

Stimulating intrapreneurial intentions with digital business training in the VET sector: the potential of massive open online courses

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Abstract

It has become imperative to stimulate and support employees to behave entrepreneurially within organizations (intrapreneurship). However, little is known about how digital, massive, and scalable business education and training formats such as massive open online course (MOOCs) can contribute to vocational and educational training (VET) in general, and to nurture intrapreneurial behavior and corresponding intentions in specific. Therefore, the purpose of this paper is to explore the potential effect of a MOOC on intrapreneurial intentions of learners.

Data were acquired from 412 employees taking a MOOC on intrapreneurship for constructs embedded in the theory of planned behavior, tailored to the context of intrapreneurship. The proposed method employs Wilcoxon signed-rank tests to compare the levels of constructs before and after the course and longitudinal structural equation modeling for gauging the initial level of intention and prior experience.

The research reveals a positive effect on the perceived behavioral control, intentions, and attitude toward the behavior of learners by the MOOC and changing perceptions regarding subjective norms among peers. Besides indicating the potential for digital business training on an extensive scale, the study demonstrates the applicability of MOOCs as integrative self-selection funnel for a reliable identification of high-potential intrapreneurs.

The findings are relevant for VET providers, organizations and business educators, especially in times of the COVID-19 pandemic, to understand better the multifaceted capacity of digital transformation, illustrated with training to stimulate intrapreneurship.

Keywords: intrapreneurship; corporate entrepreneurship; massive open online courses; vocational and educational training; digital business training; entrepreneurship education and training; intentions; theory of planned behavior

Introduction

Digital transformation has reshaped the way business is conducted and has spawned opportunities and challenges for organizations of all kinds (Cohen et al., 2017; Li et al., 2018). Established organizations, especially, have been struggling hard to adapt to this disruptive new normal and are seeking ingenious strategies for survival (Engelen et al., 2015). The concept of “intrapreneurship” (Pinchot, 1985), entrepreneurial behavior within established organizations, is recognized as a promising approach to mitigate this challenge (Felicio et al., 2012). Therefore, it has become imperative for organizations to stimulate intrapreneurial behavior for greater organizational benefit (Molina & Callahan, 2009; Kuratko & Morris, 2018; Thornberry, 2001).

As intrapreneurship is accomplished by dedicated individuals within the organization (Amo, 2010; Boon et al., 2013), training has grown as a viable approach to foster intrapreneurial behavior (Hayton & Kelley, 2006; Schmelter et al., 2010; Thornberry, 2003). However, face-to-face training approaches involve significant expenses for traveling, meetings, instructors, time, and effort (Byrne et al., 2016) and have

been widely limited by the global pandemic. Smaller businesses, especially, lack capacities and resources to establish their own training provision – a vital prerequisite to tackle the impending digital challenges (Li et al., 2018). To evade this vicious circle, scholars warrant a closer examination of the existing digital solutions (Neergaard et al., 2020) as digital transformation has arrived in the higher education (Kamsker et al., 2020) and vocational education and training (VET) sectors (European Commission, 2020).

In both sectors, massive open online courses (MOOCs) are emerging as the paradigm for digital, scalable, and open platforms for knowledge exchange and upskilling (Linzalone et al., 2020) and are rapidly growing in the era of digitalization (Hamori, 2019). In 2019, about 110 million people were reported to be enrolled in various MOOCs globally (Shah, 2020a). This uptake grew exponentially during the COVID-19 pandemic (Rindlisbacher, 2020). Lately, MOOCs became increasingly adopted by the VET sector and organizations (Dodson et al., 2015; Radford et al., 2015) as they offer promising potentials for both employers (Egloffstein & Ifenthaler 2017) and employees (Ong & Jambulingam 2016; Hamori 2019). Notably, the MOOC aggregator Class Central lists 6,916 MOOCs to business topics, with 470 dedicated to entrepreneurship (Class Central, 2021). Fascinated by the numbers of courses and learners, we are tempted to ask whether this is just digital edutainment or if MOOCs as a form of digital business training can actually offer viable answers to the elaborated challenges?

Digital applications have been successfully applied to stimulate entrepreneurial intentions (Tony & Pardede, 2020). The format is open, flexible, self-directed, interdisciplinary, interactive, customizable, practice-related, yet structured (Welsh & Dragusin, 2013). This learning setting resonates well with the team-based learning preference of entrepreneurs (Santos et al., 2019) and appears to be suitable for intrapreneurs (Honig, 2001). The digital open approach – cost-effective and scalable for organizations and individuals (Egloffstein & Ifenthaler, 2017) – can connect employees globally (Hamori, 2019; Ong & Jambulingam, 2016), can facilitate knowledge creation and the usage of social networks as a crucial platform for entrepreneurial learning (Scarmozzino et al., 2017), and the intrapreneurial behavior to bloom (Santos & Spann, 2011). MOOCs can thereby reach a broad body of employees and go beyond training exclusively meant for executive management. Thus, MOOCs can be anticipated as promising for nurturing intrapreneurs on an extensive scale. This gains significance as organizations and VET providers have repeatedly failed to select the right candidates for intrapreneurship trainings upfront (Douglas, 2020; Molina & Callahan, 2009), while intrapreneurs were reported to emerge from anywhere inside the organization (Thornberry, 2003).

Despite institutions and scholars asserting the importance of nurturing intrapreneurial intentions with VET, research specifically dedicated to this phenomenon is scarce (Byrne et al., 2016; Heinonen, 2007). Hitherto, only a few studies have investigated whether intrapreneurship can be stimulated with face-to-face training and provided empirical evidence (e.g., Bjornali & Støren, 2012; Thornberry, 2003; Kreuzer et al., 2017). However, these studies deviate in terms of methodology, target groups, and research objectives, consequently leaving large unexplored areas for future research (Hytti & Heinonen, 2013). The role of new technologies for business training and intrapreneurship training, particularly, is largely uninvestigated (Kuratko & Morris, 2018; Santos & Spann, 2011) – similar to the field of digital entrepreneurship education (Aho, 2020; Kraus et al., 2019; Kuratko, 2005; Neergaard et al., 2020). Therefore, the purpose of this study is to examine the effect of digital business training delivered via

MOOCs on intrapreneurial intentions of employees. More precisely, the changes of learners' intentions and related drivers which comprise an intrapreneurship MOOC are investigated alongside the theory of planned behavior (TPB) introduced by Ajzen (1991).

From a theoretical standpoint, this article aims at broadening the understanding of how digital business training approaches such as MOOCs effect individual intrapreneurial intentions. On top, it provides insights on how the TPB framework can be applied to study these effects. For business educators and VET providers, this study explores the potential of digital, scalable, and cost-efficient approaches such as MOOCs to stimulate and train individuals, especially significant in situations with limited physical training options.

Literature review

Intrapreneurship and related training

The concept of intrapreneurship first received attention in the 1980s, sparked by the work of Pinchot (1985), who derived the term from "intra-corporate entrepreneurship." Evident from the expression, the concept suggests that entrepreneurship is not limited to independently starting and running a new business, but the forward-thinking and ambition with which employees can behave entrepreneurially within an established organization as well, as so-called "intrapreneurs" (Neessen et al., 2019). The term "intrapreneurship" has been interchangeably used with the concept of "corporate entrepreneurship" (Guth & Ginsberg, 1990), which predominantly takes an organizational perspective, and has led to confusion regarding the definition (Sharma & Chrisham, 1999). This paper adopts the individual-level perspective of intrapreneurship and conforms to the definition of Neessen et al. (2019) contemplating intrapreneurship as:

A process whereby employee(s) recognize and exploit opportunities by being innovative, proactive, and by taking risks, in order for the organization to create new products, processes and services, initiate self-renewal, or venture new businesses to enhance the competitiveness and performance of the organization (p. 652).

Intrapreneurial behavior and the concomitant values differ from those of entrepreneurs (Gaile et al., 2020) and can thereby assume different dimensions. Scholars (Gawke et al., 2019; Guth & Ginsberg, 1990) primarily categorized the same into "corporate venturing" and "strategic renewal" behavior. While the former encompasses activities such as creating a new business unit or setting up a new business for the employer, the latter targets the transformation of existing processes, products, and services or radically rethinking the organization's strategic orientation (Burgelman, 1991). Such activities bear promising potential when coming from within the organization, as employees have in-depth understanding of the organization's daily operations, products, services, markets, customers, resources, and culture.

To build on and reap these organizational benefits, business educators and trainers need to nurture intrapreneurial skills and corresponding intentions (Boon et al., 2013; Molina & Callahan, 2009; Kuratko

& Morris, 2018; Thornberry, 2001). In this context, several researchers (Hayton and Kelley, 2006; Morris and Jones, 1993; Schmelter et al., 2010; Schuler, 1986; Thornberry, 2003) have accentuated the importance of providing intrapreneurship training. However, there is limited and dispersed empirical evidence to demonstrate the effect on learners undergoing dedicated trainings. Nicholson et al. (2019) and Longva et al. (2020) explored the effect of intrapreneurship courses on student's intentions and arrived at mixed results, while Koen (2000) and Kreuzer et al. (2017) observed support for an impact made. However, they identified the maturity level of students as a decisive element for its success. Groenewald (2012) observed positive effects on managerial and employee intrapreneurial behavior as an outcome of the training. Durand (1975), Byrne et al. (2016), and Thornberry (2003) found that adding motivational and intentional aspects to more general business-related content in the training enhanced the overall positive impact of intrapreneurship training – congruent with findings on entrepreneurship education (Lackéus, 2020).

Except for the analysis presented by Thornberry (2003), all aforementioned studies analyzed student populations. As work experience is a pivotal factor regarding intrapreneurship (Fayolle & Gailly, 2015; Guerrero & Peña-Legazkue, 2013), the suitability of this setting was questioned (Byrne et al., 2016; Heinonen, 2007). The only larger-scale study addressing employees with a collective, integrative approach is the analysis of the intrapreneurship program by Santos and Spann (2011), indicating a vast unexplored potential in terms of the quantity of business ideas developed and the financial value generated. The author concluded that this potential could be increased upon opening the program to external participants – something that can be provided by MOOCs.

Massive open online courses

The last decade witnessed a rapid raise of digital approaches in the field of VET and business education and training (Kimiloglu et al., 2017). MOOCs have contributed to this development (Ong & Jambulingam, 2016; Park et al., 2018) with a faster adoption rate among new learning technologies (Hamori, 2019). A MOOC can be classified as a form of distance learning, often featuring interactive elements, and defined as an “open-access online course (i.e., without specific participation restrictions) that allows for unlimited (massive) participation” (Kaplan & Haenlein, 2016, p. 443). Besides their massiveness and scalability (Egloffstein & Ifenthaler, 2017; Mohamed & Hammond, 2018), MOOCs can be distinguished from more traditional e-learning offers by their increased openness and interactivity (Fidalgo-Blanco et al., 2016).

MOOCs received increasing attention in 2011, when a single course on artificial intelligence attracted almost 250,000 learners (Zhang, 2016). MOOCs have grown throughout the next decade with approximately 900 universities providing over 13,500 courses to 110 million learners in 2019 (Shah, 2020a). This growth accelerated exponentially during the COVID-19 pandemic (Rindlisbacher, 2020). While MOOCs were initially designed to cater to higher education audiences, they were eventually applied to connect industry with academia (Linzalone et al., 2020). This led to a shift toward the VET and professional lifelong learning sector and an adoption by organizations (Dodson et al., 2015; Radford et al., 2015). Egloffstein and Ifenthaler (2017) demonstrated that employees valued on-the-job learning and career development opportunities of MOOCs and asserted cost-saving potential for both employers

and employees. Likewise, Ong and Jambulingam (2016) and Hamori (2019) argued that MOOCs reduce upfront investments and costs per learner, while enabling global outreach to employees. A few examples for organizations using MOOCs are TELUS, McAfee, Adidas, Deutsche Telekom, L'Oréal (Ong & Jambulingam, 2016), Audi, Erste Bank, Credit Suisse, or SAP SE (Deimann & Friedl, 2020). In addition, smaller employers, such as SMEs, which often cannot afford their own training program (Li et al., 2018) have begun insourcing MOOCs (Hamori, 2019).

Recently, Tomy and Pardede (2020) demonstrated how digital means could be leveraged to enhance entrepreneurial intentions. As MOOCs are open, flexible, self-directed, interdisciplinary, interactive, customizable, and practice-related, they seem to be promising for stimulating entrepreneurial intentions (Welsh & Dragusin, 2013). Looking at the existing offer on entrepreneurship MOOCs, the perception that MOOCs are suitable for teaching entrepreneurship is reflected in terms of the courses offered in the first quarter of 2021. The largest MOOC aggregator Class Central (2021) listed 470 entrepreneurship courses. Moberg et al. (2014) argued that teaching entrepreneurship online has the capacity to evaluate large quantities with just-in-time data collection. Aho et al. (2020) investigated differences between online and offline learning settings in an experimental project-based business course setting without finding significant differences.

However, from a research perspective, MOOCs are relatively unexplored. Existing research predominantly focuses on MOOC learners, their satisfaction, interaction, and retention levels (Zhu et al., 2018) and there are only a few studies that investigated MOOCs on entrepreneurship (Beltrán Hernández et al., 2019; Usart & Romero, 2014; Verzat et al., 2015; Welsh & Dragusin, 2013; Zimmerman et al., 2017), with insufficient evidence regarding their effect or impact.

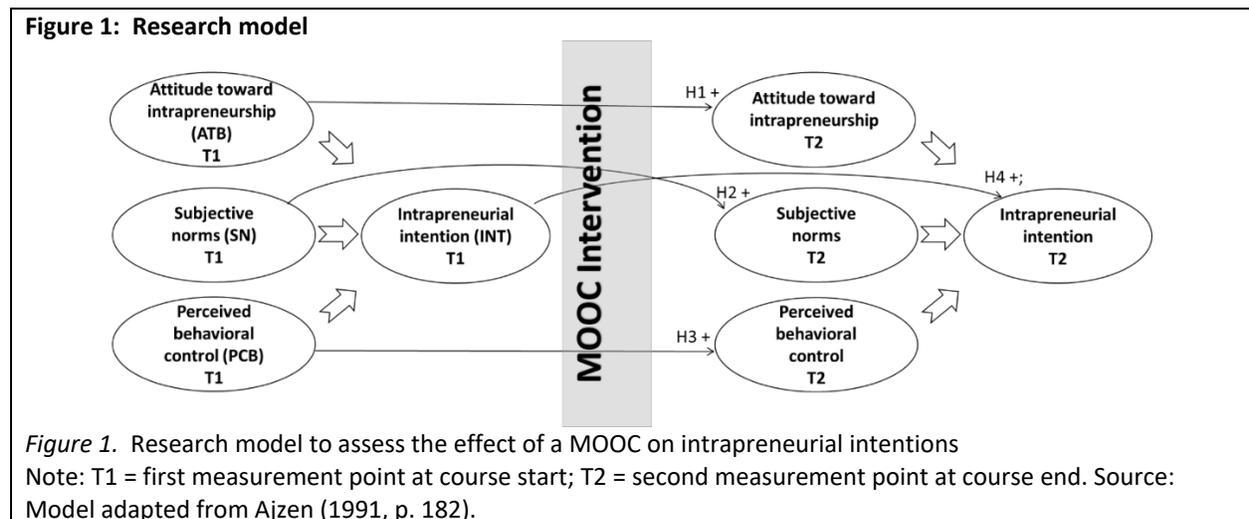
For intrapreneurship, no peer-reviewed study on MOOCs was found after an exhaustive literature search; however, meaningful conclusions can be derived. Compared to entrepreneurs, intrapreneurs prefer a more systematic, group-based approach for training (Honig, 2001). Next, a certain level of diversity and flexibility in the learning set composition is essential (Byrne et al., 2016) as workplace training is impacted by the tension between work and training demands. MOOCs with their open, flexible, interactive, and instructional approach cater to these needs (Mohamed & Hammond, 2018). As the uptake of MOOCs by organizations and VET providers depends on our ability to demonstrate the effectiveness of such approaches (Dodson et al., 2015).

Research model and hypotheses

Drawing on previous experiences to evaluate education and training interventions in the domain of entrepreneurship (Bae et al., 2014; Fayolle & Gailly, 2015), a focus on intentions is proposed by the author. Several studies exemplify those intentions optimally predict entrepreneurial behavior (Krueger & Carsrud, 1993). This applicability also holds true for business training related to opportunity emergence within organizations, that is, intrapreneurship (Krueger, 2000; Longva et al., 2020; Nicholson et al., 2019).

A plethora of studies focusing on intentions grounded their research within the theory of planned behavior (TPB) introduced by Ajzen (1991). The TPB suggests that intentions are robust predictors of behavior (Liñán & Fayolle, 2015). Interventions, such as trainings, are expected to influence three antecedents of intentions first (see Figure 1). These antecedents are the attitude toward the behavior (ATB), subjective norms (SN), and perceived behavioral control (PBC), which in turn drive intentions (INT).

These model assumptions have been widely confirmed by entrepreneurship education and training studies (Kautonen et al., 2015) and the TPB has become the prevailing framework for evaluating effects of entrepreneurship education (Fayolle & Gailly, 2015; Krueger, 2009; Moberg et al., 2014). For intrapreneurship, very few studies have used the TPB (Kirby, 2006; Byrne & Fayolle, 2009), typically to compare entrepreneurs with intrapreneurs (Douglas & Fitzsimmons, 2013; Tietz & Parker, 2012). This low uptake seems surprising as the TPB appears highly pertinent in an intrapreneurial context as it not only accounts for the personal attitudes and intentions, but also for the critical organizational environment wherein the intrapreneurs operate.



Having chosen a theoretical framework, we can now develop the research hypotheses. First, we hypothesize a significantly positive effect by the MOOC intervention on ATB (H1). Santos and Spann (2011) noted that employees attained higher levels of intrapreneurial attitude after completing the program. Other studies have identified motivational aspects as important factors of intrapreneurship training success (Byrne et al., 2016; Durand, 1975; Thornberry, 2003). Groenewald (2012) successfully observed increasing beliefs toward behaving as an intrapreneur after the training. Based on these assertions, the following hypothesis is proposed:

H1: After completing the MOOC, the learners will have significantly higher levels of ATB.

The effect of training on the perception of SN (H2) is rather under researched in the domain of intrapreneurship. However, mastering political skills (Ireland et al., 2006; Morris & Jones, 1993) integrated with stronger organizational knowledge (Hayton & Kelley, 2006; Santandreu-Mascarell et al., 2013) and better networking and team-working abilities (Byrne et al., 2016) appear crucial for intrapreneurs. If potential intrapreneurs adopt strategies to cope more easily with crucial stakeholders, they can be expected to perceive their SN more positively.

The suggested collective approach for intrapreneurship training (Morris & Jones, 1993; Santos & Spann, 2011) is well reflected by the MOOC format – its massive and social approach qualifies to showcase the importance of networks, teams, and interdisciplinary collaboration (Scarmozzino et al., 2017). Teams are important in business education and training. While Andrade et al. (2021) showed that teamwork functions in online environments as well, Randazzo-Davis & Nelson (2020) demonstrated that virtual teams even increased their performance by benefitting from global knowledge exchange and cultural intelligence. This all could result in a significantly more positive perception of SN in the course of a global and virtual business training intervention. Under these circumstances, it is hypothesized that:

H2: After completing the MOOC, the learners will have a significantly more positive perception of their SN related to their intrapreneurial intentions.

The largest effect of the training is proposed for PBC (H3), especially for the items related to self-efficacy as argued by Krueger and Casrurd (1993). Brown and Hanlon (2016) gave the top priority to enhancing entrepreneurial self-efficacy (ESE) in such trainings, as this involves related attributes such as resilience. Karriker and Mayo (2021) also stressed this focus on ESE and resilience in entrepreneurship education (in their case in a digital scenario), however, they proposed to add theoretical inputs to increase persistence. Similarly, training in intrapreneurship should enable developing respective knowledge and skills of employees and consequently raise self-confidence in mastering the intended behavior (Santos & Spann, 2011). In addition, promising results were observed in entrepreneurship education, however, in a more recent study this effect was observed only with a time lag (Fayolle & Gailly, 2015).

Regarding the second dimension of PBC, namely the locus of control, similar assumptions as for SN (H2) can be made. When employees learn the strategies regarding how to deal with important stakeholders, they might experience stronger controllability and their internal locus of control increases. For example, Hansemark (1998) observed that participants in an entrepreneurship training developed a greater internal locus of control orientation as its consequence. Therefore, for balance, a significant positive effect on PBC, consisting of self-efficacy and locus of control, would be required for a successful MOOC intervention:

H3: After completing the MOOC, the learners will have significantly higher levels of PBC toward their intrapreneurial intentions.

Regarding the direct influence on INT (H4), there is some dissent in the existing studies on entrepreneurship education. Fayolle and Gailly (2015) found an inconsequential influence, at least at a short-term level. While Sánchez (2011) observed a positive influence, Krueger and Carsrud (1993)

argued that entrepreneurship education might actually reduce the intention of starting a new business upon discovering more about the prospective pitfalls. As outlined, such diversified results have also been observed for intrapreneurship. Nicholson et al. (2019) found a small positive effect, while Longva et al. (2020) identified no discernible effect on intrapreneurial intentions, and even a negative effect on entrepreneurial intentions. To demonstrate a direct effect of a training intervention, a significant positive effect on intentions is tested:

H4: At the end of the MOOC, the learners will have significantly higher levels of intrapreneurial intentions.

Methods and Material

Design, survey measures, and instrument

The unit of analysis here is the individual level. The research objects are learners and changes in their intrapreneurial intentions and antecedents alongside a digital business training intervention. Consonant with other entrepreneurship education and training evaluations (Sánchez, 2011; Souitaris et al., 2007) and suggested by Moberg et al. (2014), a pre-post-test design (Cohen et al., 2007) was chosen.

The measurement instrument was built by applying an exploratory sequential mixed methods study and adapting existing scales. To measure intrapreneurial intentions, the employee intrapreneurship scale (EIS) developed by Gawke et al. (2019) was adapted to the training context and translated into intentions. For PBC, specific elements of the entrepreneurial intention questionnaire (EIQ) by Liñán and Chen (2009) were translated to intrapreneurship.

The remaining constructs, ATB and SN, were elicited with a qualitative pre-study collecting open-ended questionnaires from 105 employees, following the guide to develop a TPB instrument (Ajzen, 2002). The content analysis was performed with the approach introduced by Kuckartz (2018). The elicited instrument was reviewed by 13 academic and industry experts and subsequently pre-tested on two different samples with exploratory factor analyses (Principal Axis Method, Oblimin rotation; $n = 181$ and $n = 112$). On the third sample ($n = 989$), a confirmatory factor analyses, and structural equation modeling were conducted with satisfactory model fit indices (CFI, TLI above 0.9, SRMR and RMSEA below 0.08; Hu & Bentler, 1999) to corroborate the model assumptions. The final instrument with additional control variables to demographics (gender and age), prior experience and job level (employee-level, lower-/middle-/top-level manager, etc.) was integrated in the pre- and post-course surveys of the MOOC training intervention, described in the following section.

MOOC intervention: the analyzed training

The MOOC platform openSAP of the German multinational software corporation SAP SE hosted the training intervention. Founded as a pioneering corporate MOOC provider in 2013, the platform flourished over the years with an average of 387 new learner registrations in a day – that doubled during the pandemic – and reaching close to 1 million registered learners in 2020 (Link, 2020).

The MOOC1 was labeled as employee-level intrapreneurship training. The course ran over the course of six weeks in February and March 2020, shortly before the pandemic boosted digital education and training. With “anyone interested in business innovation, intrapreneurship, and reinventing their work,” the target group description was broad, but was targeted at employees with the intention to stimulate VET in the domain of intrapreneurship.

The course content featured classic elements of intrapreneurship training approaches, for example, idea/opportunity identification and assessment (Santandreu-Mascarell et al., 2013; Schmelter et al., 2010; Thornberry, 2003), business modeling (Thornberry, 2003), stakeholder management, presentation, and networking (Ireland et al., 2006), each tailored to an intrapreneurial context. These inputs were assigned to four content modules and two extra sections for the introduction and final assessment. Each week, a new module was made accessible to learners. The weekly workload took three to four hours on average. The course was in the English language, however, machine-translated subtitles were available in German, French, and Spanish. Participation was free-of-cost and open to any learner from different organizations, cultures, and backgrounds – thus, no specific company was targeted, however, as the platform was hosted by SAP SE, the majority of learners were expected to be SAP SE employees.

The course was delivered as a “hybrid MOOC” (Fidalgo-Blanco et al., 2016) featuring “xMOOC” and “cMOOC” elements, which follows the suggested mix between theory and practice from entrepreneurship education (Karriker & Mayo, 2021). The “x” stands for multiplication and provides instructor-guided inputs and evaluation methods chiefly to reproduce the knowledge (Mohamed & Hammond, 2018). In this case, the course provided video lectures and readings, followed by self-tests and quizzes to assess whether the main inputs were understood and memorized. Learners were given graded assignments in the form of multiple-choice and multiple-answer questions at the end of each week. To earn a record of achievement, a minimum of 50% of points were required to be achieved. In addition, the course provided cMOOC elements, stemming from constructivist learning theory and applying the concept of connectivism (Siemens, 2005). The learners were stimulated with specific activities to co-create content with their fellow learners and design their own learning pathway.

Results

Descriptive statistics

Participants came from 92 countries with the top three being India (26.5%), Germany (15.0%) and the United States (9.2%). The average age of learners was 37.31 years. The gender ratio was 73.4% male and 24.2% female, comparable to other MOOCs on the platform. Regarding job level, the largest group were employees (35.66%), followed by middle managers (18.32%), trainees (12.39%), lower-level managers (11.86%), top-level managers (7.61%), others (5.92%), associates (5.84%), and unemployed (2.39%). A

¹ The course is available here in self-paced (archive) mode: <https://open.sap.com/courses/bizmooc1>

share of 16.1% were SAP employees and 31% and 47% declared having prior experience with entrepreneurship and intrapreneurship, respectively.

In course start, 2,990 learners were enrolled, which gradually increased to 4,596 enrolments by the end. Out of the total people who enrolled, the active learners were 55.6%. This means that 44.4% of the enrolled learners never started the course (“no-shows”). In total, 592 learners earned a record of achievement by attaining 50% or more of the available points, leading to a 32.4% completion rate based on half-way attendance. The activity level in terms of learner’s contribution was high – in total, learners created 754 discussion posts compared to 300–500 on average in other similar platform courses. The activity level for graded assignments remained stable throughout the MOOC, and only dropped during the final exam.

The MOOC garnered positive feedback, with 98.3% being (very) satisfied with the course experience and content. The net promoter score resulted in +62.7 (ranging from -100 to +100), exceeding the average value of +50 on the platform. The overall course rating by learners was 4.54 out of 5. For 97.2% learners, the skills acquired were deemed helpful for their job and 98.7% were willing to take MOOCs in the future.

Hypothesis testing

The data for the two measurement points T1 (at course start) and T2 (at course end, six weeks in between) were available for 414 learners or 70% of the 592 learners that completed the course. Missing values accounted for 2.07% of the data and were far below common critical thresholds (Roth & Switzer, 1995). Two cases were removed because of missing data for five or more variables. Missing values in the remaining cases were imputed using the Markov chain Monte Carlo (MCMC) algorithm of the R-package “mice” (van Buuren & Groothuis-Oudshoorn, 2011). Variables were imputed by predictive mean matching, which has become a common imputation approach for quantitative data as it is less dependent from a variable’s distribution (Marshall, Altman & Holder, 2010). For binary variables, logistic regressions were applied for imputation.

Non-response bias testing, that is, comparing those who completed the surveys at T1 and T2 with the dropouts who participated only at T1, revealed a partial non-response bias. Non-significant differences were observed for PBC and SN, whereas the differences between INT and ATB were small, but significant. Remarkably, the levels for both INT and ATB were higher for the group with the dropouts. This indicates that the learners with higher levels of INT and ATB at course start did not have a higher probability of confirming their intentions throughout the course and complete the digital training.

To test the hypotheses and assess whether there were significant positive increases between the measured levels at T1 and T2, a non-parametric paired two-sample Wilcoxon test was performed for each item and construct. This method was chosen as the Shapiro-Wilk-Test on normality rejected the null hypothesis, an expected outcome considering the sample size. To check for the survey’s internal consistency, Tau-equivalent reliabilities were calculated for T1 and T2, leading to satisfactory results

between 0.86 and 0.94 (Taber, 2018). Table 1 displays the results for each individual variable as well as the whole constructs INT, ATB, SN and PBC with respective significance levels.

Table 1

*Results of the Wilcoxon signed-rank test comparing T1 and T2 levels. Note: n = 412; α = Tau-equivalent reliability; T1 = measured before taking the MOOC; T2 = measured after taking the MOOC; diff = Difference in mean; Signif. codes: * = $P \leq 0.05$; ** = $P \leq 0.01$; *** = $P \leq 0.001$.*

Constructs and items	Comparison of the means and significance level of the Wilcoxon signed-rank test					
	α T1	α T2	T1	T2	Diff	Signif.
INT – I intend to...	0.91	0.91	30.36	32.42	2.06	***
...undertake activities to realize change in my organization.			5.12	5.60	0.48	***
...contribute ideas for the strategic renewal of my organization.			5.18	5.58	0.40	***
... conceptualize new ways of working within my organization.			5.40	5.67	0.27	***
...undertake activities to change the current products/services of my organization.			4.85	5.30	0.45	***
...utilize insights of other experts to innovate in my organization.			5.34	5.50	0.16	*
...undertake activities that change the structure of my organization.			4.46	4.77	0.31	***
ATB – For me, undertaking such intrapreneurship activities is...	0.94	0.93	28.43	29.67	1.24	***
...attractive.			5.65	5.89	0.24	***
...valuable.			5.77	5.99	0.22	***
...enjoyable			5.51	5.85	0.34	***
...interesting.			5.81	6.07	0.26	***
...important.			5.69	5.87	0.18	***
SN	0.86	0.91	21.27	21.62	0.35	non.-sig.
Co-workers in my organization undertake such intrapreneurship activities themselves.			3.65	3.93	0.28	***
My direct supervisor thinks that undertaking such intrapreneurship activities is necessary.			4.41	4.47	0.06	non.-sig.
Influential people in my organization support such intrapreneurship activities.			4.67	4.62	- 0.05	non.-sig.
The top management fosters a culture that encourages the undertaking of intrapreneurship activities.			4.47	4.41	- 0.06	non.-sig.
Other departments in my organization undertake such intrapreneurship activities.			4.07	4.20	0.13	*
PBC	0.89	0.88	19.03	24.44	5.41	***
It would be easy for me to start an intrapreneurship activity and keep it working.			4.29	4.63	0.34	***
I know the necessary practical details to start intrapreneurship activities.			3.96	5.44	1.48	***
I know how to develop an intrapreneurship project.			3.64	5.33	1.69	***
I have full control over the necessary resources to undertake intrapreneurship activities.			3.29	4.20	0.91	***
I can control the creation process of an intrapreneurial project.			3.85	4.84	0.99	***

H₁ questioned whether ATB will be significantly higher after MOOC completion. According to the results of the Wilcoxon signed-rank test, there was a small, but significant increase for the whole ATB construct and for each individual item within the observed construct. Thus, H₁ can be fully accepted.

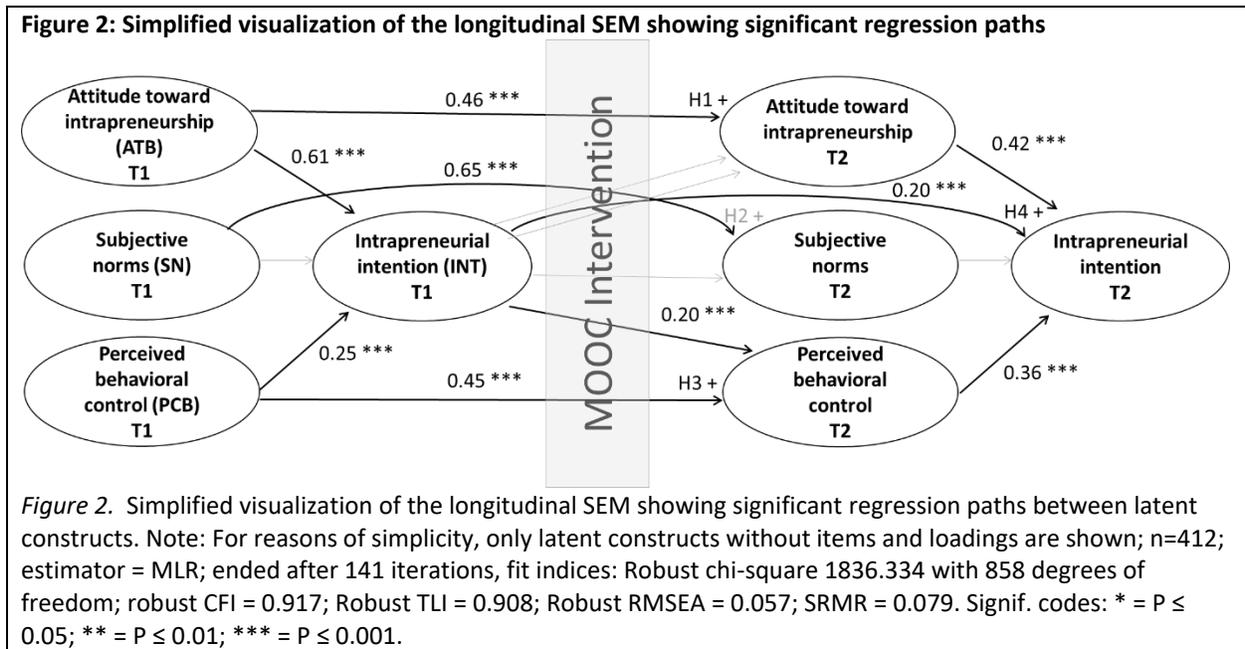
H₂ asked whether learners will have a significantly more positive perception of their SN upon completion of the MOOC. The analysis pointed to mixed results. Overall, H₂ can be rejected at a significance level of 0.05, primarily because supervisors, top management, and influential people were not perceived as more positive after taking the course. Interestingly, perceptions about peers (co-workers and other departments) increased significantly after taking the MOOC. Therefore, while H₂ needs to be rejected, the analysis of individual items revealed different perceptions about hierarchy.

H₃ proposed an increase for PBC. The overall level for this construct and all the items significantly increased from T1 to T2 ($p \leq 0.001$), with the largest increase (+28%) among all the model elements. This manifested strong support for H₃. Within the PBC construct, the largest increases affected the items related to knowledge acquisition. Further, larger differences were observed for the items concerning the controllability, indicating that the learners perceived a stronger internal locus of control after completing the MOOC.

A smaller, yet significant increase concerned H₄ and intrapreneurial intentions, thereby making H₄ acceptable. Interestingly, the learners attained overwhelmingly positive levels of intentions at T1 itself, however, they grew further throughout the MOOC. A similar phenomenon was observed for ATB (H₁). As outlined, non-response bias testing demonstrated that higher INT and ATB levels at course start did not necessarily lead to a higher likelihood for the course completion.

Finally, a longitudinal structural equation model (SEM) was specified to control different conditions, including autoregressive paths for each variable to measure the relative change. As a starting point, the three antecedents (ATB, SN, PBC) explained 63.2% in variance of intentions at T1, and 66.9% at T2, confirming the TPB model assumptions. Next, the model was controlled for prior entrepreneurial and intrapreneurial experiences. Results showed that they did not significantly influence the results and effect of the MOOC intervention.

Finally, it is critical to control the initial intention levels and existing prior experiences as they have been found to override or moderate the effect of entrepreneurship education (Bae et al., 2014; Karriker & Mayo, 2021). This effect was not observed here for digital intrapreneurship training. First, all TPB latent constructs at T1 significantly influenced their counterparts at T2. Second, paths from INT at T1 were established to the three antecedents at T2 and as a result, INT at T1 did not significantly influence ATB and SN at T2, neglecting the overriding effect. However, initial intentions at T1 did significantly influence PBC at T2, indicating an auxiliary effect as the relationship between PBC at T1 and T2 stayed significant as well. Figure 2 summarizes all significant regressions paths within the latent constructs of the SEM in a simplified manner to illustrate the overall results.



Discussion

This paper explores whether a digital, scalable, and cost-efficient business training approach bears the potential to nurture intrapreneurial intentions and the related drivers. More specifically, a MOOC on intrapreneurship was examined for having a significant effect on the different TPB elements. The results indicated a positive, significant increase for three (ATB, PBC, and INT) out of four elements and thus demonstrated at least a short-term effect. The small increase in SN was non-significant, however, with differences regarding hierarchy levels. Non-response bias testing and a longitudinal SEM corroborated the results by controlling the initial intentions and existing experiences. In the following paragraphs, the implications are discussed.

The largest effect of the MOOC intervention was observed for PBC, especially knowledge-related elements. This becomes less surprising, as the MOOC focused on fostering critical knowledge and skills that intrapreneurs are expected to master. Enriching those skills should be targeted with intrapreneurship trainings primarily (Hayton & Kelley, 2006) and should consequently lead to enhanced self-efficacy. Similar effects were reported for the Qualcomm intrapreneurship program (Santos & Spann, 2011). Notably, there are studies on entrepreneurship education reporting an inverse effect (Krueger, 1993), that is, the more the people learned about potential difficulties when behaving entrepreneurially, the less they trusted in their own abilities to overcome them. However, this phenomenon did not apply to this study, which indicates a potential for MOOCs to foster self-efficacy and locus of control as a pre-condition for intrapreneurial behavior.

This finding was reinforced by controlling for self-selection bias and initial levels of the TPB model. Bae et al. (2014) reported strongly diminishing effects of entrepreneurship education when controlling for pre-course intentions. In the MOOC intervention, the relative increases from T1 to T2 remained significant when controlling for initial levels, although INT at T1 had a significant effect on PBC at T2. Interestingly, this reciprocal causation within the TPB model, as put forward by Krueger (2009), was not observed for INT on ATB and SN.

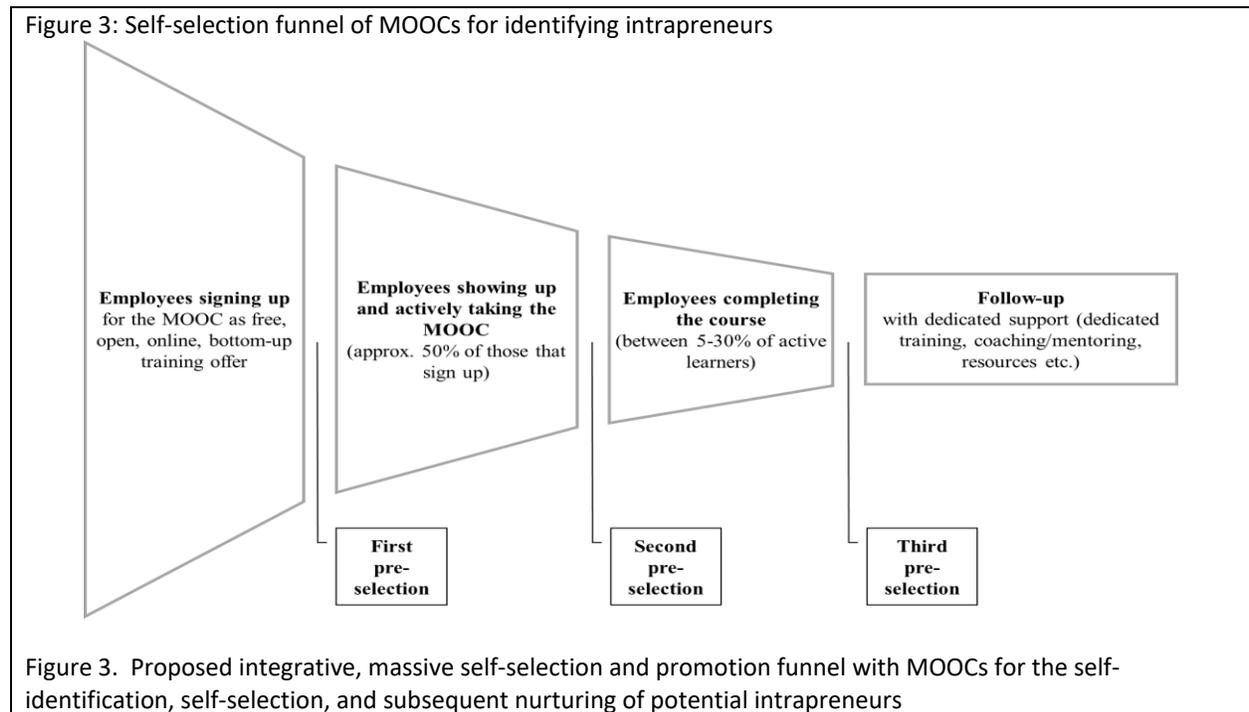
Despite the promising results regarding the increase of PBC, Heinonen (2007) argued that increasing knowledge and skills of participants might be the easier part of a training and only the starting point for a changing behavior. According to the TPB framework, intentions predict behavior and especially ATB, in turn, drives these intentions (Krueger, 2000). For both INT and ATB, the study observed significant increases. Although the ascents were much smaller in comparison with PBC, this outcome remains promising for different reasons. First, increasing attitudes (Schmelter et al., 2010) with education and training is essential, as the motivational aspect has proven to be a driving factor for successful training in intrapreneurship (Byrne et al., 2016; Durand, 1975; Thornberry, 2003) and entrepreneurship (Lackeus, 2020). Secondly, attitudes are anchored in deep beliefs (Krueger, 2007) and thus considered as fairly stable (Moberg et al., 2014). This was also corroborated by the SEM results that showed that INT at T1 did not significantly influence ATB at T2, while still a significant effect was manifested by the MOOC intervention on these elements. Significantly increasing stable elements can therefore be understood as a remarkable outcome and similar implications can be drawn for intentions (Bae et al., 2014).

Finally, even if the levels for INT and ATB were high at course start, they continuously increased throughout the course, leading to another implication regarding the potential of MOOCs. The course was labeled as intrapreneurship training and participation voluntary. Therefore, predominantly employees interested in learning about intrapreneurship with corresponding positive intentions and attitudes showed up, similar to Kreuzer et al. (2017) in their training evaluation of intrapreneurial competence among adolescents. Bae et al. (2014) referred to this as “selection hypothesis” (p. 242) – a phenomenon typically observed for MOOCs over several stages (Henderikx et al., 2018). However, and especially in the context of intrapreneurship training, this self-selection over several stages can potentially be turned into a benefit.

The first self-selection (see Figure 3) occurred when the interested employees signed up for the MOOC, with accommodating intentions and attitudes. The second, large self-selection took place throughout the MOOC. Research has shown that only approximately 50% of enrolled MOOC learners actually show up and become active learners (Reich & Ruipérez-Valiente, 2019), in accordance with the dynamics observed in this study. These active learners are mostly the selected group who follow up their initial intention, investing time and effort to go one step further. The final pre-selection marked the highest barrier, defined by course completion, typically resulting in low rates from below 10% up to 30% of active learners (Fidalgo-Blanco et al., 2016; Jordan, 2014; Reich & Ruipérez-Valiente, 2019; Zimmermann et al., 2017).² The completers at the final stage can then be viewed as those with high potentials, who

² These low completion rates in MOOCs have been explained by differing intentions of learners at course start – only approximately 50% of MOOC learners join with the intention to complete the course (Henderikx et al., 2018).

manifested resilience, reaffirmed and grew their intentions, attitudes, and PBC, and arrived at a common level of understanding for the topic with its potentials and pitfalls.



This finding stresses the importance of self-learning in virtual VET settings as well. As Heinonen (2007) remarked, intentions are a prerequisite, but not sufficient for intrapreneurship to happen and need a triggering event, which could be the MOOC and its self-selection funnel that helps VET providers and organizations to identify the right people at the right time. To these self-selected high-potential candidates, the VET providers and organization could offer follow-up support (e.g., in-depth training, dedicated mentoring, coaching), building up an integrative bundle of Human Resource Management (HRM) practices as suggested by Morris and Jones (1993), Escribá-Carda et al. (2017) or Schmelter et al. (2010) for fostering intrapreneurship.

This opportunity gains additional significance because VET providers and organizations struggle to identify suitable candidates for intrapreneurship programs upfront (Douglas, 2020), as a reliable pre-identification of intrapreneurs proved to be difficult (Molina & Callahan, 2009; Thornberry, 2003). Morris and Jones (1993) argued that intrapreneurs cannot be appointed just like that, while anyone in the organization could be the next intrapreneur. Therefore, Santos and Spann (2011) demanded a solution to optimize the targeting of high-potential intrapreneurs with subsequent innovation career

Interestingly, in the analyzed MOOC, the dropouts had even higher levels of intentions at course start than the completers, giving rise to the query whether the completers are more serious about their intentions than the dropouts.

paths, such as an internal intrapreneurship career ladder as proposed by Hayton and Kelley (2006). The MOOC self-selection funnel could constitute the initial crucial steps on this ladder and form a promising path for VET providers and organizations to work around the selection dilemma and follow-up with the self-selected group.

Finally, the small increase in SN proved to be non-significant, in contrast with the results attained by Souitaris et al. (2007) in the domain of entrepreneurship education. This might be explained as the duration of their intervention was much longer (five months versus six weeks in the MOOC). For this short period, the social environment wherein the intrapreneurs operate can be expected to remain quite stable – possibly even more, when employees come from different organizations as in the MOOC. Therefore, this result may not be surprising and rather be interpreted as a reconfirmation of learners' self-perceptions at the beginning of the course.

Still, there were significant increases observed for items concerning stakeholders on the same level (co-workers and colleagues from other departments). One possible explanation could be that the learners had a different understanding regarding what intrapreneurship actually encompassed after taking the course. This interpretation was underpinned by different discussions in the course forum where the learners stated that either themselves or colleagues had already excelled in intrapreneurial behavior without being aware of the concept. This is an important finding beyond the VET sector as it highlights the importance for earlier levels of education (e.g., as in Kreuzer et al. 2017) to make pupils aware that entrepreneurship is not limited to starting an own business, but also takes place within established organizations. This could potentially influence future career decisions.

Another explanation could be the high level of interaction and exchange between learners and the efforts for networking observed during the course. Relationships, confidence, and the evaluation by peers matter to intrapreneurs and their behavior (Gaile, 2020). The team-based approach of the MOOC and a mutual reinforcement among the learners might have led to a more positive perception of peers toward such behavior, by showcasing benefits of crossing disciplines, departments, cultural and company borders (Randazzo-Davis & Nelson 2020). This is comparable to Santos and Spann's (2011) suggestion to open up the Qualcomm program to external audiences to increase the impact, another potential a MOOC with its open approach can cater to. This is in an important implication for business educators and VET providers showing that team-work and mutual exchange are important factors in virtual venues as well.

Theoretical, Practical, and Political Implications

The results trigger several implications. First, this study contributes to the limited research about which roles digital business training approaches can assume to stimulate intentions, relevant for the study of intrapreneurs and entrepreneurs – especially in an online setting, which was lacking so far. The study showcases which cognitive areas respond to training and may be fostered first (PBC, ATB, and SN on the same hierarchical level), before nurturing intentions and eventually triggering respective behavior.

Next, this study illustrates how the TPB can be contextualized for business education research – the underlying theoretical framework may serve other scholars to explore different settings or to compare them with the newly created assessment instrument. For example, follow-up research can contrast offline/hybrid and online training formats, open/closed settings, different companies/sectors/countries, or target groups such as scholars/students and employees to test for their differing perceptions as hypothesized for intrapreneurship (Byrne et al., 2016; Heinonen, 2007).

As a final implication from a theoretical perspective, this study adds to the “selection hypothesis” (Bae et al., 2014, p. 242). While confirming the preference and ability selection for intrapreneurship, the effect of the training was not ruled out by pre-existing intentions. On top, the study identified the self-selection bias as an opportunity for VET providers and organizations for recruiting suitable candidates – by applying an open and voluntary format allowing massive self-selection. The proposed selection funnel with MOOCs could constitute a starting point for future research. For example, attributes of self-selected intrapreneurs by the MOOC could be compared with the theoretical frameworks of Brøndum (2019) and Davis (1999).

From a practical perspective, the study offers two chief contributions. First, the paper outlines different potentials of MOOCs as digital, integrative, and extensive business training approach for VET providers and organizations. If not since the era of digitalization, the times of the pandemic put online training on the agenda of institutions worldwide. By offering insights on how new technologies can potentially stimulate learners’ intentions, business educators can adopt digital solutions for their programs. Ideally, these new formats complement the existing approaches with their strengths. To illustrate an example, a MOOC might efficiently cater for delivering the training parts of the large Qualcomm program (Santos & Spann, 2011). As Karriker & Mayo (2021) showed with their online exit room scenario, a virtual module can enrich offline course experiences and enhance ESE.

Moreover, as discussed in the literature review, MOOCs are not limited to professional lifelong learning and adult education – even in the analyzed course, where the platform, the MOOC and its topic were clearly targeted at the VET sector, younger learners enrolled as well. The vast available offer of MOOCs to various business topics³, often starting at basic levels, could be selectively applied in business education at secondary level as well to complement, support and enrich the current approaches of offline and online teaching.

Another practical contribution is the discovery of a MOOC to be a promising self-selection instrument for training candidates. Traditional face-to-face approaches were labeled as cost-intensive practices (Byrne et al., 2016) and it was questioned whether the small-scale outcome is worth the investment (Thornberry, 2003), especially when targeting the “wrong” learners. As illustrated, the MOOCs could be applied here to catch the right people at the right time with the proposed self-selection funnel. This self-selection procedure can then be followed-up with dedicated training, mentoring or a project and is not limited to intrapreneurship. Other areas relevant for business education and training (e.g., on financial

³ MOOCs cater a wide range of topics, and especially business-related courses grew in importance during the pandemic (Shah 2020b).

and legal topics) can be catered with MOOCs to build a company-internal talent pipeline. Similarly, for VET and business education providers, MOOC may be leveraged for an open self-selection and recruitment procedure for participants and to reach out to new target audiences.

Finally, from a political perspective, this study aligns with the European agenda to re-think education and training for the digital age in the upcoming years (European Commission, 2020). It provides policy-makers further evidence by showing that even short-time interventions as this MOOC can ignite effects in different domains, ideally piling up with additional interventions. This paves the way for new stackable formats (e.g., Micro-credentials) answering to the increasing demand by VET target groups for flexible learning offers (European Commission, 2021). To illustrate one example, an intrapreneurship MOOC could be complemented with other corporate entrepreneurship and innovation MOOCs to constitute a MicroCredential on corporate innovation. Policymakers are advised to provide frameworks for the transferability, stackability and quality recognition of these new formats.

Limitation and Future Research

This study has certain limitations. In the specific case, it was difficult to establish a reliable control group – a limitation typical in training evaluation (Fayolle & Gailly, 2015; Moberg et al., 2014). Especially, in such an open, global, and massive digital training setting as a MOOC is, no specific company or country was targeted. Therefore, it is questionable whether there would be an observable, significant change across a control group that did not receive the treatment, especially during the short intervention timeframe. Thus, the results were additionally controlled for non-response bias, initial intentions, and existing experiences.

Next, the analysis is based on a single training intervention, raising the question in how far the results apply to other contexts. Due to the open approach of the course format it was not possible to analyze a random sample of a clearly defined population. For this reason, the results need to be interpreted with care. However, the study clearly addressed the recommended target group of employees. Next to non-response bias testing, the established SEM controlled pre-existing intentions and still, the significant effects of the MOOC intervention could be observed.

While the sample size is larger than comparable studies and the research is based on different samples involving various contexts (e.g., different companies and job levels), future research could replicate the research by studying new course iterations (e.g., similar MOOCs, or other types of comparable training interventions). Assumptions derived from the results of this study could be tested and additional variables integrated for a deeper analysis. Examples are studying the additional effect of organizational factors on certain TPB elements or more closely investigating pre-existing intentions of course drop-outs and completers.

Another direction for future work would be longitudinal research examining the link between intentions and subsequent behavior to investigate longer-term effects and impact. Interestingly, Fayolle and Gailly (2015) did not find short-term effects on intentions in their evaluation of entrepreneurship education,

but in the mid-term only. Therefore, the short-term effects observed might gain weight, however, they need to be corroborated over a longer timeframe to demonstrate a sustainable impact.

The pandemic exponentially accelerated digital transformation. The current study offers a snapshot to illustrate potential of new digital technologies such as MOOCs for VET providers and organizations, not limited to stimulate intentions of intrapreneurs.

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