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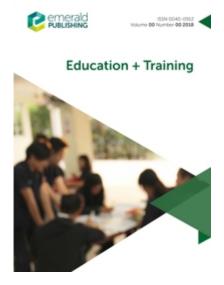The final published version is available online at: . https://doi.org/10.1108/ET-04-2020-0072

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Assessing entrepreneurial competences: Insights from a business model challenge

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Assessing entrepreneurial competences:
Insights from a business model challenge

STRUCTURED ABSTRACT

Purpose: While the number of entrepreneurship education programmes offered around the world is on the rise, research into the assessment of entrepreneurship education programmes is still lacking. In this paper, we take the stance that entrepreneurship education has to focus on a set of transversal competences aimed at teaching individuals to become more enterprising, and develop a framework and practical proposal for the teaching and assessment of entrepreneurial competences.

Design/methodology/approach: We followed a three-pronged research design. Firstly, we reviewed literature and practices on the definition of entrepreneurial competences and measures for their assessment, and identified a rubric of competences and a set of assessment tools. Secondly, we tested the identified tools to assess entrepreneurial competences, through the development of an intensive extra-curricular initiative on entrepreneurship based on a business model challenge. Thirdly, we evaluated the outcomes of this experience based on 72 student pre-test and post-test survey responses.

Findings: We assessed the impact of participation in a business model challenge with regard to five competence areas: positive attitude and initiative; communication and interaction; team-work and collaboration; critical and analytical thinking or problem solving, including risk assessment; creativity and innovation. We found no relevant changes across these dimensions, concluding that the mere exposure to the business challenge was not a sufficient condition for stimulating the development of entrepreneurial competences in our sample.

Originality/value: This work provides a relevant contribution to researchers, educators and policy-makers by taking an interdisciplinary approach to reviewing previous literature and proposing ways of assessing transversal competences in the context of entrepreneurship education.

Keywords: Entrepreneurship education; Assessment; Entrepreneurial competences; Transferable competences

INTRODUCTION

The number of educational entrepreneurship programmes in higher education offered around the world is on the rise (Kuratko, 2005; Lekoko, Rankhumise, & Ras, 2012; Mohamad et al., 2015), pushed by widespread recognition of entrepreneurship as an important driver of economic development and employment (e.g., OECD, 2017; United Nations, 2016). The rise in entrepreneurship education opportunities is therefore accompanied by growing demands for accountability from educational stakeholders and accreditation organisations (Duval-Couetil, 2013). In this landscape, assessment practice in entrepreneurship education is an increasingly important issue that educators and policy-makers have to tackle, since assessment is a key element for ensuring coherent and quality learning patterns (e.g., Banta, 1999). Previous literature has highlighted that the success of entrepreneurship education can be analysed either from a "macro" perspective, for instance by analysing dedicated policies or the university context, or a more "micro" perspective, focusing on the learning outcomes of programmes (e.g., Pittaway & Cope, 2007; Duval-Couetil, 2013). In this paper, we are interested in the latter perspective and focus on student assessment, which regards the evaluation of the correspondence between desired educational outcomes and actual student achievement (Banta, 1999; Pittaway et al., 2012). Despite its relevance, this topic has received relatively poor academic attention, for instance overlooking educators' aspired or actual assessment practices (e.g., Pittaway et al., 2009; Pittaway & Edwards, 2012) or methodological implications for the measurement of the effectiveness of entrepreneurship education (e.g., Falkäng & Alberti, 2000; Penaluna & Penaluna, 2009).

The breadth of research in this area can be explained by two issues that make student assessment in entrepreneurship education particularly complex. First, entrepreneurship education is characterised by different ontological foundations and interpretations about the relevant contents and learning objectives (Fayolle & Gailly, 2008; Gibb, 2002; Johannisson,

2016). In fact, scholars have distinguished between education related to educating "in" entrepreneurship (i.e., making individuals to become more entrepreneurial in their existing firms or place of work), educating "for" entrepreneurship (i.e., aiming to teach individuals how to start a business) or "about" entrepreneurship (i.e., giving a general understanding about entrepreneurship as a phenomenon) (Kirby, 2004; Mwasalwiba, 2010). Secondly, and related to the previous point, entrepreneurship programmes are characterised by a variety of pedagogical approaches (Fayolle & Gailly, 2008), many of them action- and experience-based, requiring assessment practices able to assess learning in an innovative and effective way (Pittaway et al., 2009).

We position our contribution to this debate by acknowledging that nowadays entrepreneurship education is more than just learning about new business creation or small business management, but rather learning to become enterprising individuals (e.g., Gibb, 2002; Henry, Hill, & Leitch, 2005; Hoppe, 2016). This implies a focus on the "know-why" and "know-when" aspects of entrepreneurship (Fayolle & Guilly, 2008; Williams-Middleton & Donnellon, 2014; Johannisson, 2016), with an emphasis on cognitive constructs (e.g., attitudes, motivations, self-efficacy) or transversal competences (e.g., creativity, innovation, problem-solving, decision-making) rather than on managerial/small business management contents (Gibb, 1993, 2002). In addition, it implies students' involvement with a wider audience outside the business field (Cooper, Bottomley, & Gordon, 2004; Fayolle & Guilly, 2008; Johannisson, 2016), which requires the adoption of cross-disciplinary or cross-cultural education approaches (e.g., Hynes, 1996; Kazakeviciute, Urbone, & Petraite, 2016). We therefore suggest that student assessment in entrepreneurship education should be based on teaching methods and assessment practices that are able to stimulate and evaluate students' "transversal" competences.

Drawing on previous literature, we refer to transversal competences as a range of cognitive (e.g., critical thinking), personal (e.g., awareness) and interpersonal competences (e.g., communication, cooperation and teamwork), which span various scientific disciplines or educational subjects, and are thus transversal to many social fields (OECD, 2012; Rychen & Salganik, 2000)[1]. To date, assessing transversal competences in entrepreneurship education has been problematic because, while literature has provided several classifications and lists of entrepreneurial competences, there are no standardised tools and methods clarifying *how instructors can assess transversal entrepreneurial competences developed through entrepreneurship education*. In this paper we aim to shed some light on this important and overlooked area, thus contributing to the literature on entrepreneurship education and its effectiveness (e.g., Henry et al., 2005; Fayolle, 2013; Pittaway et al., 2009). We empirically explore the practical case of a short, intensive entrepreneurship education programme based on a business model challenge involving university students from different countries and disciplinary fields. Our results highlight some of the challenges that university educators need to consider when designing entrepreneurship education programme assessment, underlining the limitations of assessment techniques based on mainstream quantitative approaches.

The paper is organised as follows. Firstly, we present a literature review to set the background for understanding the assessment of entrepreneurial competences. Secondly, we analyse the case of an extra-curricular entrepreneurship education initiative, highlighting the critical components regarding the enhancement and assessment of entrepreneurial competences in a cross-disciplinary and cross-cultural environment. Thirdly, we conclude by describing the implications of our study in terms of research and practice in the domain of entrepreneurship education assessment.

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[1] In this paper, we deal with the terms "soft", "transferable" and "transversal" as interchangeable in the discussion of related competences (OECD, 2012), and we use the term 'transversal' as a summary of the three terms. We nevertheless acknowledge that the debate is broader and could include other approaches and terms, such as socio-emotional skills, life skills, or 21st century skills (Sánchez Puerta, Valerio, & Bernal, 2016).

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LITERATURE REVIEW

Assessing entrepreneurial competences

Assessment in education is defined as a process of systematic gathering of evidence, review and use of information to make judgements and draw inferences about students' achievements and performances, and about potential improvements in student learning and development (Palomba & Banta, 1999; Pellegrino, Chudowsky, & Glaser, 2011).

The assessment of entrepreneurship education is particularly difficult because it is a relatively young discipline, characterised by conceptual and methodological debates (Duval-Couetil, 2013; Fayolle, 2013; Mwasalwiba, 2010). An important issue in this regard is that entrepreneurship education comprises four categories, including educating "about" entrepreneurship, i.e., aimed at increasing the understanding of theoretical concepts in entrepreneurship; "for" entrepreneurship, i.e., focusing on new business creation and small business management, and thus on practical enterprise-related contents; educating "through" entrepreneurship, i.e., applying a learning style involving enterprising behaviours based on trial and error; and educating "in" entrepreneurship, i.e., focusing on a wider set of skills (e.g., innovation, problem-solving, self-efficacy), knowledge, and experiences, aimed at teaching individuals to become more enterprising (Kirby, 2004; Mwasalwiba, 2010; Hoppe, 2016).

Several scholars and policy-makers have supported the idea that entrepreneurship education can be distinguished from small business education, because its major objectives are to develop enterprising people rather than merely stimulating business ownership and growth (Blenker et al., 2011; Gibb, 1993, 2002; Hoppe, 2016). This has important implications on two levels. At macro-level, it entails a shift from policies fostering enterprise education (i.e., "about" and "for" approaches), to policies fostering entrepreneurial learning (i.e., "through" and "in" approaches) (e.g., Hoppe, 2016). At micro-level, it implies the adoption of different

practical teaching and assessment approaches, which can accommodate wider learning objectives in terms of reflexive action and experimental learning (e.g., Cooper et al., 2004; Pittaway & Edwards, 2012). To approach this wider understanding of entrepreneurial education, both scholars and policy-makers have pragmatically adopted the concept of entrepreneurial competences (e.g., European Parliament and Council, 2006; Edwards-Schachter et al., 2015; Man, Lau, & Snape, 2008; Mitchelmore & Rowley, 2010; Morris et al., 2013). The concept of entrepreneurial competences is not unitary in social sciences (OECD, 2012), because the notion of competences is complex – comprising components that are deeply rooted in a person's background (traits, personality, attitudes, social role and self-image) as well as those that can be acquired at work or through training and education (skills, knowledge, and experience) (Man, Lau, & Chan, 2002). In this paper, we propose to adopt the concept of entrepreneurial competences as a description about something which a person should be able to demonstrate or achieve to successfully exercise entrepreneurship (Mitchelmore & Rowley, 2010). This concept includes a range of transversal competences referred to the cognitive, personal and interpersonal domain and span across social fields (e.g., Luppi & Bolzani, 2019).

Drawing on these considerations, entrepreneurship educators need to reflect on three key elements of assessment practice, defined as "the assessment triangle": observation, data collection and interpretation, and learners' cognition (Ketchagias, 2011). This entails answering to a set of key questions about what is assessed; how, when and where the assessment is carried out; and who is the assessor (Pittaway & Edwards, 2012).

With reference to "what" it is assessed (i.e., learning objectives), as previously discussed, assessing transversal competences in entrepreneurial education refers to a wide range of competences referred to engagement in entrepreneurial behaviours (e.g., opportunity seeking; taking initiative), understanding and management real-business uncertainty and complexity, and developing interpersonal relationships (Pittaway & Edwards, 2012). It is important to

highlight that specifying learning outcomes in competence-based education should be viewed holistically rather than "an effort to describe or list educational and behavioural objectives" (European Commission, 2012, p. 13). In fact, when learning outcomes are over-specified, competences are reduced to atomised tasks (for example described by long check lists of actions and behaviours).

The "how" assessment carried out (i.e., methods) is influenced by the teacher's education paradigm. Firstly, according to the so-called classical test (or measurement) theory, which relies on behaviourism, associationism, traits and fundamental abilities theory (Mislevy, 1996), knowledge is an organised accumulation of associations and skills, and learning is the process that allows them to be acquired (Skinner, 1958). This paradigm maintains an overall epistemological positivist orientation and an empirical approach. In this view, learning can be tested by measuring behavioural skills in discrete tasks, while the process of learning can be shown by monitoring changes in behaviour, according to regular task practice and reinforcement. Assessment is limited only to measurable and objectively observable facts, performances and events (e.g., Lindquist, 1951) and carried out through quantitative tests that ensure the reliability and validity of assessment. A second paradigm is based on a cognitive psychology perspective on learning (e.g., Neisser, 1976). According to this view, individuals are active when acquiring knowledge (e.g., the selecting and processing of stimuli and provision of responses; metacognitive experiences and self-questioning) (e.g., Anastasi, 1967; Carroll, 1981; Sternberg & Smith, 1988). In this perspective, assessment implies dealing with complex abilities and competences (e.g., synthesis, analysis, planning, evaluation, decision making, problem solving, etc.). A third perspective is the social constructivist one, which assumes that learning is an active and continuous process where knowledge is constructed and reconstructed, influenced by prior knowledge and experience (Handley et al., 2004). Constructivism assumes that students become creators of their personal knowledge structures

(Herman, 1997) through identifying personal relevance, using a critical voice and acting in negotiations (Taylor, Fraser, & Fisher, 1997). In this view, assessment focuses on learners' processes of experiential reflection, which can be represented by mind maps, self-questioning, self-explanations and search for meaning (Fenwick, 2000). In addition, according to approaches rooted in intersubjective ontology, students' learning can be construed by focusing on the nature of their living relationships with others, recognising that they are always deeply embedded, and embodied, in mutual relationships with communities of people (Cunliffe, 2016).

Going on to discuss the "when" of assessment, we need to distinguish between formative and summative assessment. Formative assessment is carried out as part of the learning process in a specific context (e.g., via diagnostic testing or feedback), providing information on where students are with respect to the expected performance (Huhta, 2010) and how they could be supported to progress further, in order to promote meaningful learning. Summative assessment is the assessment that attests that the student is competent at a certain level and, as a result, can earn credits or a certification at the end of a learning process. A connected issue regards "where" the assessment is carried out. Looking at learning environments, besides traditional classroom-based learning, several programmes entail non-classroom learning environments that facilitate experiential, reflexive or critically reflexive learning, while at the same time supporting students by scaffolding teaching activities and explicit instructions where relevant (e.g., Brookfield, 2017; Cooper et al., 2004; Lackéus & Williams Middleton, 2015; Macht & Ball, 2016). It is thus important to align assessment to the chosen learning environment, especially for students exposed to authentic learning, i.e., activities that are representative of the reality and complexity of situations of entrepreneurial activity (e.g., within start-up or entrepreneurial behaviour in other contexts) (Blenker et al., 2011; Match & Ball, 2016).

Finally, "who" does the assessment is an important issue to be addressed, by choosing between the possibility to engage only the educator, or make use of self- or peer assessment (e.g., peers, entrepreneurs, other professionals) (e.g., Pittaway & Edwards, 2012).

AN EMPIRICAL ASSESSMENT OF ENTREPRENEURIAL COMPETENCES

To answer our research question about how to assess transversal entrepreneurial competences developed in entrepreneurship education, we followed a research design characterised by two phases (summarised in Figure 1), as explained below. The research team endorsed an interdisciplinary approach (Fayolle et al., 2016), merging an education- and a management-science view on the topic.

Insert Figure 1 about here

Phase 1 – Identifying entrepreneurial competences and assessment tools

The first phase of the research consisted in a baseline analysis of literature and practice about the definition and measurement of entrepreneurial competences, with the aim of identifying a rubric of competences and a set of assessment tools. To accomplish this, we mapped the approaches and methods in teaching and assessing entrepreneurial competences (1) through a review of existing programmes, policy documents and existing literature on entrepreneurial skills and competences; (2) through interviews with experts to produce a complementary mapping of current educational environments and practices in relation to the teaching and assessment methods/tools of transversal competences.

The review of academic literature was carried out by searching for relevant articles on Scopus[2] as of December 2015 by extracting combinations based on the following keywords: entrep*, competenc*/skill*, transversal, transfer*, soft[3]. We narrowed our search to journal articles in the English language. We merged the results from our searches and eliminated the redundant documents, ending up with a sample of 3,085 articles. The relevance of the articles for our review was coded by two independent judges, who reached an inter-rater agreement of .92 and solved disagreement by discussion, so that all articles were assigned for inclusion/non-inclusion for our review. A total of 474 articles were retained as relevant for providing a list of transversal competences for entrepreneurship and a set of measures to assess them. It is important to underline that this search was used as a first initial step into the field, and later we included additional up-to-date literature. In addition to academic literature, in January 2016 we carried out a general search on the Internet for policy and practice documents on the topic, retrieving around 20 relevant documents.

In addition to the literature review, we carried out 15 expert interviews with teachers working in five partner institutions of a European project on the assessment of entrepreneurial competences (project XX[4]), with the aim of evaluating the current educational environments and practices at their institutions, and their perceived main development needs regarding the assessment of the defined competences.

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[2] Started in November 2004 and owned by Elsevier, Scopus is recommended by some scholars and bibliometricians as having a wider coverage for the social sciences and humanities than the Web Of Science Social Sciences Citation Index (SSCI-WOS) database (e.g., Harzing 2013). Scopus contains over 21,500 titles from more than 5,000 publishers. It consists of over 38 million records back to 1996 (63%) and over 22 million records pre-1996 (37%) going back as far as 1823 (Scopus, 2016).

[3] More specifically, our search was carried out as follows: entrepr* AND competenc*, entrepr* AND skill*, entrepr* AND competenc* AND soft; entrepr* AND competenc* AND transversal; entrepr* AND competenc* AND transfer*; entrepr* AND skill* AND soft; entrepr* AND skill* AND transversal; entrepr* AND skill* AND transfer*. For a similar approach, e.g., Haq, 2016.

[4] Details about the project are not disclosed to ensure anonymity during the review process and will be added later.

Based on the insights gained through coding and grouping entrepreneurial competences from our literature review and expert interviews, we developed a framework and methodology to assess transversal entrepreneurial competences belonging to the following five areas:

1. Positive attitude and initiative

2. Communication and interaction

3. Team-work and collaboration

4. Critical and analytical thinking or problem solving, including risk assessment

5. Creativity and innovation

For each area of competence, a list of specific competences and validated tools to assess them were identified, as summarised in Table 1. An in-depth description of skills, together with levels against which to assess them, is provided in Table A1 in Appendix.

Insert Table 1 about here

Phase 2 – Pilot test of assessment tools

Based on insights gained during the first phase of the research, in 2016 we organised a pilot test of the assessment tools, with the aim of assessing their reliability and feasibility in assessing students' performances in terms of entrepreneurial competences before and after an entrepreneurship education programme.

Our pilot test was carried out as part of the activities of the project XX. The partner institutions launched two virtually-enabled, real-life business challenges to be solved through a cross-disciplinary, international collaborative teamwork. Seventy-two students were recruited to participate in the two business challenges from Bachelor (67%) and/or Master courses across the partner universities. On average, students were 23 years old (SD=4.06). 56%

of them were males. One business challenge required students to creatively propose new services and opportunities for developing active participation by citizens in the new public Central Library in Helsinki. This challenge was addressed by students with a management and an applied sciences background. The second business challenge required civil engineering and management students to collaborate to develop a business idea to market a new retrofitting technology to non-domestic buildings. Details about the two business cases are provided in the Appendix (Table A2). For both challenges, students set up teams at national level to work on the project, which were matched with other teams from other countries to work collaboratively to solve the business challenge. The virtual platform FairShare[5] was set up as a joint learning environment for all the participating students. The students had one month to complete the business challenge. During this period, the students received a one-day introductory class on entrepreneurship, business modelling and teamwork; they were asked to deliver intermediate outputs every week. The final result was presented to other students and professors from participating institutions.

We deemed this learning environment particularly suited to testing the transversal competences for entrepreneurship that we identified in the first phase of our research for two reasons. Firstly, the two business challenges were developed to reflect real world problems, characterised by complexity and having possible multiple solutions. Students could thus attempt to solve them through debate, experimentation, exploration and creativity (Kirriemuir & McFarlane, 2004). This type of activities can motivate learners more than traditional approaches (Gordon et al., 2009) and make them more likely to remember concepts they discover on their own (De Jong & Van Joolingen, 1998). Secondly, the business challenges were organised in such a way as to encourage learners to be active and autonomous, and to activate collaboration between learners both within and across countries, developing social and

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[5] https://fairsharetraining.eu/frontpage-en

communicative competences. In addition, the learning environment was not classroom-based but technology-enhanced, involving the use of a communication platform and other communication technologies to engage students. We thus believed that the two settings allowed several transversal competences to be addressed simultaneously.

The business challenges were implemented smoothly, with students being able to follow the prescribed activities and deliver all the expected outputs. Based on a survey administered at the end of the experience to students (n= 55, response rate= 76.4%) and teachers (n= 10; response rate= 100%), the general evaluation of pilot workload, challenge and relevance of the experience was positive (Appendix, Table A3). The survey also investigated whether, according to students and teachers, the business challenge was perceived as effective in generating awareness of the selected entrepreneurial competences and useful in activating them. The data show that the initiative was highly effective in generating awareness and useful for activating competences with regard to communication and teamwork; and least effective with regard to awareness of risk assessment competences (Table 2). Similarly, the business challenge was perceived as most useful in activating communication and teamwork competences; and least useful in activating risk assessment competences (Table 3). We interpret these results in two ways. Firstly, they may indicate that simulations like ours can allow students to engage in action and experiential learning, but that the "protected" conditions in which students operate in these projects do not allow them to fully experiment with the real, uncertain life of entrepreneurial endeavours (Daly, 2001; Macht & Ball, 2016). Secondly, the organisation of our business challenge as a group work, in such a short time frame, was more suited to stimulating the competences needed to participate in the group activities (e.g., communication and collaboration) than business-related competences (e.g., creativity, problem solving, critical thinking).

Insert Tables 2 and 3 about here

To assess the defined entrepreneurial competences, a pre- and post-test questionnaire was administered to students through an online survey. A total of 72 students filled in the pre-test questionnaire; 61 students completed the post-test questionnaire. All the constructs demonstrated good reliability in both questionnaires (all Alphas>.70). We carried out a comparison between pre-test and post-test scores with a set of paired *t-tests*, and found that no statistically significant change could be detected across all the tested constructs. To interpret this result, we organised one focus group with students and in-depth interviews with teachers one week after the post-test survey, in order to have additional insights to reflect on our pedagogical approach and our assessment method. Why did we register a null difference between the mean scores on competences before and after the participation to the business challenge, while the initiative was perceived as effective in raising awareness on the selected entrepreneurial competences and useful for activating them? We can offer three explanations. Firstly, the length of the learning experience (around one month) might have been too short to ensure proper engagement and reflection on learning outcomes by students, also considering that this was an extra-curricular initiative possibly conflicting with other personal or study priorities. Furthermore, the short length of the initiative, together with the fast timing of activities, made it unfeasible for the teachers to plan an effective combination of formative and summative assessment. We therefore reason that students in our study were not actively engaged in exercising metacognition, self-assessment and transfer of knowledge and competences acquired within other settings (Packer & Goicoechea, 2000) and in reflecting about what they could do to improve their competences (Bransford, Brown, & Cocking, 2000). Secondly, and connected to the previous point, students taking part in the business challenge did not receive any specific training, nor were they offered any opportunity to further reflect

on their learning achievements with regard to any of the entrepreneurial competences assessed by our tools. We therefore suggest that being merely exposed to an experiential entrepreneurial education initiative, such as our business challenge, might not be a sufficient condition to stimulate the development of entrepreneurial competences. Thirdly, we reason that a null statistical change over pre- and post-test scores in the identified competences does necessarily signal a null learning process. The adoption of a qualitative rather than quantitative approach to assess the same competences might have produced different results.

Based on our quantitative findings and the discussion of pilot tests with the participating teachers and students, we performed a SWOT analysis to offer a synthesis of the assessment of the two pilot tests (Figure 2). We believe that such analysis is relevant for the implementation of business case challenges in other educational contexts.

Insert Figure 2 about here

DISCUSSION AND CONCLUSION

Entrepreneurship education is increasingly seen as "critical for developing entrepreneurial skills, attitudes and behaviours that are the basis for economic growth" (Volkmann et al., 2009) and as a key competence for individual development and fulfilment, active citizenship, social inclusion and employability in a knowledge society (European Parliament and Council, 2006). Entrepreneurial competences not only refer to enterprise management but to a wider set of transversal competences (Bolzani & Luppi, 2019). This poses several challenges to educators, regarding both the teaching side—how and where entrepreneurial cross-curricular competences will fit the educational set-up of subject-based timetables of schools and universities; and the assessment side—how, when, and where to assess such multifaceted

competences, and who should assess them. Several authors have engaged in the effort to measure the outcomes of entrepreneurship education around the globe (e.g., Martin, McNally, & Kay, 2013). However, to date the issues of what entrepreneurial competencies should be developed through education and training, how should they be developed, and how they could be specifically assessed are still in need of further understanding (Edwards-Schachter et al., 2015; Pittaway & Edwards, 2012).

In this paper we specifically tackle the issue of how to assess entrepreneurial competences at student level, by presenting insights from the test of an assessment framework for entrepreneurial competences within an extra-curricular business challenge. While our learning context was perceived as effective in raising awareness on the selected entrepreneurial competences and useful for stimulating their development, and although we used validated quantitative tools with good reliability and data from multiple sources (self- and peer assessment), we found no statistically significant change in the pre-test and post-test scores of any of the competences we tested. We have interpreted this as a result of three key issues: (1) the short time frame during which the students were exposed to the learning initiative and the lack of formative assessment; (2) the lack of any form of specific training on the selected competences or meta-cognition on the learning experience; (3) the use of a mono-method quantitative approach to assess competences.

Theoretical contribution and future research paths

This study contributes to the literature on entrepreneurship education, specifically extending previous literature on the assessment of entrepreneurial competences in an entrepreneurship education context (e.g., Chell, 2013; Fayolle, 2013; Markman, 2007; Mitchelmore & Rowley, 2010). By embracing an interdisciplinary perspective, our paper presents an overview of theoretical and empirical issues regarding the assessment of entrepreneurial competences, an

assessment framework and two business challenges that can be used by teachers, and examines practical issues regarding the assessment of entrepreneurial competences based on such learning environment.

The findings and limitations of this study provide valuable insights into some of the issues that should be considered in the design and implementation of assessment practices in the domain of entrepreneurship education. Firstly, our study seems to confirm that entrepreneurship "educators may not be able to depend on traditional assessment techniques" (Pittaway et al., 2009, p. 90), especially those based purely on a positivistic stance where assessment outcomes are clearly defined and quantitatively measured (Penaluna & Penaluna, 2009). This sets the stage for future studies investigating whether and how learning designs, learning outcomes and assessment approach in entrepreneurship education can be aligned; and how educators can make use of different methods of assessment, for instance through narrative or reflexive accounts by students (e.g., Blackwood et al., 2015; Lackéus & Middleton, 2018) rather than only using strong inferential designs (Rideout & Gray, 2013).

Secondly, there is a trade-off about measuring entrepreneurial competences through self-reported measures or peer-reported or observed measures. In fact, on one hand, entrepreneurial competences are manifested in a social context (i.e., in the interaction with other people), and therefore assessment should ideally involve the learners being assessed during socially-situated actions (e.g., during group work). On the other hand, it is individual learners that are interested in having their competences assessed. In our study, we therefore made the choice of proposing a standardised assessment aimed at testing and evaluating entrepreneurial competences at individual level, acknowledging that they are key to social interaction. For instance, it was noted that the specific competences pertaining to the area of team-work and collaboration consisted of more granular and basic competences linked to interpersonal communication, and therefore the choice was made to not include team-work and collaboration tools. In addition,

given that transversal competences tend to overlap in many aspects, future studies should take care to design assessment tools to avoid the inclusion of redundant constructs. This could be also solved by building assessment tools focusing on specific competence areas and adopting a modular structure; or by allowing a one-time self-standing assessment session (e.g., serving as a full certification of entrepreneurial competences similar to the European computer skills certification released by ECTL)[6].

Thirdly, nowadays scholars agree that assessment should be considered as part of the learning process, rather than simply playing the role of certification or final stage of a teaching a learning programme (Segers, Dochy, & Cascallar, 2003; Wiggins, 1998). Given the short time span of our study, it was not possible for us to engage in formative assessment (e.g., diagnostic testing or feedback) during the learning process. It might be that this choice has limited the learning process in our students, as they did not receive important information about their strengths and weaknesses and thus may not have been able to decide how to improve their competences. We thus urge educators to combine both formative and summative assessment in the design of their assessment approaches.

Fourthly, our study adopted self- and peer assessment of entrepreneurial competences based on quantitative methods. However, a key concept that has emerged in education studies is that of authentic assessment (Rennert-Ariev, 2005). Authentic assessment is representative of the reality and complexity of situations which typically occur in real life in students' fields of study, helping students to create "discourse, products and performances that have value or meaning beyond success in school" (Newmann & Wehlage, 1993, p. 8). Authentic assessment integrates multiple types of knowledge and skills, relying on multiple sources of evidence collected over time and in different contexts which are evaluated using codified professional standards (Darling-Hammond, 2000). Therefore, authentic assessment is characterised by

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[6] For more information on the European Computer Driving Licence, see http://ecdl.org/

students' active engagement, exploration and inquiry (Wiggins, 1989). In the future, we suggest that entrepreneurial competences should be carried out resorting also to authentic assessment (e.g., Macht & Ball, 2016), so that competences can be assessed by making reference to the students' real personal or professional situations and experiences.

Lastly, our study highlights how learning and assessing transferable competences requires attention to the social context of learning (i.e., learning environment). Simulations and games, such as the business challenge analysed in our study, can foster students' debate, experimentation, exploration, creativity, collaboration, social and communication competences (Kirriemuir & McFarlane, 2004). As in our study, learning environments do not necessarily have to be classroom-based. In many cases, they are increasingly technology enhanced – some examples include the use of virtual worlds offering opportunities for interactive learning, and the use of communication technologies (e.g., also mobile technology) to engage students over long term project-based learning experiences. We believe that further studies should investigate the use of these tools as a way to create and assess students' entrepreneurial competences (e.g., Daly, 2001; Human et al., 2005; Lackéus & Middleton, 2018; Sousa et al., 2019).

Implications for policy-making and practice

This study is of interest to policy-makers and educators. The global rise of entrepreneurship programmes in the last decades has been fuelled by unprecedented demand, as students look for a style of business education that will provide them with the transversal skills needed to succeed in an increasingly divergent business environment (Cooper et al., 2004). For instance, the "sense of initiative and entrepreneurship" is one of an individual's key competences in workplaces and in private life contexts, according to the European Union (European Parliament and Council, 2006). Here, policy-makers have contributed to a progressive definition of entrepreneurship education policy and educational practices as related to a set of competences

referred to the individual sense of initiative and an entrepreneurial mindset, to be fostered through reflexive action and experiential knowledge (Bacigalupo et al., 2016; Komarkova et al., 2015; Hoppe, 2016). Therefore, this paper is relevant for education policy-makers because it addresses the topic of developing appropriate assessment of transversal competences, such as entrepreneurial ones, in curricula: an important issue which is still lagging behind (EACEA/Eurydice, 2012).

Our study is useful for entrepreneurship and management educators. Assessment is an important part of educational practice, and educators should think carefully about this aspect (Banta, 1999). In line with previous studies, we call for closer consideration of the link between the intended entrepreneurial learning outcomes and the assessment approach for measuring them, also taking into account that students gear their learning behaviour (e.g., what they learn and how they learn) to the assessment method used (Pittaway et al., 2009). The assessment of entrepreneurial competences will also partly depend on the assessment purpose: the learning outcomes for summative assessment for a qualification will be more tightly specified than the learning outcomes for formative assessment within the university curriculum. Our work highlights that students' performances in entrepreneurial competences can be demonstrated in different ways, in different contexts, and not taking into account single specific outcomes but rather a holistic view of these competences. In this regard, using a method mix in assessment seems essential for compensating for strengths and weaknesses in the validity, reliability and generalisability of different methods.

Adopting a competence-based approach to teaching and assessing entrepreneurial competences has relevant implications in terms of teacher training. For example, training will need to tackle the re-orientation of initial teacher training frameworks; the development of a shared understanding of outcome specification and teacher judgement; knowledge of active

learning, gamification, technology-based teaching techniques; and continuous learning and peer-to-peer support.

To conclude, our paper highlights that the assessment of entrepreneurial competences needs to be based on the integration of different epistemological and empirical approaches, adopting mixed-, multi-source, and real-life methods, aimed not only at summative but also formative purposes. We see numerous issues and possibilities for continuing the debate and research with regard to the assessment of entrepreneurial competences, both from the theoretical and practical point of view. We therefore hope that our findings can stimulate new directions of research and practice aimed at introducing a game-changing approach to learning, teaching and assessing entrepreneurship as a set of transversal competences.

TABLES AND FIGURES

Table 1 – Assessment framework for entrepreneurial competences

Area of competence	Specific competence	Assessment tools
Positive attitude and initiative	**Self-assessment**	Empowerment scale (Rogers et al., 1997) (self-assessed)
	Growth mindset	Mindset Scale (Dweck, 1999) (self-assessed)
	Emotional intelligence	Brief Emotional Intelligence Scale (Davies et al., 1998) (self-assessed and alter-assessed)
	Perseverance	Perseverance scale (Kyndt & Baert, 2015) and narrative form (self-assessed and alter-assessed)
	Coping strategy	Self-knowledge, orientation towards learning, and planning for future scale (Kyndt & Baert, 2015) (self-assessed and alter-assessed)
Communication and interaction	**General communication**	Interpersonal Communication Competence Scale (Rubin & Martin, 1994) and narrative form (self-assessed and alter-assessed)
	Interaction	Interpersonal Communication Competence Scale (Rubin & Martin, 1994) and narrative form (self-assessed and alter-assessed)
	Presentation	Presentation exercise and Interpersonal Communication Competence Scale (Rubin & Martin, 1994) and narrative form (self-assessed and alter-assessed)
	Negotiation and persuasion	Entrepreneurial competences scale (ability to persuade scale (Kyndt and Baert, 2015) and narrative form (self-assessed and alter-assessed)
Team work and collaboration	**Group work and team management**	Belbin role self-assessment tool (self-assessed)
	Conflict resolution	Interpersonal Communication Competence Scale (Rubin & Martin, 1994) (self-assessed)
Critical and Analytical Thinking or Problem Solving, including Risk Assessment	**Problem solving attitude**	Creative problem solving scale (Morris et al., 2013) (self-assessed)
	Recognizing opportunities	Opportunity recognition scale + conveying a vision/seeing the future scale) (Morris et al, 2013) (self-assessed)
	Risk management	Risk management scale (Morris et al., 2013) (self-assessed)
Creativity and Innovation	**Creativity and lateral thinking**	Creative problem solving scale (Morris et al., 2013) (self-assessed)
	Adaptability	Making Decisions scale (Rogers et al., 1997) (self-assessed)
	Innovation	Innovativeness scale (Mueller & Thomas, 2001) (self-assessed)

Table 2 – Evaluation of pilot effectiveness in generating awareness of entrepreneurial transversal competences (Likert scale ranging from 1=very much to 5=very low)

	Teamwork	Critical thinking	Problem solving	Risk assessment	Communic.	Creativity	Positive attitude
Teachers	1.31	2.63	2.50	3.81	1.63	2.69	2.25
N	10	10	10	10	10	10	10
Students	1.96	2.31	2.26	2.48	1.98	2.02	1.96
N	55	55	54	54	55	55	55
Overall	**1.64**	**2.47**	**2.38**	**3.15**	**1.81**	**2.36**	**2.11**
N	**65**	**65**	**64**	**64**	**65**	**65**	**65**

Table 3 – Evaluation of pilot perceived usefulness in activating entrepreneurial transversal competences (Likert scale ranging from 1=very much to 5=very low)

	Teamwork	Critical Thinking	Problem Solving	Risk Assessment	Communic.	Creativity	Positive Attitude
Teachers	1.44	2.56	2.56	4.14	1.94	2.69	2.50
N	10	10	10	9	10	10	10
Students	2.00	2.22	2.27	2.59	1.91	2.20	2.06
N	55	55	55	54	55	55	53
Overall	**1.72**	**2.39**	**2.42**	**3.37**	**1.93**	**2.45**	**2.28**
N	**65**	**65**	**65**	**63**	**65**	**65**	**63**

Figure 1 – Summary of research methodology

Phase of the research	Activity	Outcomes
1- Identification of entrepreneurial competences	1.1. Literature review	- identification of entrepreneurial competences - identification of assessment tools
	1.2. Interviews with teachers and experts	- discussion of entrepreneurial competences - selection of assessment tools
2 - Pilot test of assessment tools	2.1. Pilot test	- business challenge and survey to students - analysis of results

Figure 2 – SWOT analysis of the business challenge for pilot test

Strengths	Weaknesses
- Activating and capturing teamwork and communication competences - Attracting students with an interest in improving their skills - International collaboration, especially valuable for students with low exposure to international environments during ordinary university-level courses - Cross disciplinary working and appreciating other profession's perspective and requirements.	- Business challenges are carried out in a relatively safe environment and thus are potentially not able to capture risk assessment competences - Technically "simple" business challenges might not be suitable for making students focus on problem solving and creativity; technically "complex" business challenges might exacerbate differences in students' disciplinary skills - Short timeframe of exposure to the assigned activities is not "realistic" and might negatively impact quality of outputs - International virtual interaction does not work automatically, it needs to be planned in great detail, allowing students to get introduced and guided through a clear pattern of solution to the business challenge
Opportunities	**Threats**
- Business challenges implemented in different countries can enhance the cross-cultural aspects of transversal competences for entrepreneurship - Longer test time frames ensure interim feedbacks to monitor activities and improve the work carried out by students and guidance by teachers - The methodology can also be replicated in a non-international and non-virtual environment - Enabling activities in a virtual environment offers possibilities for interaction (e.g., webinars), also through additional interaction tools integrated with other media/social media	- Students losing interest in the project contest or collaboration with other students (locally and internationally) during time - Business challenges carried out in virtual environments might generate superficial interactions if "compulsory" interactive sessions are not planned - Exposure to business challenges might not be particularly valuable to students with previous experience in teamwork or other similar simulations - Business challenges carried out over a short period of time might not be effective in developing different transversal competences for entrepreneurship

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APPENDIX

Table A1 – Levels of assessment – assessment framework for entrepreneurial competences

Area of competence	Specific competence	Low level	Medium level	High level
Positive attitude and initiative	**Self assessment**	Does not recognise his/her own strengths and weaknesses	Recognises a few of his/her own strengths and weaknesses but cannot find improvement strategies	Is aware of his/her own strengths and weaknesses and can find improvement strategies.
	Growth mindset	Believes that intelligence is static; does not apply for improvement; avoids effort, criticism and challenges and feels threatened by the success of others.	Considers intelligence both static and dynamic; sometimes applies for improvement; can cope with minor effort and moderate challenges; does not care about criticism and the success of others.	Believes that intelligence is dynamic; applies for improvement; sees effort as a path to mastery; embraces challenges, learns from criticism; feels inspired by the success of others.
	Emotional intelligence	Does not recognise emotions and their impact on him/her self and on others	Recognises emotions and their impact on him/her self and on others	Recognises, gives value and manages emotions and their impact on him/her self and on others
	Perseverance	Abandons an assignment when tired or under distraction; abandons a task when experiencing failure; does not work with clear goals.	Risks abandoning an assignment when tired or under distraction; risks abandoning a task when experiencing failure; does not always work with clear goals	Finishes an assignment even if tired; keeps on working in a concentrated way even if there is a distraction; continues with the task even after a setback or failure; works with clear goals
	Coping strategy	Cannot find ways to cope with difficult situations; does not see growth possibilities when dealing with difficult situations; cannot control reactions; cannot ask for help.	Cannot always find ways to cope with difficult situations; does not always see growth possibilities when dealing with difficult situations; can control reactions only in some cases; can ask for help only under certain conditions.	Looks for creative ways to alter difficult situations; believes that positive growth is possible when dealing with difficult situations; can control reactions; asks for help when needed.
Communication and interaction	**General communication**	Is not aware about the components of communication (verbal, non-verbal and paraverbal); does not listen and does not understand messages someone is sending; cannot send clear and concise messages to others.	Is partially aware about the components of communication (verbal, non-verbal and paraverbal); partially listens and understands messages someone is sending; can send clear and concise messages to others only if a few conditions are satisfied.	Is aware about the components of communication (verbal, non-verbal and paraverbal); listens and correctly understands messages someone is sending; always sends clear, concise messages to others.

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	Interaction	Has marked difficulty in keeping up with the discussion and contributes only occasionally.	Keeps up with the discussion and can justify an opinion; responds and interacts adequately with other speakers; uses communication strategies well when unsure about (e.g., idiomatic use).	Can present articulated ideas in a complex discussion; can use sophisticated arguing and turn-taking strategies; has no difficulty in understanding idiomatic language use or different registers
	Presentation	Structure lacks coherence. Speaker unfamiliar with topic. Transitional elements largely missing.	Evidence of a standard three-part structure and some use of transitional elements. Maintains contact with the audience. Level is appropriate, but the listener is not totally convinced that the presenter knows his/her topic well.	Is thoroughly familiar with the topic and can respond confidently and spontaneously to complex questions. Presentation is well structured, uses transitional elements, and follows the conventions of the field. Good eye contact, no reading from his/her paper. Level appropriate for the intended audience.
	Negotiation and persuasion	Uses facts to support claims. Helps to find solutions that contribute to positive outcomes. Contributes to resolving differences with other staff or parties. Responds to conflict without worsening the situation and refers to a supervisor where appropriate. Knows when to withdraw from a conflict situation.	Negotiates from an informed and credible position. Leads and facilitates productive discussions with staff and stakeholders. Encourages others to talk, shares and debates ideas to achieve a consensus. Recognises and explains the need for compromise. Influences others with a fair and considered approach and sound arguments. Shows sensitivity and understanding in resolving conflicts and differences. Manages challenging relations with internal and external stakeholders. Pre-empts and minimises conflict	Engages in a range of approaches to generate solutions, seeking expert inputs and advice to inform negotiating strategy. Uses sound arguments, strong evidence, and expert opinion to influence outcomes. Determines and communicates the organisation's position and bargaining strategy. Represents the organisation in critical negotiations, including those that are cross jurisdictional, achieving effective solutions in challenging relationships, ambiguous and conflicting positions. Pre-empts and avoids conflict across organisations and with senior internal and external stakeholders. Identifies contentious issues, directs discussion and debate, and steers parties towards an effective resolution.
Team work and collaboration	**Group work and team management**	Works uniquely alone, does not cooperate, avoids working with persons different to each other, does not take into account other people's ideas and contributions, avoids sharing information.	Is able to work in groups with a low level of complexity, cooperate only under certain conditions, can manage moderate diversity in a group, partially listen other people's ideas and contributions, and share some information.	Is able to work interdependently and contribute to a variety of work teams, promotes cooperation, give value to diversity in a group, respects ideas and contributions of others, shares information, assists in mentoring others.

2

	Conflict resolution	Avoids difficult conversations; does not listen nor empathise with others; tries to find guiltiness; is not focused on the outcome; takes comments as personal attacks; is not able to negotiate; privileges competition and win-lose outcomes.	Copes with but cannot completely manage difficult conversations; listens to others but does not always empathise; is partially focused on the outcome; rarely takes comments as personal attacks; tries to negotiate; promotes win-win outcomes when participants adhere.	Uses assertiveness in initiating difficult conversations; listens in an objective, empathic way; avoids the blame game; is focused on the outcome; does not take comments as personal attacks; is able to negotiate; promotes win-win outcomes.
Critical and Analytical Thinking or Problem Solving, including Risk Assessment	**Problem solving attitude**	Does not recognise and is not able to analyse problems; is not oriented to quickly finding solutions; does not involve others; tends to avoid decision-making or takes unclear decisions.	Identifies and tries to analyse problems; can distinguish relevant from irrelevant information in low complexity situation; tries to seek the best solutions, not necessarily quickly and/or involving others; makes decisions; acts with integrity.	Identifies and appropriately analyses problems; distinguishes relevant from irrelevant information; quickly searches for the best solutions involving others; makes clear, consistent, transparent decisions; acts with integrity in all decision making.
	Recognizing opportunities	Is unaware of data /information/research available to inform and develop areas of work; seldomly keeps up to date with information and its quality in order to make judgements; tends to treat information from different pieces of information as separate.	Is aware of data/information/research available to inform and develop areas of work; moderately keeps up to date with information and its quality in order to make judgements; is able to see some new connections and patterns from available data.	Is an avid information seeker, always searching for new information/ data/research; is good at "connecting the dots", seeing links between seemingly unrelated pieces of information; has ideas about developing novel products, policies, and strategies for the future.
	Risk management	Is fairly unable to recognise and assess risk; is not able to accept risk; feels that being able to deal with risk is not important and cannot be learned.	Has a moderate ability to recognise and assess risk; is able to accept risk under certain conditions; feels that being able to deal with risk is quite important and can be learned.	Is very able to recognise and assess risk; is able to accept risk; feels that being able to deal with risk is important and can be learned.
Creativity and Innovation	**Creativity and lateral thinking**	Can only see the immediate problem and easy connections between topics or ideas, prefers traditional models, even if out-dated, does not challenge the status quo, gets lost in the detail and cannot see the bigger picture.	Can see alternative and innovative solutions to problems but cannot always apply them, can imagine good but not necessarily innovative ways to tackle problems, adopts lateral thinking if accompanied.	Considers different approaches, disciplines and points of view when generating solutions, uses resources creatively, produces alternatives to conventional thinking, produces imaginative or unique responses to a problem
	Adaptability	Willingly takes on new tasks/adopts new approaches as required and as appropriate to job role. Takes responsibility for keeping professional skills and knowledge up to date.	Embraces and manages change. Seeks opportunities for change, supporting colleagues in implementing new ways of working, effectively and supportively communicating the rationale for change.	Instigates and leads programmes of change, working in close collaboration with team mates/ colleagues. Identifies resource implications of strategic developments and manages them accordingly.

3

		Seeks out, reviews and integrates new ways of working into the role.	Reviews, tests and implements new concepts, models and approaches to practice in support of service development and delivery	Develops and implements new concepts, models, approaches to practice and products that have a significant impact on the longer-term success of the team/organisation/company. Drives strategic thinking.
	Innovation			

4

Table A2 – Overview of business challenges used in the pilot test
(note: details about the participating institutions will be disclosed later to allow anonymous review)

Business challenge #1 – Helsinky City Library	
Participating institutions	XX University of Applied Sciences (Finland)
	University of XX (France)
	XX University of Applied Sciences (The Netherlands)
	XX University (Bulgaria)
Number of students	33
Date of pilot	February 15, 2016 - March 18, 2016
Description of the challenge	**Case organisation and background**
	The city of Helsinki is building a new Central Library at Töölönlahti Bay in the heart of Helsinki culture cluster. The new building is under construction and the doors will be opened to the public on 6 December 2018, Finnish Independence Day. A place of civic participation will be built opposite the Parliament House that will bring together those interested in city culture and civic participation.
	When completed, the Central Library will reach some 10,000 visitors per day and some 2.5 million visitors annually. The Central Library offers a public space open to all in the heart of the city. It will raise the profile of Helsinki and be a showcase for this creative city. It will be brought into the city residents' own homes, where culture can be created individually or with others. This digitally intelligent library will provide the city residents with information to support their decision-making in everyday life. Learning, competence sharing and opening of contents are supported by means of different technologies.
	More information about the new library and the project can be found at: http://keskustakirjasto.fi/en/.
	The challenge
	The role of a library is changing. It is no longer just a stock of books – all kinds of digital content is already available in modern libraries and the selection of services ranges from lending things to supporting active citizenship. Helsinki wants to find its own model for the libraries of the future. However, the main focus is on the library's core competence. Versatile reading skills and the ability to evaluate media critically are the foundations of active citizenship, and the Central Library will do its part to support them. In addition, the Central Library wants to become an active enabler and enhancer of modern city life. Moreover, it is to be a public space where people work, meet and interact.
	How is all this put into action? Helsinki Central Library 2018 is a new kind of project, whose contents and operation models are being sought in co-operation with the library, city residents and partners. The Central Library project is based on the idea that more than just architects are needed to create a new, functional library in Helsinki city centre: the needs and wishes of city residents are incorporated into the design process.
	In this case, the Library invites the student groups to participate in finding solutions to the question:
	• What new services and opportunities of active participation could be incorporated into the Central Library in order to best support the creation of an open, active and equal society?

(continues on the next page)

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3   (continues from previous page)
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Business challenge #2 – Sustainable Retrofitting Technologies	
Participating institutions	XX University (United Kingdom) XX University (Italy)
Number of students	39
Date of pilot	February 29, 2016 – March 30, 2016
Description of the challenge	**Case background** A substantial share of the building stock in Europe is older than 50 years, with many buildings in use to date which are hundreds of years old (Building Performance Institute Europe, 2011). Because these buildings were constructed when energy regulations were very limited, to date this represents a huge challenge in terms of heating consumption and related pollution performance. For example, in the United Kingdom, the built environment accounts for a significant 44% of UK emissions, of which 18% is from non-domestic buildings. Although new properties are increasingly environmentally friendly, only 2% of the UK's existing stock is less than five years old. Within this context, retrofitting is emerging as a relatively untapped solution for reducing the environmental impact of buildings, thus satisfying both legislative requirements and general public awareness on environmental sustainability. In addition, retrofitting allows buildings' users to cut running costs and energy bills. To date, while a small but growing number of businesses offer services specifically targeted at the emerging domestic retrofitting market, there is a huge need for retrofitting solutions targeting non-domestic (e.g., industrial or public) buildings. In fact, the emissions from existing non-domestic stock present a specific challenge, because of size and construction methods used. To this regard, the project RESSEEPE (REtrofitting Solutions and Services for the enhancement of Energy Efficiency in Public Edification) is an innovative project, funded by the European Union, that focuses on the refurbishment of existing public buildings in three European cities (http://www.resseepe-project.eu/). RESSEEPE brings together manufacturers and designers of new sustainable technologies with the aim of assessing the performance of these technologies on real-life buildings. To this extent, the project will be able to technically advance, adapt, demonstrate, and assess a number of innovative retrofit technologies. **Business challenge** While the RESSEPPEE project has been very successful in demonstrating a reduction of around 50% in energy consumption, to date it is not clear how this technology can be brought to the market. In particular, since Southern European countries lag behind in this type of technological development, there is a need to target their markets. The business challenge waiting to be tackled is: how to market the RESSEPPEE retrofitting technology to non-domestic buildings in Italy? To answer this challenge, we will set up a collaboration between a group of engineers from Coventry University and management experts from the University of Bologna. The two groups will collaborate on the following activities: 1) Presentation of an outline of the technologies used in the RESSEPPEE project 2) Presentation of an outline of a business idea to market the technology 3) Finalisation of a business idea to market the RESSEPPEE technology in Italy

Table A3 – Evaluation of pilot workload, challenge and relevance (Likert scale ranging from 1=very much to 5= very low)

	Teacher workload	Student workload	Challenge to teachers	Challenge to students	Interesting to teachers	Interesting to students	Value added by internat. collaboration	Value added by virtual platform
Teachers	3.06	2.56	2.19	2.00	1.19	1.69	1.56	3.38
N	10	10	10	10	10	10	10	10
Students	n.a.	2.37	n.a.	2.38	n.a.	2.00	1.93	2.37
N	n.a.	54	n.a.	55	n.a.	55	55	54
Overall	**3.06**	**2.47**	**2.19**	**2.19**	**1.19**	**1.85**	**1.75**	**2.88**
N	**10**	**64**	**10**	**65**	**10**	**65**	**65**	**64**

7

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3   24 September 2020
4
5   Dear Prof. Winterton,
6
7   We thank you for the opportunity to further revise the paper according to the Reviewers' suggestions. We
8   have carefully reflected on Reviewer 1's comments and implemented some of the required suggestions.
9   We want to emphasize that we really appreciated the comments and welcomed the suggestion to include
10   some additional citations which we believed could fit the topic of the article and contribute to its
11   development. However, we have decided to avoid including some other references suggested by Reviewer
12   1 (e.g., Haq 2015, focused on migrant entrepreneurs in the UK; or Parris & Peachey 2015 on servant
13   leadership) in order to include only core references to the manuscript, and avoid proliferation of constructs
14   and concepts. We believe that the >80 citations in our paper are well reflecting the status of relevant
15   literature on this topic and that all the cited works are the relevant ones for the reader.
16
17   We have provided a point-by-point reply to the Reviewers below. In the paper, the changes have been
18   highlighted in a light-blue color.
19
20   We hope that you will allow this paper to further proceed towards publication in Education + Training.
21
22   Thank you for your scholarship,
23
24   The authors
25
26
27
28   **Reviewer(s)' Comments to Author:**
29
30   **Reviewer: 1**
31   Recommendation: Minor Revision
32
33   Comments:
34   Introduction: the authors have a good start, i.e. 'The number of educational entrepreneurship programmes
35   in higher education offered around the world is on the rise...'
36   However, it might be worthwhile to provide a background for this rise in a sentence or two such as
37   entrepreneurs increasingly play important roles in economic development in many countries around the
38   word. The following texts may be helpful:
39   South Asian ethnic minority small and medium enterprises in the UK: a review and research agenda.
40   International Journal of Entrepreneurship and Small Business, 25(4), 494-516.
41   https://doi.org/10.1504/IJESB.2015.070222
42   **Our reply: Thank you for this suggestion. We agree that a background sentence like the one you**
43   **proposed serves well as an introduction to our article. We have revised p. 1 as follows:**
44   **"The number of educational entrepreneurship programmes in higher education offered around the world**
45   **is on the rise (Kuratko, 2005; Lekoko, Rankhumise, & Ras, 2012; Mohamad et al., 2015), pushed by**
46   **widespread recognition of entrepreneurship as an important driver of economic development and**
47   **employment (OECD, 2017; United Nations, 2016). The rise in entrepreneurship education opportunities is**
48   **therefore accompanied by growing demands for accountability from educational stakeholders and**
49   **accreditation organisations (Duval-Couetil, 2013)."**
50   **We thank you for suggesting the paper by Haq (2015) but in this case we preferred to use two highly**
51   **relevant documents at the policy level with a global outlook to support our sentence. We hope that you**
52   **agree that these are two key references in this regard.**
53   **References:**
54   **OECD. (2017). Entrepreneurship at a glance 2017. Paris: OECD Publishing.**
55   **United Nations. (2016). Entrepreneurship for development. Report of the Secretary-General. 26 July 2016,**
56   **A/71/210.**
57
58
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60

Literature review: A strong literature review makes a strong paper and increases the possibility of being cited. I recommend the authors highlight few additional themes related to entrepreneurship and entrepreneurial competence. This can be done on Page 6 following 'The concept of entrepreneurial competences is not unitary...'

The following sources may be helpful:

Defining the entrepreneur. In L. P. Dana (Ed.), World Encyclopedia of Entrepreneurship (1st ed., pp. 41-52). Cheltenham, UK: Edward Elgar Publishing

Limited Human capital resources: a review and direction for future research. International Journal of Management Development, 1(4), 261-286. https://doi.org/10.1504/IJMD.2016.083581

Small business success factors: the role of education and training. Education+ Training, 46(8/9), 481-491. https://doi.org/10.1108/00400910410569605

Our reply: We thank you for suggesting these interesting references. We believe that Filion's (2011) "Defining the entrepreneur" is a key piece of literature to define entrepreneurship. However, in our literature review, we specifically want to focus on defining entrepreneurship education and entrepreneurial competences rather than general entrepreneurship. We have therefore decided to avoid referring to this source because it would increase the theoretical proliferation of constructs examined in our paper. Similarly, we found the work by Simpson et al. (2014) on small business success factors only partially relevant for our discussion of entrepreneurial competences, which closely relate to transversal competences for students rather than small business management competences for entrepreneurs. Instead, we cited and found particularly interesting the paper by Haq (2016), which is actually serving our methodological section, as you suggest in the next point.

Methodology: it is more helpful if the methods adopted are linked to relevant literature. The author's adopted method matches with some past studies, such as those mentioned below. Citing them may increase quality of the paper.

Human capital resources: a review and direction for future research. International Journal of Management Development, 1(4), 261-286. https://doi.org/10.1504/IJMD.2016.083581

A systematic literature review of servant leadership theory in organizational contexts. Journal of Business Ethics, 113(3), 377-393

Our reply: We thank you for suggesting these interesting works. As anticipated in our previous point, we believe that Haq's (2016) work is matching with the methodology we used for our initial review of the literature. We therefore mention this work on p. 10. Although also Parris & Peachey (2013) work on servant leadership is also a good example of systematic literature review, our approach is far less systematized in the analysis of papers than the one carried out by these two authors; we have therefore decided to avoid referencing to this work.

We want to conclude by thanking you for helping us during the review process. We found your suggestions very constructive and helpful, and we hope that you will agree that the paper can further proceed for publication after this round of revisions.

Reviewer: 2

Recommendation: Accept

Comments:
Congratulations for the authors. Great paper and well written.

Our reply: We are extremely grateful for your support and appreciation of our work. We thank you for spending time reviewing our work and helping us to improve it.