the question, "who will we be doing this for?" (VaCP, site 27)

6. Discussion
This study has resulted in three main answers to the question of what differences there are between IACP, VaCP and VeCP in terms of their effects on students. Strong differences were observed in how much entrepreneurial competencies were developed among students, how much students' motivation increased and how much curricular knowledge and skills were developed.

The effects of IACP and VeCP reported here are largely in line with previous research in entrepreneurial education. IACP has recently been summarised as illustrating a "relative (un)effectiveness" due to fuzziness and confusion among teachers (Pepin and St-Jean, 2018, p. 276). By contrast, VeCP approaches have recently been summarised to "typically obtain higher impact", since students are working with "real-life entrepreneurial situations" (Nabi *et al.*, 2017, pp. 288–292). The strong difference in effects on students between IACP and VeCP found here confirms that there is a need to distinguish between different pedagogical approaches in comparative studies, in order to avoid contradictory findings (Nabi *et al.*, 2017). This is the case with both traditional versus experiential pedagogy, as previously shown by Kozlinska (2016) and between different experiential approaches, as shown here.

While this study is one of the first in entrepreneurial education to compare the differing effects across different pedagogical approaches, there have been other comparative studies in general education. The relatively weak effects of IACP on the development of curricular knowledge and skills may be mirrored in the small effects that Hattie (2008) and Dochy *et al.* (2003) found for problem-based learning, as well as the medium effects Hattie (2008) found for cooperative learning [12]. The strong effects of VaCP on the development of curricular knowledge and skills may be mirrored in the strong effects Hattie (2008) and Celio *et al.* (2011) found for service-learning and in the strong effects Smith *et al.* (2014) found for work-integrated learning. Still, caution is needed, since Hattie's compilations have been criticised for being overly positivistic, dogmatic and simplistic (Biesta, 2007; McKnight and Whitburn, 2018). The differences between IACP, VaCP and VeCP are summarised in Table 6.

6.1 A tentative causal mechanisms scheme: how are strong effects produced?
Scholars have recently called for assessment research that opens the "black box" of entrepreneurial education (Lans *et al.*, 2017; Maritz and Brown, 2013). Such calls signify a need to go beyond mere "yes/no" answers to whether or not effects are produced, to also illustrate more qualitatively how, when and why effects are produced by entrepreneurial education. Therefore, a qualitative account is given here to summarise the empirical findings of this study. When students get to apply curricular knowledge and skills in teams, creating value for external stakeholders through personal interactions that trigger external feedback and support, they seem to undergo profound development in a variety of sought-after entrepreneurial competencies. Such activities also trigger entrepreneurial passion; this plays a key role in making them work harder, want to learn more, take more responsibility, be kinder to each other and develop on a deeply personal level. This then leads to deeper learning of curricular knowledge and skills, more frequent instances of self-directed learning and fewer conflicts in class. This qualitative summary is illustrated in Figure 4.

	Idea and artefact-creation pedagogy (IACP)	Value-creation pedagogy (VaCP)	Venture-creation pedagogy (VeCP)
Focus	Idea and artefact-creation	Value creation	Venture creation
Definition	Let students learn by working in teams to create artefacts around ideas they develop themselves	Let students learn by applying their knowledge to create something of value to external stakeholders	Let students learn through mini or full-venture creation
Definitional grounding and source of passion	Opportunity identification and creation (Shane, 2003)	New value creation (Bruyat and Julien, 2001)	Organisation creation (Gartner, 1989)
Examples in practice	Students work thematically in class Students create artefacts in class, such as plans, presentation materials or prototypes	Students produce text or video that is useful or enjoyable for others Students help others with something they need help with	Students start a new mini-venture that is later liquidated Students start a full-scale venture that they become co-founders of if successful
Observed impact	Weak/no development of entrepreneurial competencies Somewhat increased motivation Some development of curricular knowledge/skills	Strong development of entrepreneurial competencies Strong increase of motivation Strong development of curricular knowledge/skills	Strong development of entrepreneurial competencies Strong increase of motivation Weak/no development of curricular knowledge/skills outside entrepreneurship
Motivational theory base	Hedonism	Belonging	Egoism
Critical questions	Is this really entrepreneurship?	Is this too good to be true? Is this really that different?	Is this really education?

Table 6.
Comparison of three different approaches in entrepreneurial education. A focus on idea and artefact creation (IACP) is compared to a focus on value creation (VaCP) and on venture creation (VeCP)
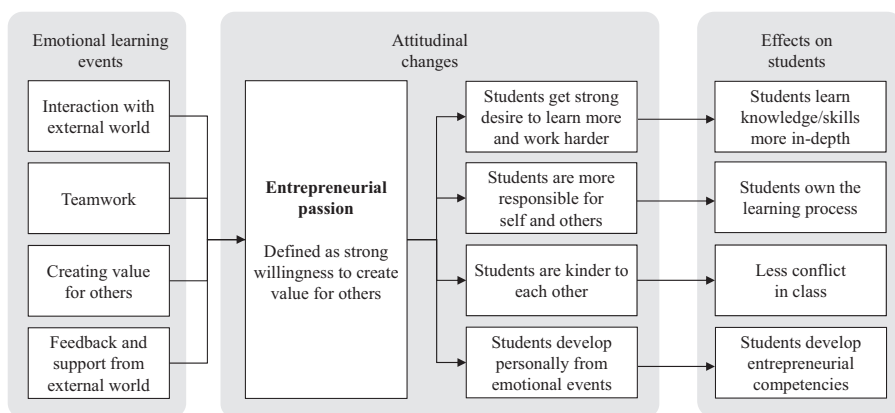
Figure 4.
A mechanism scheme illustrating the role of entrepreneurial passion in entrepreneurial education. The model shows how entrepreneurial passion plays a key role in generating strong positive effects in entrepreneurial education. Emotional learning events lead to attitudinal changes which, in turn, produce effects

Figure 4 is an example of a "mechanism scheme"; in other words, an "abstract representation of mechanisms that could bring about effects of a certain kind" (Ylikoski, 2019, pp. 3–4). Such schemes may be seen as middle-range theories (Merton, 1968), in which "theory is a toolbox of different kinds of semi-general mechanisms" (Hedström and Wennberg, 2017, p. 99).

Compared to the common call for more macro-level randomised control studies (cf. Longva and Foss, 2018; Martin *et al.*, 2013; Rideout and Gray, 2013), the toolbox-of-mechanisms view represents a different way forward for impact assessment of entrepreneurial education. Instead of searching for answers to a simplistic yes/no question, "does entrepreneurial education work?", it represents a search for mechanism-based answers to the question of "how, when and why does entrepreneurial education work?"

A toolbox-of-mechanisms view may also be associated with recent calls for more emotion-based assessment studies (Nabi *et al.*, 2017), since it could provide viable answers to a vexing question: "which emotional events to probe for in future assessment studies?" To illustrate this, a tentative emotional events-centric and mechanism-based proposition (grounded in Table 4 of this study) is articulated here:

Proposition 1. Entrepreneurial education in which students get to experience emotionally charged...

(1) ...interaction with the external world,

(2) ...teamwork,

(3) ...value creation for others and

(4) ...feedback and support from external people

is more effective than other, less emotionally charged entrepreneurial education.

6.2 A tentative explanatory model: why do effects on students differ?
The following brief attempt to explore why the three pedagogical approaches lead to differing levels of effects on students draws upon action theory and motivation theory. All three pedagogical approaches compared here involve students taking action to create something. According to von Mises (1949) and Oakeshott (1991), human action is always meaningful and purposeful from the perspective of the person choosing to take action (Callahan, 2005). Further, emotions play a crucial role both in connecting a learning experience to one's own personal meaning (Dirkx, 2001) and in triggering deep learning (Boekaerts, 2010; Jarvis, 2006). Emotion, meaning, learning and purpose are thus interconnected. Different purposes as experienced by students will then lead to different levels of emotionality, meaning and learning.

This study has offered much insight into how students interpret the purpose of educational activities. For many students in this study, the purpose of IACP was unclear and, at times, even devoid of purpose, apart from offering a moment of enjoyment and pleasure. IACP may thus be viewed as anchored in hedonistic motivation theory of searching for pleasure and avoiding pain (Fiske, 2008). Turning to VeCP, for many students, the purpose was self-orientated; centred on making money for themselves, so that their business would become viable. It was thus anchored in egoistic motivation theory (Fiske, 2008). Finally, for many students, the purpose of VaCP was others-orientated; centred on helping other people. VaCP thus opens the way to a different motivational theory base for education than the more common self-orientated, hedonistic and egoistic motivational theories so prevalent in classroom research (Fiske, 2008), or the situation of students lacking motivation altogether (Fredricks *et al.*, 2004). Instead, VaCP seems to lean on belongingness and prosocial motivation theory (Fiske, 2008), positing that "we humans can and do act to benefit others" and that "people can do spectacular things for others" (Batson *et al.*, 2008, p. 135). Related to this, Baumeister *et al.* (2013, p. 516) have shown empirically how perceived meaningfulness is stronger in others-orientated activities than in self-orientated ones, concluding that "the quest for meaning is a key part of what makes us human, and uniquely so". Maybe the others-orientated purpose for students explains why VaCP triggers high levels of positive emotion and motivation, high levels of perceived meaningfulness and deep learning of core curriculum knowledge and skills?

Relating to literature on entrepreneurial passion (Cardon *et al.*, 2009), these results indicate that an entrepreneurial role identity grounded in value creation for others could merit further study (for example, "creating value for others is an important part of who I am"). The findings reported here indicate that, as a source of entrepreneurial passion, such a value-creating role could be a strong motivational force in entrepreneurial education; perhaps even stronger than the more common inventor or venture founder/developer role identities grounded in opportunity identification and organisation creation definitions of entrepreneurship (cf. Cardon *et al.*, 2009; Miller *et al.*, 2012; Renko, 2013). These different sources of entrepreneurial passion are shown in Table 6.

6.3 Four critical questions around the three pedagogical approaches

In this study, IACP and VeCP have been associated with certain limitations in terms of their effects on students. The weak effects of VeCP on curricular knowledge and skills outside entrepreneurship might imply problems of integrating VeCP with non-business education. This might explain why some teachers are sceptical about VeCP. Economic activity and capitalism are often seen as being misaligned with the overall educational aim of developing curricular knowledge and skills (Johannisson, 2010; Komulainen *et al.*, 2011). Would it not, then, be reasonable for some educators observing VeCP to ask a critical question: "is this really education?" Is VeCP then to be considered an effective but marginal approach, of relevance primarily to business students?

One limitation that seems to be associated with IACP is its relatively weak effects in all three areas assessed here. Might this be due, in part, to IACP suffering from a fuzziness caused by definitional dilution (cf. Neck and Corbett, 2018; Hoppe *et al.*, 2017)? Consistent with this, Hägg (2016, p. 14) argues that when "creation of organisations (Gartner, 1989), is taken out of entrepreneurial learning, we are merely left with a version 2.0 of the progressive educational movement." Would it not, then, be reasonable for some entrepreneurs observing IACP to ask a critical question: "is this really entrepreneurship?" Is IACP then to be considered a broadly applicable but fuzzy and inefficient approach to entrepreneurial education?

In this study, VaCP emerges as a third alternative; seemingly capable of bridging between education and entrepreneurship in a more productive way than was previously possible (cf. Figure 1 and Table 6). Can VaCP then allow for the strong effects of VeCP to be reached without the inherent complexity of letting students start a mini or full-venture? And can VaCP help preserve the broad applicability of IACP in most subjects and on all levels of education, without suffering from weak effects and definitional fuzziness? If so, one might hypothesise that the cost/benefit relationship of entrepreneurial education could be greatly improved. Such a bridging perspective resonates with a recent claim by Günzel-Jensen *et al.* (2017, p. 327), that going from "about/for" pedagogy to experiential "through" pedagogy "may be too big a step for students". They conclude that a new, bridging concept is needed: "learning from" interventions that mimic entrepreneurship.

Still, these considerations are based on emerging empirical evidence. The potentially useful results disclosed here need to be corroborated by other researchers and in other contexts. Value creation for others may also be seen as present in many existing instances of both IACP and VeCP. Would it not, then, be reasonable if people contemplating VaCP asked two critical questions: "is this too good to be true?" and "is this really that different?" The four critical questions are shown in Table 6.

6.4 Implications for practice

This study has provided emerging empirical data, showing that VaCP may constitute an escape from the dilemma, for many teachers, of entrepreneurial education being caught between two limiting courses of action. Could it be that teachers no longer need to choose

between effective but marginal practices and widely applicable but fuzzy and ineffective ones? If so, VaCP may be opening up a new solution space for entrepreneurial education practice.

For IACP practitioners, the necessary step to achieve stronger effects on students is a small one, as this study has shown that IACP can be relatively easily transformed into VaCP. In doing so, teachers need to understand the risk of triggering too much emotionality in students, and the associated need to provide them with emotional support. VaCP also necessitates appropriate teacher training.

6.5 Implications for policy
Based on the results reported here, policymakers may be prompted to reconsider some of the ongoing initiatives to infuse entrepreneurship into education. In some cases, VaCP could be a more effective and efficient way forward than IACP or VeCP. For existing activities, it might be worthwhile investigating how VaCP may be integrated with them, so as to complement and strengthen them.

VaCP also opens the way to new objectives when infusing entrepreneurship into education. Given the strong effects of VaCP on the learning of curricular knowledge and skills, initiatives to infuse entrepreneurship into education might now be better able to inject improvements at the heart of education. This might imply that entrepreneurial education no longer needs to rely solely on economic policy objectives, such as economic growth and employability; it might be connected directly to educational policy objectives, such as improving student learning and raising results in various student performance rankings. Such alignment with the core objectives of education could facilitate a broader diffusion of entrepreneurial education.

6.6 Implications for further research
Since the effects of IACP and VeCP reported here are largely in line with previous research (cf. Kozlinska, 2016; Pepin, 2012), a key future work for scholars might be to corroborate the results around VaCP presented in this article. The empirical data were collected by a single research team, using a single mix of methodologies and mostly in a single country. Other research teams may, therefore, want to conduct research into VaCP using other methods and in other cultures, to see if they find similar effects and causal mechanisms. Such research would be particularly warranted in higher and adult education institutions, since only eight such participants of VaCP were included in this study. Another area in which the effects of VaCP might be studied is vocational education. This would perhaps be the most natural application of VaCP, as there are numerous examples of programmes and courses, in which students learn by creating value for others as apprentices.

Scholars might also investigate the similarities and differences between VaCP and other pedagogical approaches often claimed to be similar to entrepreneurial education; for example, problem-based learning, project-based learning and service-learning. Such comparisons have previously been made on a superficial level (cf. Lackéus *et al.*, 2016), but not empirically or in more depth [13]. On a more micro-level, scholars might also conduct impact assessment studies that probe for differences in the prevalence of emotional learning events that have been found to produce outcomes of interest; for example, interaction with the outside world, teamwork, value creation for others and feedback and support from external people.

The emergence of VaCP also poses new semantic challenges. Is "value-creation pedagogy" an appropriate term, or should such practice be subsumed under either of the established terms? And what does the overarching term "entrepreneurial education" signify, when a value-creation perspective is added?

7. Conclusions

This work has posited that VaCP could be a bridge between the two established pedagogical approaches of IACP and VeCP. Hence, in certain contexts, VaCP might be a way to overcome some of the acknowledged limitations of IACP and VeCP. For certain teachers, this situation may be viewed as being caught between two unpleasant choices. However, another way to view such a dilemma would be as a tradeoff. Weick (1979, p. 35) has emphasised the importance of acknowledging tradeoffs in social science, paraphrasing Thorngate (1976) by stating that "it is impossible for a theory of social behaviour to be simultaneously general, accurate, and simple". Transferred to the topics examined here, is it then impossible for experiential entrepreneurial education to be simultaneously effective, widely applicable and precise? What if a generic and unavoidable aspect of social life were to be that gains made in generalisability and applicability (when going from VeCP to IACP) are lost in precision and effectiveness? If this is the case, then the prospect of finding an escape from such a generic tradeoff, a panacea or magic bullet, might seem slim and unrealistic. Claiming that VaCP gives stronger effects, wider applicability, higher definitional precision and lower hurdles to implementation and diffusion than previously established approaches might thus be viewed as unrealistic. Indeed, if anyone were to claim to have found such an escape, the level of evidence required to accept and trust such a statement would have to be high.

Thus, interpreting the large volumes of empirical data on the three pedagogical approaches compared here needs to be approached with significant caution and a critical stance. The findings give such a positive image of VaCP that one inevitably needs to question whether they are simply too good to be true, or whether differences between the three pedagogical approaches have been exaggerated. Questions need to be posed by outsiders concerning whether study cases have been selected reasonably, whether the data collection has been trustworthy, whether the research team has interpreted that data appropriately and whether the methodology applied was robust and fit for purpose. It is thus important to consider the risk of overstating the results. Methodological caveats in the present study might include unexpected effects of self-selection bias, challenges in comparing across different education levels and hidden errors stemming from unaccounted contextual dimensions. Another limitation relates to differences in the enactment of different pedagogical approaches, caused, for example, by differences in teachers' prior experience or training. There might be instances of IACP out there that produce much stronger effects than have been found in the cases investigated here. Instances of VeCP might also exist which scale well across an entire educational institution and which strengthen students' learning of non-business knowledge and skills.

Notwithstanding the numerous methodological and semantical challenges, this study has shown some emotional learning events to be more impactful on students than others, such as interaction with the outside world and value creation for others. This might explain why some teachers and programmes succeed better than others in entrepreneurial education. With pedagogical differences being more substantial than previously assumed in entrepreneurial education, it may, perhaps, be more worthwhile to conduct further study of the particularly successful teachers and particularly emotionally charged programmes (investigating "When, how and why is entrepreneurial education working?" cf. Brentnall *et al.*, 2018) than of average teachers and programmes (investigating "Does entrepreneurial education work?", cf. Bae *et al.*, 2014; Martin *et al.*, 2013). Such research might be a pathway towards stronger effects and broader relevance of entrepreneurial education.

Notes

1. In this article, the term "pedagogy" is defined as theories and models of teaching and learning. This is in keeping with the Anglo-American educational research tradition and thus covers both "pedagogy" and "didactics", which are commonly used terms in Continental approaches (cf. Kyrö, 2005).

2. Neoliberalism is a political ideology that celebrates market mechanisms through privatisation, competition through the exercise of "freedom of choice" and a reliance on self-sufficient, enterprising and self-optimising individuals (Castree, 2010). The challenges of neoliberalism include increased gender, class and race inequality, a neglect of democratic values and an unjust blame of the poor for their misfortunes (Gill, 2014).

3. The typology was created abductively over a period of seven years. An abductive research approach implies a simultaneous development of theoretical framework, empirical fieldwork and case analysis, see Dubois and Gadde (2002). The abductive process has been detailed in the methodology section of a doctoral thesis (Lackéus, 2016, pp. 36–46).

4. Notwithstanding other differences, the factor used in this research to distinguish between mini and full-VeCP is whether or not students are expected to incorporate their venture if it proves successful. Thus, what is deemed "mini" is students not being expected, encouraged or even allowed to continue their venture post-graduation.

5. Wave 1 in Table 1 comprised site 1, wave 2 comprised sites 2–3, wave 3 comprised sites 4–6, wave 4 comprised sites 7–13, wave 5 comprised sites 14–16 and wave 6 comprised sites 17–35.

6. According to Wikipedia, the average age span of compulsory education in the world is 6–16, see https://en.wikipedia.org/wiki/Compulsory_education#Per-country_variations_in_the_age_range_of_compulsory_education

7. The term "learning environment" is used here to signify a formal learning environment, in which a teacher dictates a learning process for multiple students in a predetermined way. It could be a course, a programme or part of compulsory schooling.

8. For more information on the smartphone app and its different uses in practice and research, see www.loopme.io.

9. The coding frameworks were first used in wave 1, and then abductively developed further in each subsequent wave through open coding. The final version of the two coding frameworks is shown in Table 3. All key concepts shown in the first two columns of Table 4, except for "Value creation for others", were coded in all waves and thus formed part of all coding frameworks from the start.

10. Defined as passion for new value creation (cf. Bruyat, 1993).

11. Eight codes were used to capture entrepreneurial competencies as a composite construct: entrepreneurial passion, entrepreneurial identity, entrepreneurial self-efficacy, general self-efficacy, uncertainty and ambiguity tolerance, proactiveness, marketing skills and opportunity skills.

12. Hattie claims that an effect size below 0.20 is small, between 0.30 and 0.60 is medium, and above 0.60 is strong. Problem-based learning has an effect size of 0.26, cooperative learning 0.42 and service-learning 0.58 (see Hattie, 2017).

13. While the purpose of this article is not to compare entrepreneurial education to other pedagogical approaches, some speculation will nevertheless be provided here to inspire future research. Three novel and unique contributions of VaCP could be: (1) its broad applicability in general education, well beyond, say, vocational education; (2) its reliance on entrepreneurship as a practice grounded in expertise, traditions and prescriptive methods; and (3) its emphasis on novel value created, as opposed to the routine value creation often seen in vocational education. An interesting comparison might be to study VaCP alongside service-learning, apprenticeship education, internships and other types of experiential and socially situated learning approaches, in which students learn by creating value for others.

process and did most of the interviews in study waves 2–6. She also played a key part in the analysis of data from study waves 2–6 and co-authored the internal reports for study waves 2, 3, 4 and 6. The interviews in Malmö, for study wave 4, were done by Annhild Månsson at Gimle AB. The interviews in Turkey, in study wave 5, were done by Tuba Kinali, Zeynep Kaya and Fredrik Johansen. Interview transcription was done by the author, Carin Sävetun, Ewa-Lena Lackéus and a number of transcription consultants. The mobile app-based data collection instrument Loopme was built by programmers Senad Santic, Michael Jasinski, Hesho Rashid, Carl Rynning, Martin Helmersson, Patrik Bäckström, Patrik Nygren, Christoffer Henriksson and Dionysios Papathanopoulos at Me Analytics AB. The functionality of the app instrument was specified and tested by the author and Carin Sävetun, Christer Westlund, Senad Santic, Michael Jasinski at Me Analytics AB and design consultant Lars Gäfvert. The scientific process was supervised and supported by PhD supervisors Karen Williams Middleton and Mats Lundqvist at Chalmers University of Technology and PhD examiner Flemming Norrgren. The case selection process in study wave 3 was supported by Christer Westlund at Me Analytics AB and Ragnar Åsbrink at the Swedish National Agency of Education (SNAE). SNAE's participation in study waves 3 and 6 was championed and coordinated by Ragnar Åsbrink. Analysis of findings was supported by Malin Heimer Nilsson and Viktoria Struxsjö, among others. The resulting article was reviewed by six anonymous reviewers and the two editors Helle Neergaard and Ulla Hytti. The studies drawn upon here were also conducted in collaboration with, and financed by, a large number of organisations. Study wave 1 was conducted in collaboration with the University of Gothenburg and was financed by Chalmers University of Technology. Study wave 2 was conducted in collaboration with Framtidsfrön and the municipalities of Kungsbacka and Härryda and was financed by Business Region Göteborg, Västra Götalandsregionen and Chalmers University of Technology. Study wave 3 was conducted in collaboration with Me Analytics AB and financed by SNAE plus three different municipalities. Study wave 4 was conducted in collaboration with Ung Företagsamhet (Young Enterprise), Stiftelsen Drivhuset, Lund University (Venture Lab), Me Analytics AB and the municipalities of Skurup, Lerum and Landskrona and was financed by Region Skåne and the participating municipalities. Study wave 5 was conducted in collaboration with Göteborgs Stad, Esenyurt Halk Egitim Mudurlugu, Mustafa Yesil Ortaokulu, Ungt Entreprenørskap, Chalmers University of Technology, Rakkestad Ungdomsskole and Me Analytics AB and was financed by the European Union through their Erasmus Plus programme. Study wave 6 was conducted in collaboration with, and financed by, SNAE and the municipalities of Sundsvall, Varberg, Kungsbacka, Göteborg, Växjö, Nacka, Huddinge and Skövde.

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Supplementary material

Five of the six data collection waves have been summarised in internal reports in Swedish, or separate articles in English.

Wave 1

Lackéus, M. (2014), "An emotion based approach to assessing entrepreneurial education", International Journal of Management Education, Vol. 12 No. 3, pp. 374–396.

Wave 2

Lackéus, M. and Sävetun, C. (2014), Att mäta det omätbara, Framtidsfrön i Väst, , Gothenburg.

Wave 3

Lackéus, M. and Sävetun, C. (2015), Elevperspektiv från tre entreprenöriella lärmiljöer i svensk grundskola – en effektstudie genomförd på uppdrag av Skolverket, Chalmers Publication Library, Göteborg.

Lackéus, M. and Sävetun, C. (2019), "Assessing the Impact of Enterprise Education in Three Leading Swedish Compulsory Schools", Journal of Small Business Management, Vol. 57 No. S1, pp. 33–59.

Wave 4

Lackéus, M. and Sävetun, C. (2016b), Koncept kontra skola: En studie av åtta entreprenöriella lärmiljöer - En effektstudie på uppdrag av Region Skåne, Chalmers Publications, Gothenburg.

Wave 6

Lackéus, M. and Sävetun, C. (2016a), Entreprenöriell utbildning som värdeskapande lärande - en tredje väg? En effektstudie av värdeskapande lärande på uppdrag av Skolverket, Chalmers University of Technology, Gothenburg.

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