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MOOCs and entrepreneurship education-contributions, opportunities and gaps

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Abstract

The goal of this study is to provide a systemic review and evaluation of the existing MOOCs and Micro-credentials in the area of entrepreneurship, adding to the current state of research on online entrepreneurship education. The study is based on desk research consisting of literature review as well as comparative analysis and systemic review of entrepreneurship MOOC and Micro-credentials. Two MOOC aggregators Class Central and MOOC List as well as five MOOC platforms, Coursera, edX, FutureLearn, Udacity and Kadenze, have been used to identify the existing courses. The main comparison criteria in both analyses have been: course focus, format, length, fees and language. Key research findings indicate that the majority of the current MOOCs and Micro-credentials devoted to entrepreneurship focus on start-ups and universal entrepreneurial skills. The area of firm-level entrepreneurship remains most unaddressed by MOOCs. Two MOOC platforms Coursera and edX lead at this early development stage of Micro-credentials. The Micro-credential offer is growing rapidly, responding to the learner preferences of modularity, stackability and competence based education. This study aims to contribute to the analysis of new developments within online entrepreneurship education. The findings present valuable practical implications, especially relevant for MOOC providers and creators for evaluating their

current entrepreneurship education offer, in order to identify possible gaps and opportunities for future online courses, credentials and degrees.

Keywords: entrepreneurship education, online entrepreneurship education, MOOC, micro-credential

JEL codes: A29, L26, O31

INTRODUCTION

Entrepreneurship education has received immense academic (and non-academic) attention in the last decades (Stevenson & Lundstrüm, 2001). It is an important area of inquiry, especially relevant in times of crisis and economic challenges. Several authors have highlighted the critical role of entrepreneurship education in developing more and/or better entrepreneurs (e.g. Gorman, Hanlon, & King, 1997; Katz, 2014; Pittaway & Cope, 2007).

In this context, the popularization of online entrepreneurship education has also strongly accelerated in the last two decades in great part thanks to the new opportunities brought by the development of information technologies. Online learning materials have become abundant and diverse. Online courses facilitate the development of entrepreneurial skills by individuals on their own by means of electronic devices. New technology has made it possible to learn from successful entrepreneurs, share experiences and exchange ideas. Today, thanks to technology, entrepreneurship education is not only easy to access, but it has become more inspirational than ever. Contemporary authors and educators (Pittaway & Cope, 2007; Rigg & O'Dwyer, 2012) articulate the role of inspiration as a key factor of effective education for entrepreneurship.

Massive Open Online Courses (MOOCs) are seen as an example of a disruptive, emerging technology in the area of entrepreneurship education. Being characterized as flexible, open, self-directed, self-paced, highly interactive including peer learning, interdisciplinary and cost-reducing, MOOCs bare a huge potential to cater the needs of future and existing entrepreneurs (Welsh & Dragusin, 2013). As Siemens and Tittenberger (2009, p. 53) noted, "the greater use of emerging technology can serve as an important bridging process between the traditional role of education and the not yet clearly defined future". Micro-credentials as an emerging trend in entrepreneurship education contribute to the legitimization and formal recognition of online education, MOOCs especially (Matkin, 2017).

Taken the promising developments in online entrepreneurship education, newer formats of online courses, such as MOOCs and Micro-credentials, remain under-researched in mainstream entrepreneurship education research. This research gap will be examined in this study, focusing on an exploration and classification of the current range of entrepreneurship MOOCs and Micro-credentials. The identification of state of the art of new online formats seems important for educators, learners and course providers. This study contributes to the evaluation of the current portfolio of entrepreneurship online courses, in order to identify possible gaps and opportunities for future developments.

This paper is organized as follows. Section 1 focuses on a brief literature review on entrepreneurship education and the recent developments in this area. Section 2 discusses the two new formats of online education, MOOCs and micro-credentials, in detail. Section 3 provides the research findings and results of the exploration, classification and comparison process of entrepreneurship MOOCs and Micro-credentials, as

conducted within this study. Finally, conclusions are drawn and possible future research is briefly discussed.

ENTREPRENEURSHIP EDUCATION

> The entrepreneurial mystique? It's not magic, it's not mysterious, and it has nothing to do with the genes. It's a discipline. And, like any discipline, it can be learned. (Drucker, 1985, p. 18)

Entrepreneurship education is at the centre of attention of academics and policy makers attention for at least the last three decades (Stevenson & Lundstrüm, 2001). For example, the European Union has launched numerous programs aimed at creating and reinforcing the entrepreneurial culture and entrepreneurship education is a fundamental element of its policy. European conceptual frameworks for entrepreneurship education encourage building an "entrepreneurial spirit, development of creativity, initiative and self-confidence[1]." The European Union defines as one of the eight key competences for Lifelong Learning "Sense of initiative and entrepreneurship":

> It is the ability to turn ideas into action. It involves creativity, innovation and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives. The individual is aware of the context of his/her work and is able to seize opportunities that arise. It is the foundation for acquiring more specific skills and knowledge needed by those establishing or contributing to social or commercial activity. This should include awareness of ethical values and promote good governance. (European Parliament and Council, 2006, p. 17)

Across Europe much effort is put into promoting entrepreneurial behaviour across countries. The European Commission has stated in their Entrepreneurship 2020 Action Plan that "investing in entrepreneurship education is one of the highest return investments Europe can make" (EC, 2013, p. 5). Overall, entrepreneurship education has gained importance and has been implemented in the national strategies of most EU member states, given the premise that it may influence the level of entrepreneurial activity in a given country, positively impact entrepreneurial intentions, entrepreneurial traits, support economic growth and create new jobs (Dickson et al. 2008; EC, 2013; Kuratko, 2005).

Several authors have highlighted the critical role of entrepreneurship education in developing more and/or better entrepreneurs (e.g. Gorman, Hanlon, & King, 1997; Katz, 2014; Pittaway & Cope, 2007). Elert, Andersson and Wennberg (2015) have shown that entrepreneurship education increases self-confidence, long-term probability of starting a firm, as well as entrepreneurial income generation. Von Graevenitz, Harhoff and Weber (2010) confirmed the positive effects of entrepreneurship education on student's self-assessed entrepreneurial skills and the learning process of their entrepreneurial suitability or aptitude. A survey by Jenner (2012) suggests that 15% to 20% of students who took part in a mini-company program in secondary school will later establish their own business, a percentage which is about three to five times

[1] Analytical Report "Entrepreneurship in the EU and Beyond", European Commission, Flash Eurobarometer, (2010) No. 283.

higher than within the general population. Finally, Martin, McNally and Kay (2013) found a significant relation between entrepreneurship education/training and entrepreneurship-related human capital assets and entrepreneurship outcomes.

In the last twenty years, we have witnessed an immense and dynamic growth of entrepreneurship teaching programs all over the world. Entrepreneurship education has become a standard practice at secondary and higher education institutions in countries around the world (Katz, 2003; Kuratko, 2005). This growth in volume and scope has been coupled by a sharp shift from educating about entrepreneurship to educating for entrepreneurship. Education about entrepreneurship is limited to knowledge transfer. Students learn about starting a business, about legal and business frameworks, what it means to be entrepreneurial or how to prepare a business plan. The goal of this type of education is to acquaint students with many aspects of entrepreneurial practice and pursue their understanding of them. However, after many years of this standard approach, research suggests that educating about entrepreneurship does not necessarily imply that students become more entrepreneurial nor that they wish to act in entrepreneurial ways (Dickson et al., 2008).

Educating for entrepreneurship is driven by a different goal. It is to develop real-life entrepreneurial skills and behaviours. Some authors go as far as to say that the goal is to change thinking and behavioural patterns (Rae, 2005). Rae (2010) defines entrepreneurial learning as "led by creativity, informality, curiosity, emotion and its application to personal and real-world problems and opportunities" (p. 595). It is a holistic process, engaging numerous areas of human activity, primarily intellectual and emotional. Wilson, Vyakarnam, Volkmann, Mariotti and Rabuzzi (2009) argue that entrepreneurship education should provide a mix of experiential learning, skills building and mindset shift, ideally starting from the primary level up.

Hence, contemporary education for entrepreneurship includes the promotion and training of personal skills related to entrepreneurship, such as creativity skills, problem-solving skills, communication skills and networking skills. Repeatedly, these features have been identified in the past as the goals of entrepreneurial education. A meta-analysis conducted by Mwasalwiba (2010) of top entrepreneurship education programs identifies the following distribution of goals among goals of the education process:

- to enhance attitudes, values, intentions and behaviours – 36%,
- to improve personal skills – 32%,
- to develop opportunity recognition skills – 14%,
- to develop skills necessary for establishing a new business – 9% and
- to acquire general management and organizational skills – 9%.

The analysis of other publications reveals a very clear hierarchy of goals within entrepreneurship education, consistent with the above meta-analysis (Raposo & Paco, 2011). Firstly, all existing conceptualizations include the dominating goal of developing an entrepreneurial drive, spirit and culture among students. In second place comes the goal of generating the ability to recognize and pursue opportunities in various areas, whether business, social and academic. A significant number of authors associate entrepreneurship with the ability to create and operate new companies. Mwasalwiba (2010) also notes that scholars in the field of entrepreneurship education are converging towards a single framework of entrepreneurship education. Nevertheless, Mwasalwiba

(2010) also highlights the lack of shared success indicators and common definitions of entrepreneurial competence between educators and other stakeholders, when it comes to entrepreneurship education for different target groups.

In the context of entrepreneurial competences, the Entrepreneurship Competence Framework (EntreComp – Figure 1) developed by the European Union in 2016 presents a holistic and unified approach to defining entrepreneurial competence (Bacigalupo, Kampylis, Punie, & Van den Brande, 2016).

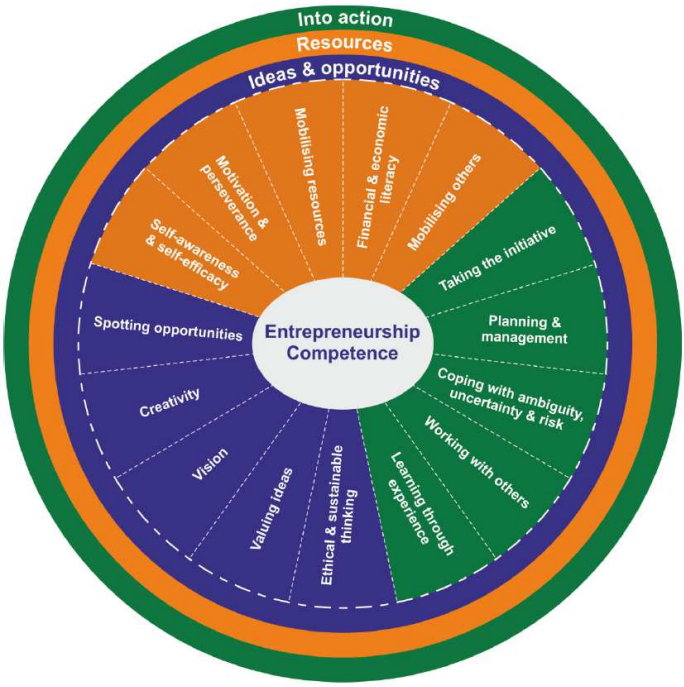

Figure 1. EntreComp Framework
Source: Bacigalupo, Kampylis, Punie, & Van den Brande, 2016

The EntreComp Framework, not only indicates what entrepreneurial education focus should be, but also conceptualizes entrepreneurship very broadly as a universally applicable set of competences:

> A transversal competence, which can be applied by citizens to all spheres of life from nurturing personal development, to actively participating in society, to (re)entering the job market as an employee or as a self-employed person, and to starting up ventures (cultural, social or commercial). (Bacigalupo et al., 2016, p. 6)

This definition is based on a broader definition by FFE-YE (2012) which describes entrepreneurship as acting upon opportunities and ideas and transform them into value (financial, cultural, or social) for others.

According to the EntreComp Report, there is an increasing awareness that entrepreneurial skills, knowledge and attitudes can be learned and in addition, foster the devel-

opment of entrepreneurial mindsets and culture. In order to create a bridge between the two worlds of education and work and reach consensus among all stakeholders, the framework provides a common definition of entrepreneurship as a competence. The Framework serves as a foundation for the design of curricula and learning activities aimed at developing entrepreneurship competences, whether at new or existing organizations). In addition, the framework enables the development of parameters and tools for the assessment of individual entrepreneurial competences, which can serve to evaluate the effectiveness of entrepreneurship education programmes. This is especially relevant for the growing body of digital entrepreneurship education formats.

METHODOLOGY

The focus of this research is on new online entrepreneurship education frameworks: MOOCs and Micro-credentials. As shown in figure 2 below, the areas of entrepreneurship, entrepreneurship education, online entrepreneurship education and MOOCs are heavily interconnected and building on each other.

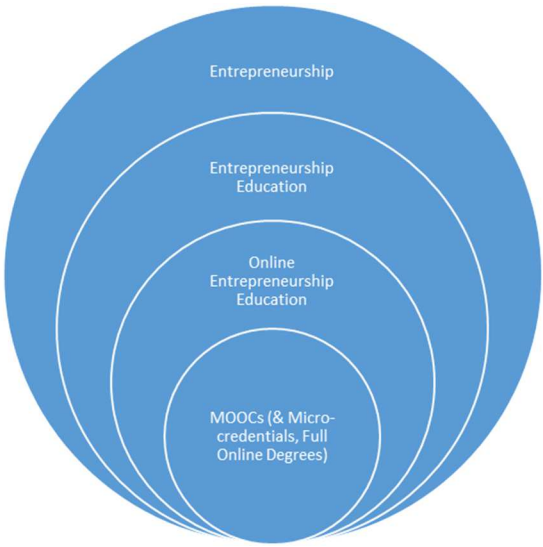

Figure 2. Research context
Source: own elaboration.

The driving goal of this study is to evaluate the potential value added of MOOCs and Micro-credentials in the development of entrepreneurship education.

This study is based on desk research consisting of a literature review and a comparative systematic analysis. As for the classification and comparison process of the current entrepreneurship MOOC offer, the two MOOC aggregators Class Central[2] and MOOC List[3] have been used to identify the relevant courses. As a result, 238 MOOCs have been identi-

[2] Class Central, https://www.class-central.com
[3] MOOC List, https://www.mooc-list.com/tags/entrepreneurship?static=true

fied on Class Central and 114 on MOOC List, whereas the majority on MOOC List is the same as on Class Central, with only slight deviations (as of 28 August 2018). The identified 238 MOOCs served then as the foundation for the subsequent in-depth comparative analysis, where the main criteria have been: course focus, format, length, fees and language.

Regarding the second comparative analysis of the current Micro-credential offer devoted to entrepreneurship, the five MOOC platforms Coursera, edX, FutureLearn, Udacity and Kadenze have been used to identify the relevant Micro-credentials existing, by searching for "entrepreneurship" on their respective online database. In total, 22 entrepreneurship micro-credentials have been provided by the platforms as of 28 August 2018, which served as the foundation for the comparative analysis. Again, the main criteria have been: course focus, format, length, fees and language.

OPPORTUNITIES OF MASSIVE OPEN ONLINE COURSES FOR ENTREPRENURSHIP EDUCATION

In the context of online education and the current digitalization of the education sector, Massive Open Online Courses (MOOC) have been emerging rapidly since 2012 as a disrupting and competitive component of individuals' education process. A MOOC can be defined as an online course designed for a massive number of participants that can be accessed by anyone anywhere, by internet connection, which is open to everyone without entry qualifications and offers a complete course experience online for free (Jansen & Schuwer, 2015). MOOCs received increasing attention from 2011 on, after one course attracted more than 120,000 learners (Sharples et al., 2012; Treeck, Himpsl-Gutermann & Robes, 2013). The subsequent hype saw 2012 becoming the "Year of the MOOC" (Sharples et al. 2013) and five years later, more than 800 universities provided 9,400 courses to 81 million learners (Shah 2017). MOOCs are seen as a door-opener to new trends in education and training (Sharples et al., 2013; Yuan & Powell, 2013), one of them introducing a switch from traditional university target groups to professional lifelong learners (Radford et al., 2015; Sreeleakha & Manikandan, 2015).

There are reasons to believe that MOOCs represent a promising opportunity in the development of basic entrepreneurship skills. According to a recent study by Class Central (Shah, 2017), 52% of MOOC learners in 2017 indicated to upgrade their skills for the current job with MOOCs. Being characterized as flexible, open, self-directed, self-paced, highly interactive (including peer learning), interdisciplinary and cost-reducing, MOOC bare a huge potential to cater the needs of future and existing entrepreneurs (Welsh & Dragusin, 2013). In addition, collected learning data provide completely new opportunities (learning analytics) for educators to reflect on and improve their teaching. Mondal, Kumar and Bose (2015) have stated the valuable opportunity of using MOOCs for entrepreneurial education and training, especially for developing/emerging countries (in this case India). There, MOOCs can support the provision of high quality education for learners living at far-off places, help re-integrating school-dropouts and motivate learners towards entrepreneurship and starting their own business. As described earlier, this can again stimulate the economic growth, reduce poverty and improve the quality of life of the whole population. Existing research studies identify several important limitations of MOOCs such as high drop-out rates, lack of frequent feedback, cheating, or the difficulty to assess humanities including social sciences online (Welsh & Dragusin, 2013). However,

MOOCs add a modern facet to the diverse spectrum of educational offers in the domain of entrepreneurship and open up access to education to millions of learners world-wide.

Looking at the some of the recent trends in the MOOC landscape, courses increasingly teach and apply innovation tools, many of them deriving from the start-up area, such as the Business Model Canvas, Lean Approach or Design Thinking.

MOOCs also hold the potential of global outreach and thus widespread promotion of entrepreneurship. Educating for entrepreneurship requires contact with a mentor, a practitioner who can share their success story and experience and provide inspiration for personal life choices. Online teaching resources make that possible regardless the geographic or financial limitations.

Slowly, MOOCs are gaining formal recognition among traditional education providers. In 2016, several platforms have started to provide specific MOOCs offering transferable college credit to learners who are not enrolled in any of the corresponding university's programs. There exist now several collaborations between MOOC platforms and universities for the recognition of certificates and award of these kind of credits (such as EdX partnering with Arizona State University and offering full university fresh-level courses) and the number is rising constantly, which also affects digital entrepreneurship education offers (Lequerica, 2016).

In 2017, Georgia Tech and MIT for the first time offered their on-campus students the possibility of earning credits from a MOOC. Students could choose between enrolling in traditional on-campus courses or signing up for a parallel version available completely online. The results of these two pilots have been promising, MIT students rated the course as significantly less stressful compared to their on-campus classes. For online students, this could also improve the credibility of non-credit certificates (Shah, 2017).

Shah (2018a) identified several other MOOC trends in 2017, also strongly affecting the online entrepreneurship education offer. First of all, MOOC providers are still looking for a sustainable revenue model, from free courses, certificates, Micro-credentials, university credits, online degrees to corporate training. Second, the number of completely free MOOCs is constantly shrinking, one of the core features that distinguished MOOCs from other forms of online education in the past. Third, MOOC providers have realized that their real audience are not universities and the higher education market, but rather the labor market, in particular people who aim at achieving professional and career growth (also called "lifelong career learners"). Fourth, MOOCs have become increasingly flexible and convenient over the past years, adapting to the time constraints of many learners. Fifth, MOOC platforms have successfully entered into the markets for online degrees and corporate learning. Shah (2018b) stated that these two monetization models are what drives the revenue and fast growth of the big MOOC platforms, currently and especially in the future. Coursera for example announced almost $10M in tuition from their online degrees, recently offered the first MOOC-based Bachelor's Degree and has already more than 1000 corporate partners (up from 30 in 2016 and 500 at the end of 2017). This will also heavily effect entrepreneurship education and there are already several online degrees in entrepreneurship available on different MOOC platforms. Also, corporations are increasingly using MOOCs for training and education of their workforce, such as intrapreneurship courses to foster employee innovation and the creation of ideas within their companies.

ENTREPRENEURSHIP MOOCS – STATE OF THE ART

The comparative analysis of entrepreneurship MOOCs has shown that the offer varies greatly in their focus on subject area, audience, content and other features. Various entrepreneurship online courses have already been offered in the 2000s (e.g. MIT OpenCourseWare "Entrepreneurial Marketing" in 2002) and one of the first European MOOCs was devoted to idea creation and creativity (ThinkTank - Ideal City of the 21st Century by Leuphana Digital School in January 2013). However, in recent years there was an exponential growth rate of entrepreneurship MOOCs in the global educational landscape. According to Class Central, the number of MOOCs relating to business and management rose from 339 courses in 2014 to 1685 (!) courses in 2018 (as of 28 August 2018). Different online repositories facilitate a search for finding the current offerings, in an appropriate timeframe (or self-paced), language, didactical approach, workload, subtopic, quality, certification options etc. The two biggest and most-widely known online repositories are:

- Class Central[4]: As of 28 August 2018, Class Central lists 238 entrepreneurship MOOCs (compared to 128 on 29 February 2016), of which 112 are future courses, 72 recently started or will be starting soon, and 49 are self-paced – which means, the majority are still or will be available and open for enrolment. Not all MOOCs listed are MOOCs in its closest definition as some of them ask for tuition fees. When classified by languages, English dominates (171 courses), followed by Spanish (26) and French (20). There is a rating system with reviews, however with an unequal distribution of user ratings per course (between 0 and 30), the meaningfulness could be questioned.
- MOOC List[5]: As of 28 August 2018, MOOC List provides an overview of 114 entrepreneurship MOOCs (compared to 61 on 26 August 2016). The majority of the listed MOOCs are the same listed by Class central, with only slight deviations.

The joint analysis of the above repositories revealed an unequal distribution of entrepreneurship themes in existing online courses. To summarize, there is a large number of distinctive course types, differing in duration. Their design is quite inclusive and they are addressed to university students as well as to the general public. A dominant majority of the courses are in English.

Figure 3 below presents a graphical overview of the potentially most important types of courses relating to entrepreneurship for independent learners. Some of these are plentiful while others are very scarce in the existing online offer.

The analysis of 238 MOOCs dedicated to entrepreneurship education revealed that the existing offer of online entrepreneurship courses is greatly dominated by courses on start-ups (bottom of figure 3). Within this vast group of courses, most concentrate on universal start-up skills and processes necessary to successfully launch a business. Several thematic subgroups of courses have been identified relating to start-ups in a specific context. Among these, a small number of courses focuses on international new ventures (born-globals) and developing knowledge and skills typical for international entrepreneurship, others refer to social entrepreneurship and still others to high-tech start-ups. Examples include:

[4] Class Central, https://www.class-central.com/subject/entrepreneurship
[5] MOOC List, https://www.mooc-list.com/tags/entrepreneurship?static=true

- *Developing Innovative Ideas for New Companies: The 1st Step in Entrepreneurship* by University of Maryland, platform: Coursera
- *Becoming an Entrepreneur* by MITx, platform: edX
- *Starting a business* by University of Leeds, platform: FutureLearn
- *Beyond Silicon Valley: Growing Entrepreneurship in Transitioning Economies* by Western Reserve University, platform: Coursera
- *Global entrepreneurship* by Taylor's University, platform: Openlearning
- *Changemaker MOOC - Social Entrepreneurship* by Universität Kiel, platform: iversity
- *Social Entrepreneurship* by Copenhagen Business School, platform: Coursera
- *Business Model Canvas: A Tool for Entrepreneurs and Innovators (Project-Centered Course)* by University System of Georgia, platform: Coursera

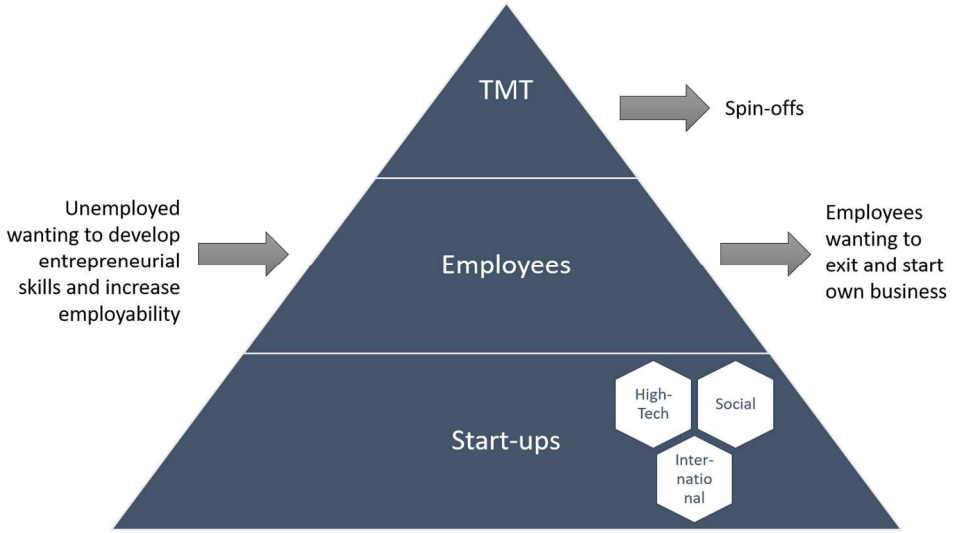

Figure 3. Types of online entrepreneurship courses (TMT = Top Management Team)
Source: own elaboration.

Second, several courses have been identified on up-scaling general entrepreneurial skills, as illustrated at the centre of the pyramid in figure 3. These are addressed to the general public and focus on developing creativity skills, opportunity recognition skills, time management skills, organizational skills and general management skills. These skills serve to reinforce entrepreneurial postures, enhance career development or to increase the employability of the unemployed. Examples include:

- *Visual Thinking for Business - Make Your Point* by WHU, platform: iversity
- *Design Thinking for Innovation* by University of Virginia, platform: Coursera
- *Diploma in Business Management & Entrepreneurship – Revised 2017* by XSIQ, platform: Alison
- *Entrepreneurial Strategic Management* by University of New Mexico, platform: Coursera
- *Critical & Creative Thinking (V2),* platform: Openlearning

- *Cracking the Creativity Code: Discovering Ideas* by Israel Institute of Technology, platform: Coursera
- *Grow to Greatness: Smart Growth for Private Businesses Part I & II* by University of Virginia, platform: Coursera
- *Strategic Planning and Execution* by University of Virginia, platform: Coursera
- *Managing Responsibly: Practicing Sustainability, Responsibility and Ethics* by University of Manchester, platform: Coursera
- *Valuing Companies* by University of Michigan, platform: Coursera

Third, the top part of figure 3, relating to firm-level entrepreneurship, remains still largely unaddressed by online education. Courses dedicated to enhancing general entrepreneurial skills fall into this category to some extent. There is now a clear trend of courses dedicated to creating an entrepreneurship friendly environment or an entrepreneurial orientation of companies and courses dedicated to facilitating entrepreneurial behaviour of companies in the form of radical innovation, spin-offs or high-risk investments. Similarly, the scarce offer of courses dedicated to enhancing employee entrepreneurship (intrapreneurship) has been growing very slowly, compared to other metioned above categories of courses.

MICRO-CREDENTIALS AND ENTREPRENEURSHIP EDUCATION: STATE OF THE ART

In the context of MOOCs and entrepreneurship education, an important trend is the rise of Micro-credentials over the last two years. According to a report by CTQ and Digital Promise (2016), Micro-credentials can be defined as a certification indicating demonstrated competency in a specific skill. CTQ and Digital Promise argue that Micro-credentials have four key characteristics: competency-based, personalized, on-demand and shareable.

Laurie Pickard (2018) recently published an analysis of 450 MOOC-based Micro-credentials offered on five MOOC platforms (Coursera, edX, Udacity, FutureLearn and Kadenze). Pickard states that micro-credentials consist of more than a single course, but are less than a full degree and can be seen as a response to the trend of modularity and stackability in higher education, enabling learners to basically create their own education "playlist". However, Pickard concludes that the current offer of various micro-credentials lacks consistency and standardization, making it difficult to evaluate their significance and compare them, for both learners and employers. It is important to note that the majority of the offered micro-credentials by the 5 platforms is paid, with price ranges from a few hundred to a few thousand dollars. Learners can choose between payment for each course individually or pay upfront for the whole series, receiving a small discount (Pickard, 2018). Table 1 illustrates the 11 different types of micro-credentials on the market today (as of 28 August) on the five biggest MOOC platforms.

Building on Pickard's (2018) 11 identified types of micro-credentials on the MOOC platforms Coursera, edX, Udacity, FutureLearn and Kadenze (as shown in table 1), the authors of this study conducted follow-up research focusing on micro-credentials in the area of entrepreneurship. Table 2 illustrates the full list of identified entrepreneurship micro-credentials on the 5 selected MOOC platforms, as of 28 August 2018. Summarizing appendix A, Coursera (9 English, 2 Spanish, 1 French) and edX (7 English, 1 Spanish) are the two leading providers of entrepreneurship micro-credentials of all 5

platforms evaluated. FutureLearn and Kadenze only offer one micro-credential respectively (both in English) and Udacity does not offer any micro-credential in the area of entrepreneurship at all. Similar to the previous analysis of the entrepreneurship MOOC offer, the majority of the currently provided micro-credentials is focusing on how to start your own business and teaching universal entrepreneurial skills.

Table 1. Micro-credentials on the Market Today

Platform	Micro-credentials
Coursera	Specialization, MasterTrack Certificate, Professional Certificate
edX	XSeries, MicroMasters, Professional Certificate
Udacity	Nanodegree
FutureLearn	Program, Graduate Certificate, Graduate Diploma
Kadenze	Program

Source: Pickard (2018).

Table 2. Overview of entrepreneurship micro-credentials on 5 MOOC platforms

Platform	*Micro-credential Type*	*Title*	*Creator*	*No of courses*	*Language*
Coursera	Specialization	Entrepreneurship	University of Pennsylvania	5	English
		Social Entrepreneurship	Copenhagen Business School	3	English
		Entrepreneurship: Launching an Innovative Business	University of Maryland	4	English
		Corporate Entrepreneurship: Innovating within Corporations	University of Maryland	5	English
		Doing Business in China	The Chinese University of Hong Kong	4	English
		Startup Entrepreneurship	Technion - Israel Institute of Technology	4	English
		How to Start Your Own Business	Michigan State University	6	English
		L'impact investing, la finance qui change le monde	ESSEC Business School	4	French
		Value Creation Through Innovation	EIT Digital	5	English
		Finanzas corporativas	Universidad Nacional Autónoma de México	6	Spanish
		Programa en Desarrollo de nuevas empresas	Universidad de los Andes	4	Spanish
	Professional Certificate	Innovation Management and Entrepreneurship	HEC Paris	12	English
edX	XSeries	Business Principles and Entrepreneurial Thought	Babson College	6	English
	Micro-Masters	Entrepreneurship	Indian Institute of Management Bangalore	4	English

Platform	*Micro-credential Type*	*Title*	*Creator*	*No of cours-es*	*Langua ge*
		Corporate Innovation	The University of Queens-land	5	English
		Managing Technology & Inno-vation: How to deal with dis-ruptive change	RWTH Aachen University	6	English
	Profes-sional Certificate	Empresas familiares: em-prendimiento y liderazgo para trascender	Tecnológico de Monterrey	2	Spanish
		Fintech	University of Hong Kong	3	Spanish
		Entrepreneurial Mindset and Leadership	Babson College	4	English
		Business Model Innovation	Delft University of Tech-nology	4	English
Future Learn	Program	Social Enterprise	Middlesex University Business School	3	English
Kadenze	Program	Money Matters for Creative Entrepreneurs	Columbus College of Art & Design	3	English

Note: as of 28 August 2018
Source: own study.

The conducted analysis reveals that even though platforms like Udacity, FutureLearn and Kadenze offer various Micro-credentials for many subjects, they still lag behind when it comes to micro-credentials on entrepreneurship education and training. Moreo-ver, the problem of standardization and variability, as identified by Pickard (2018), can also be confirmed for the current offer of entrepreneurship Micro-credentials. As a re-sult, learners and employers are facing barriers when it comes to the comparison of different entrepreneurship micro-credentials offered online. Nevertheless, the Micro-credentials trend clearly responds to the needs and preferences of learners and employ-ers looking for modularity, stackability and competence based education (Matkin, 2017).

CONCLUSIONS

The driving aim of this study was to evaluate the stet of the art on the developments of MOOCs and Micro-credentials dedicated to entrepreneurship education. The study con-firms prior claims that MOOCs are a strong current trend in the global entrepreneurship online courses movement. There is already an ongoing competition between providers to attract learners, which will be reinforced by the great number of entrepreneurship MOOCs and newer formats, such as Micro-credentials and full online degrees. The ques-tion will be how these offerings differentiate from each other and if the areas of compa-ny-level entrepreneurship, intrapreneurship and enlarging/furthering existing entrepre-neurial skills will be tackled by MOOCs and follow-up formats.

The analysis highlights a shift which can already be recognized towards self-paced and regularly recurring courses and there are also tendencies to apply the original defini-tion of MOOCs as free courses towards fee-required courses, as more and more content

gets locked behind paywalls, especially for certification. As the education sector itself is currently disrupted by entrepreneurship, innovation pressure and digitalization processes, it also has several impacts on entrepreneurship education (such as changing business and revenue models or content delivery channels). Today, the online entrepreneurship education sector is clearly dominated by several American MOOC platforms and content created by American universities and business schools, also severely affecting entrepreneurship education in general on a global level.

The research has identified the main topics of existing online courses devoted to entrepreneurship, which are: start-ups and universal entrepreneurial skills. Also, the number of courses in the area of corporate entrepreneurship has been rising over the last few years, as it clearly responds to the need of fostering entrepreneurial orientation and innovation within companies. Even though course topics and contents within entrepreneurship courses are extremely diverse, the focus is now clearly on entrepreneurship for entrepreneurs, increasingly using innovation tools, such as Business Canvas and Lean Approaches. Such tools have proven to be not only successful and applicable in the area of start-ups but also for corporates looking for constant innovation.

The analysis has also shown that course titles and descriptions not always reflect the actual content of MOOCs (e.g. mixing up idea generation and business modelling or firm-level entrepreneurship, corporate entrepreneurship and intrapreneurship). Many entrepreneurship courses also follow the same structural pattern, such as the development of a Canvas and a follow-up pitch by learners. This raises the question of whether this actually represents a useful and valuable application of learnings in entrepreneurship courses.

As reported by existing research and this study, many MOOC courses are rather superficial and there exists a clear gap of MOOCs teaching the validation of business models, using experimentation techniques for example. For the future, filling these “MOOC gaps” would be highly beneficial. Future research should focus on evaluating the deliverables of MOOCs and Micro-credentials and the value added created by these formats to the entrepreneurship competence of the learners. It would be highly recommended to evaluate existing MOOCs against the EU EntreComp Framework to recognize the consistency and reliability of entrepreneurship MOOCs and Micro-credentials for EU learners, educators and policy makers. This type of research would help mitigate the still existing problem of consistency and standardization of MOOCs, making it possible to evaluate their significance and compare them. This progress is necessary for both learners, educational institutions and employers as digital formats will most likely rise in scope and in popularity.

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