



The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs



Daniela Maresch^a, Rainer Harms^{b,*}, Norbert Kailer^c, Birgit Wimmer-Wurm^c

^a Institute for Innovation Management, Johannes Kepler University Linz, Austria

^b IGS/NIKOS, University of Twente, The Netherlands

^c Institute for Entrepreneurship and Organizational Development, Johannes Kepler University Linz, Austria

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ABSTRACT

Academic research has shown that Entrepreneurship Education (EE) increases Entrepreneurial Intention (EI). However, this does not happen uniformly in all contexts, as specific contexts may require different EE action. In this paper the authors investigate the context-specific questions in two separate categories of students. If context is important, we should see different outcomes from similar EE classes provided to different student groups. The authors' results suggest that there is a contextual difference. The results indicate that EE modified to suit a particular target group could address the issue of subjective norms separately for business students and science and engineering students. Their principal results show that EE is generally effective for business students and science and engineering students. However, the EI of science and engineering students is actually negatively affected by subjective norms, whereas that effect is not apparent among the business student sample. The authors suggest that future research is needed on effective didactic approaches in EE for science and engineering students.

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1. Introduction

The importance of entrepreneurship to society has been identified and discussed since at least the fifteenth century (Schumpeter, 1912), and that discussion remains topical (Kirchhoff et al., 2013; Grichnik and Harms, 2007). The questions of whether and how entrepreneurial skills and competences can be fostered during education were posed by Cotrugli (1990), and later followed up by Cantillon (1931). From these historical roots, Entrepreneurship Education (EE) has evolved to become a prominent field. This field is born of diverse disciplines, which include economics, management, education, and technical studies (Davidsson, 2008).

The authors embrace the concept that EE is based on the realization that successful entrepreneurship is positively affected by the dispositions, skills, and competences of the founders of an enterprise (Rauch et al., 2005; Unger et al., 2011). We suggest that these dispositions, skills, and competences can be shaped by education (Kuratko, 2005), and cite recent meta-analyses (Bae et al., 2014; Martin et al., 2013) indicating that EE is generally effective. We seek to enhance the knowledge in this field by investigating the outstanding question of what makes EE effective, and for whom.

* Corresponding author.

E-mail addresses: daniela.maresch@jku.at (D. Maresch), r.harms@utwente.nl (R. Harms), Norbert.kailer@jku.at (N. Kailer), birgit.wimmer-wurm@jku.at (B. Wimmer-Wurm).

The question of “what makes EE effective” has been discussed in a literature stream on intention-based models for entrepreneurship education (Kuehn, 2008). Kuehn (2008, p. 87) states: “If entrepreneurial intentions precede entrepreneurial behavior, then entrepreneurship educators should benefit from intentions-based research in entrepreneurship”. If this is so, then EE should investigate the drivers of this Entrepreneurial Intention (EI). Theory, and a recent meta-analytical assessment (Schlaegel and Koenig, 2014), both suggest that the drivers of EI are attitudes, subjective norms, and perceived behavioral control. These elements of the Theory of Planned Behavior (TPB) also influence the effectiveness of EE (Kuratko, 2005; Gorman et al., 1997; Rauch and Hulsink, 2015).

EE research further investigates when EE can most effectively influence students' EI. We analyze two such conditions. First, we examine the extent to which students possess the attitudes, subjective norms, and perceived behavioral control considered prerequisites of becoming an entrepreneur. Here we add to the literature by investigating not only the direct effects of TPB constructs, but, in treating them as moderators of the EE–EI relationship (Ho et al., 2014), and we also examine the relationship in the context of specific fields of study.

Second, it is science and engineering students in particular whose entrepreneurial activities create new, high-quality firms (Åstebro et al., 2012) that ultimately contribute to job growth (Kirchhoff, 1994). Strengthening this human capital basis for technology-based entrepreneurship may be vital, especially for regions affected by an economic crisis (Harms et al., 2010; Heitor et al., 2014; Fink et al., 2012).

However, with few exceptions (Phan et al., 2009; Yanez et al., 2010), the literature on the EE offered to science and engineering students is quite thin. We address the call from Rauch and Hulsink (2015) for more research into the specific effects of EE programs on students from different disciplines, particularly from science and engineering disciplines. We investigate the specific situation of students of technical sciences, as they are the most likely to start up technology-oriented ventures. Our analysis is relevant as it shows which drivers in which target groups educators can address to nurture EI.

2. Theoretical framework and hypotheses

2.1. Affecting entrepreneurial intention through entrepreneurship education – a discussion of the literature

We refer to the definition of EI as the “self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future” (Thompson, 2009, p. 676). EI has become a vibrant field in entrepreneurship research (Fayolle and Linan, 2014), as “intentions have proven the best predictor of planned behavior, particularly when that behavior is rare, hard to observe, or involves unpredictable time lags” (Krueger et al., 2000, p. 411). Most recently, a longitudinal study by Kautonen et al. (2015) confirmed that EI predicts entrepreneurial action. Thus, the question of what influences EI is a relevant one for policy makers, practitioners, and educators.

Research into the role of EE in the formation of EI is based, first of all, on TPB (Ajzen, 1991), which provides a strong theoretical foundation (Schlaegel and Koenig, 2014; Krueger and Carsrud, 1993). It posits that a person's future behavior is preceded by intention: the stronger a person's intention to engage in a specific behavior, the more likely it is that the actual behavior will be performed. Furthermore, the intention to perform a given behavior is the result of three cognitive antecedents: (i) attitude toward behavior; (ii) subjective norms; and (iii) perceived behavioral control.

Second, EE is seen as a strong antecedent of EI. Two theoretical concepts have been developed that support this relationship: (i) human capital theory (Becker, 1964); and (ii) entrepreneurial self-efficacy (Bae et al., 2014; Chen et al., 1998). Human capital theory holds that human capital represents “the skills and knowledge that individuals acquire through investments in schooling, on-the-job training, and other types of experience” (Bae et al., 2014, p. 219–220). It is regarded as a determinant of EI. A meta-analysis by Martin et al. (2013) found that EE is associated with higher levels of EI. Entrepreneurial self-efficacy refers to “the strength of a person's belief that he or she is capable of successfully performing the various roles and tasks of entrepreneurship” (Chen et al., 1998, p. 295). Chen (2010) found entrepreneurial self-efficacy to be a positive moderator of the relationship between EE and EI.

Research on EI has brought together TPB and EE in various ways (Martin et al., 2013). In earlier studies, education was merely the context in which TPB constructs and EI were evaluated (Autio et al., 2001; Liñán, 2004; Lüthje and Franke, 2003). Apart from the direct effects of EE on EI, another group of studies assumes that the effect of EE on EI is (partially) mediated through its effect on TPB's intervening constructs (Rauch and Hulsink, 2015). As the direct and mediated influences of EE via TPB have meta-analytical support, research has begun to investigate a fourth model variant, which is that the effect of EE on EI may be moderated by the three cognitive antecedents posited under TPB (Ho et al., 2014).

In this study we provide an integrated model of the relationship between EE and EI that brings together both direct and indirect effects. The following section reports the development of the hypotheses.

2.2. Hypotheses

We begin by hypothesizing a direct impact of TPB constructs on EI, based on the findings of previous studies (Krueger et al., 2000; Kautonen et al., 2015; Lüthje and Franke, 2003; Kolvereid, 1996;

Souitaris et al., 2007). We add to the literature by providing hypotheses on why this impact may differ between science and engineering students and other students.

First, the term ‘attitudes toward behavior’ refers to a person's favorable or unfavorable evaluation of the target behavior. The more positive a person's evaluation of the outcome of starting a business is (Krueger et al., 2000; Autio et al., 1997; Pruett et al., 2009; Segal et al., 2005; Van Gelderen and Jansen, 2008), the more favorable his or her attitude toward that behavior should be, and consequently the stronger his or her intention to start a business should be. Second, the term ‘subjective norms’ relates to a person's perception of the opinions of social reference groups (such as family and friends) on whether the person should perform a certain behavior. The better the reference group's opinion is, the more encouragement for starting a business a person receives from this reference group, and the higher the person's motivation to comply with it is, the stronger the person's intention to start a business should be. Third, the term ‘perceived behavioral control’ reflects the perceived ease or difficulty of performing the behavior. It is based on whether the person believes that the required resources can be obtained, and that opportunities for performing the behavior exist (Bandura, 1986; Swan et al., 2007). Perceived behavioral control not only predicts the formation of intentions, but also supports the prediction of actual behavior by serving as a proxy for actual control (Ajzen, 1991).

In the context of entrepreneurship, the empirical results broadly confirmed TPB predictions with respect to the positive relationship between attitudes toward behavior, subjective norms and perceived behavioral control, respectively, and EI (Krueger et al., 2000; Kautonen et al., 2015; Lüthje and Franke, 2003; Kolvereid, 1996; Souitaris et al., 2007). In line with these findings, we propose the following hypothesis:

H1a. There is a positive relationship between (1) pro-entrepreneurial attitudes, (2) subjective norms, and (3) perceived behavioral control, and a person's EI.

The fact that recent graduates from science and engineering are providing the gross flow of new, high-quality firms—over and above those of other academic entrepreneurs (Åstebro et al., 2012)—highlights the importance of these students as targets of EE. Thus, the fact that the majority of studies into student EI are based on business students or on undefined student populations (Bae et al., 2014; Martin et al., 2013), indicates a gap in the literature arising because this student population might differ from others with regard to entrepreneurship. This difference may be based on education content (Kuckertz and Wagner, 2010) and on social identity theory (Obschonka et al., 2012).

Business students have received more education in business matters than other students. This may cause a weakening of the relationship between pro-entrepreneurial attitudes, subjective norms, perceived behavioral control and a person's EI. Kuckertz and Wagner argue that (Kuckertz and Wagner, 2010, p. 529): “learning about the facts of business causes [business students] to evaluate entrepreneurial opportunities more vigorously”. This additional knowledge may not only reduce the level of EI per se, but also the degree to which initially favorable TPB components influence EI.

Obschonka et al. (2012) draw on social identity theory. They argue that social identity – “the aspect of a person's self-image that is derived from membership of social groups” (Obschonka et al., 2012, p. 137) – influences the “cognitive processes that [...] underlie the formation of entrepreneurial intentions” (Obschonka et al., 2012, p. 137). Here, Obschonka et al. (2012) show that the strength of group identification can affect the relative strength of the TPB drivers of EI. We argue that it may not only be the strength of group identification that leads to differences in the strength of TPB drivers—between business students and science and engineering students—but that the group differences themselves lead to differences in the strength of TPB drivers. For example, science and engineering students may perceive that legitimate group behavior in their case includes the exploration of science and

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