

# Entrepreneurial Competencies in Student Companies at School: Development of a Research Instrument



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**Abstract** Entrepreneurial competencies are increasingly relevant and thus fostered in schools and universities, for instance, in the form of student companies. However, there are hardly any theoretically and empirically founded research instruments to assess students' competence development. Accordingly, this paper aims to develop and validate a newly designed questionnaire that captures entrepreneurial competencies in three different domains: on the economic, team, and individual levels. The instrument was tested in a pilot test with 163 students and in a main study with 226 students in secondary education. Overall, reliability and the assumed factor structure could be confirmed. The questionnaire can be used in schools and universities for the purpose of quality development and competence assessment in entrepreneurship education.

**Keywords** Student companies · Competence development · Questionnaire · Entrepreneurship education · Secondary schools

## 1 Introduction<sup>1</sup>

All over the world, entrepreneurship is an important pillar of the economy (Birdthistle et al., 2007; Busom et al., 2017; García-Rodríguez et al., 2019; Johannisson, 2016; Khan & Quaddus, 2015; Morris et al., 2013; Sánchez, 2013;

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Yu, 2013). Accordingly, many countries aim to support entrepreneurial initiatives, for example, by integrating it as a pedagogical principle in schools, colleges, and universities so that potential entrepreneurs can be identified, motivated, and supported to use their capabilities and to act entrepreneurially. In terms of focusing on a sustainable future, entrepreneurship education (EE) may also foster personal and social responsibility and enhance a culture of solidarity (Lindner, 2018). Consequently, the implementation of entrepreneurship within curricula at universities (and at schools) has increased in numbers during recent years (Sánchez, 2013; Peterman & Kennedy, 2003). In recent years, research has also intensified, recently resulting in several literature reviews as well as meta-analyses with the aim of assessing the efficacy of EE (Alanazi, 2019; Bae et al., 2014; Brüne & Lutz, 2020; Kuratko, 2005; Longva & Foss, 2018; Lorz et al., 2013; Martin et al., 2013; Nabi et al., 2017; Samwel Mwasalwiba, 2010). For instance, the recent meta-analysis by Martínez-Gregorio et al. (2021) distinguished between primary, secondary, and tertiary education. Overall, it found a small effect size of EE on increasing entrepreneurial intention and self-efficacy (Martínez-Gregorio et al., 2021). However, there are some methodological issues regarding the studies such as missing control groups (Lorz et al., 2013; Martínez-Gregorio et al., 2021). Above all, only six studies from primary (1) and secondary (5) education could be included in the meta-analysis (Martínez-Gregorio et al., 2021). Thus, there is still a need for more studies on the impact of EE, particularly on primary and secondary students' development of entrepreneurial skills and values (Samwel Mwasalwiba, 2010; Marques & Albuquerque, 2012). This lack of studies within schools is connected to a lack of instruments to reliably and validly assess students' competencies developed in entrepreneurial initiatives. Indeed, there are few instruments available to evaluate EE at schools (Volery et al., 2013), for instance, in the context of student companies. Consequently, this study aims to develop a research instrument to investigate the entrepreneurial competencies to be developed in student companies. Such an instrument is of relevance as student companies are an important opportunity to make young students familiar with the option of starting one's own business. Accordingly, student companies are seen as a possible (collaborative and experiential) learning environment to foster entrepreneurial thinking and action without the need for students to take risks (Pittaway et al., 2011). Therefore, this research instrument advances research on entrepreneurship education, and the findings may help to further develop the evidence-based design of student companies. From a practical point of view, the study can be used to further develop existing programs for student companies.

This article first reviews the state of research on entrepreneurial competencies, which provides the foundation for the competence framework and the development of a corresponding research instrument. Finally, the methods of this study are introduced and followed by the results and a discussion.

## 2 State of Research on Entrepreneurial Competencies

An initial literature review carried out to clarify the specific competencies in the field of entrepreneurship resulted in more than 100 competencies commonly connected to entrepreneurs [for example, Arafeh, 2016; Bacigalupo et al., 2016; Boyles, 2012; Driessen & Zwart, 2006; Lackéus, 2013; Man et al., 2002; Mitchelmore & Rowley, 2010; Wu, 2009; Moberg et al., 2014]. In the following, we will briefly describe selected studies due to their relevance for the field or for EE.

In their literature review on entrepreneurial competencies, Mitchelmore and Rowley (2010) presented a summary of key competencies associated with an entrepreneur's role in different studies. Four aspects emerged: business and management competencies, human relation competencies, conceptual and relationship competencies, and entrepreneurial competencies, which are understood in terms of the identification and definition of a viable market niche, idea generation, recognition, formulation of strategies, and the taking advantage of opportunities (Mitchelmore & Rowley, 2010).

Reviewing an extensive range of literature to assess entrepreneurial competencies, Arafeh (2016) provided an in-depth analysis of the number of quantified entrepreneurial competencies ranging from 5 to 25. "Most of them share competencies like passionate, risk-taking, confidence, determination, disciplined, visionary, decision-making, and leadership" (Arafeh, 2016). The researcher then proposed a "soft computing-based entrepreneurial key competencies' model (SKECM)" (Arafeh, 2016). This model includes three clusters: achievement, planning, and power.

Man et al. (2002) focused on a procedural approach and developed a conceptual model linking "the characteristics of small and medium-sized enterprises' (SMEs) owner-managers and their firms' performance" (Man et al., 2002). This model comprised four constructs, with one of them being entrepreneurial competencies from a process perspective. The authors assumed that these competencies are changeable and learnable and that they "can be investigated from a process perspective, reflecting the actual behavior of the entrepreneur" (Man et al., 2002). Thus, they identified, for example, using contacts, persuasive ability, communication, and decision skills; understanding complex information, risk-taking, innovativeness, and team building; and evaluating and implementing the strategies of a firm as competencies related to (successful) entrepreneurs. However, according to Morris et al. (2013), there has been neither empirical evidence validating these constructs nor insights into how to measure these competencies. In response, these authors (Morris et al., 2013) conducted a Delphi study to measure entrepreneurial competencies. By questioning entrepreneurs and leading entrepreneurship educators, they identified 13 core entrepreneurial competencies.

This approach was also adopted by Driessen and Zwart (2006) in their model called Entrepreneur Scan (E-Scan), which "provides insight into necessary traits and capabilities for entrepreneurship" (Driessen & Zwart, 2006, p.2). The model is based on four components that form a person's competence (knowledge and experience,

motivation, characteristics, and capabilities) and are transferred to entrepreneurial competencies. These include, for example, market, environment, finances (knowledge), autonomy, power, interest in the subject (motivation), achievement, affiliation, effectiveness, risk-taking (characteristics) and organization, financial administration, creativity, and flexibility (capabilities).

Boyles (2012) adopted a knowledge, skills, and abilities (KSA) perspective and identified relevant connections between a core set of twenty-first-century KSA (“Information, media, and technology literacy; inventive thinking; communication and collaboration; productivity and results,” (Boyles, 2012, p. 47)) as well as cognitive, social, and action-oriented entrepreneurial competencies. These include identifying opportunities and developing new ventures, creativity, curiosity, risk-taking, teamwork and collaboration, global awareness, flexibility and adaptability, and initiative and self-direction (Boyles, 2012).

In 2013, Lackéus (2013) developed and published a KSA-based framework for entrepreneurial competencies. This framework was prepared by adapting the concept of entrepreneurial competencies being defined as “knowledge, skills and attitudes that affect the willingness and ability to perform the entrepreneurial job of new value creation; that can be measured directly or indirectly; and that can be improved through training and development” (Lackéus, 2013, p. 1). Hence, entrepreneurial competencies are defined in terms of, for example, mental knowledge (referring to knowledge), marketing, strategy, opportunity identification (referring to skills) and passion, self-efficacy, pro-activeness, and perseverance (referring to attitudes).

The Danish Assessment Tools and Indicators for Entrepreneurship Education (ASTEE) project followed this KSA approach in a more specific way and defined “creativity, planning, financial literacy, resource marshalling, and teamwork [as] skills [...] needed in different phases of an entrepreneurial venture” (Moberg et al., 2014, p. 16). This assessment of entrepreneurial competencies and students’ learning processes included entrepreneurial self-efficacy, entrepreneurial mindset, entrepreneurial knowledge, career ambition, and connectedness to education, that is, entrepreneurship education and teacher support. A large-scale test was carried out with 4900 respondents who were European students at the primary level (aged 10–11), secondary level (aged 16–17), and tertiary level (aged 20+). However, this study focused on the distinction of cognitive-oriented and non-cognitive-oriented entrepreneurial skills as well as how to teach and codify these skills in an entrepreneurial setting.

Intentions and competence levels of EE are combined in the TRIO Model of Entrepreneurship Education, developed during a pilot project of the Schumpeter College (Lindner, 2018). The TRIO model covers three segments: core entrepreneurship education (core competencies fostering entrepreneurial development and implementation on the personal or individual level), entrepreneurial culture (encouraging entrepreneurial thinking, communication, and relationships by empathy and independence), and entrepreneurial civic education (focusing on a societal culture of responsibility in order to face social challenges) (Lindner, 2018).

In 2016, Bacigalupo et al. (2016) developed the Entrepreneurship Competence Framework, emphasizing that “the EntreComp Framework can be seen as a starting

point for the interpretation of the entrepreneurship competence, which over time will be further elaborated and refined to address the particular needs of specific target groups” (Bacigalupo et al., 2016). Entrepreneurial competencies within the competence area of “ideas and opportunities” include creativity, vision, and ethical and sustainable thinking; representative competencies for “resources” are motivation and perseverance, self-awareness, and self-efficacy; and “into action” competencies include taking the initiative, coping with uncertainty, dealing with ambiguity and risk, and focusing on planning and management (Bacigalupo et al., 2016).

### 3 Competence Framework for This Study

Based on the literature review on entrepreneurial competencies, the competence framework for this study was developed in a multistage process: competencies that were cited most often and hence considered to be important and characteristically for entrepreneurs were aligned with the Entrepreneurship Competence Framework (Bacigalupo et al., 2016, p. 11). This framework was chosen as it “offers a tool to improve the entrepreneurial capacity of European citizens and organizations. The framework aims to build consensus around a common understanding of entrepreneurship competence by defining 3 competence areas, a list of 15 competencies, learning outcomes and proficiency levels, which current and future initiatives can refer to” (Bacigalupo et al., 2016, p. 2).

The conceptual work resulted in three competence areas: First, competencies on the *economic level* included aspects such as vision, working strategically, using resources, planning and organizing, security and risk awareness, creativity, problem-solving, and ethical and sustainable thinking. Second, *team-level* competencies comprise, for instance, spotting opportunities, communicating successfully, working together in heterogeneous groups, and networking. Third, competencies on the personal level encompass assuming responsibility, working independently, motivation and perseverance, reflecting, self-awareness, and self-efficacy (Grewe & Brahm, 2019).

### 4 Research Methods

To validate the model and assess the reliability and validity of the research, the study was based on a survey design to gather data from students participating in so-called student companies in the south-west of Germany. Participating in a student company was part of the students’ extra-curricular economic courses (grade 11 in secondary schools).

#### **4.1 Research Instrument and Questionnaire Design**

The survey was questionnaire-based, translating the previously discussed framework into survey items. The questionnaire was distributed online.

**Participants** The pilot test of the survey was administered in May 2017 by email to participants in student companies during the 2016–2017 school year to test the scales and gather feedback on the survey design and comprehensibility. The survey was again administered in November 2017. On both occasions, the email explained the survey objectives and the confidentiality agreement and included a hyperlink to an online survey collection tool. One week before the closing date of the survey, a follow-up email was sent to all students to remind those who had not participated yet. Respondents were asked to self-assess their entrepreneurial competencies from a range of competencies presented using a five-point Likert scale (1 = does not apply at all to 5 = fully applies). Respondents were not compensated for their participation.

The sample of the pilot test included 163 students (87 female and 76 male students), ranging in age from 16 to 18 ( $M = 16.79$ ; median = 17). In the main testing, 226 of 677 students completed the questionnaire, corresponding to an overall response rate of 17.38%. This sample ranged in age from 13 to 20 ( $M = 16.26$ ; median = 16) and included 135 female students and 80 male students (11 non-response).

**Research instrument** The questionnaire included three sections: entrepreneurial competencies; questions on students' motivation in economic lessons and on individual interest in economics in general; and demographics (e.g., gender, age, grade). Based on the previously outlined competence framework, survey questions were created for the self-assessment of students' entrepreneurial competencies. The core of the questionnaire was based on a list of entrepreneurial competencies gathered through the literature review (see above) and tested by means of the pilot test, as previously mentioned. In the pilot test, each student received the original survey with 225 items. To assess scale properties, a series of factor and reliability analyses were performed to validate the scales (for further details, see below). Items that were not consistent within the rotated component matrix were deleted. This pilot test resulted in a shortening and modification of the original questionnaire to a final set of 139 items; this process also avoided increasing tardiness due to many questions, increased precision and validity, and did not limit the questionnaire's reliability.

The remaining 139 items developed for the online questionnaire cover the 15 identified competencies, with each of the competencies subdivided into several theoretical constructs that were assessed using different statements. In Table 1 provides an overview of the constructs and shows a sample item for each construct.

**Table 1** Constructs and sample items

Construct	Sample item
Economic level	
Understanding economic concepts	“I can explain how market prices come about.”
Vision	“I can imagine my future.”
Managing resources	“It is important to share resources with others.”
Planning and organizing	“I can create a strategy to achieve goals.”
Calculating and managing risks	“I can evaluate risks to take decisions.”
Creativity and problem-solving	“I can actively search for solutions.”
Ethical and sustainable thinking	“I can investigate social and technical developments in relation to sustainability.”
Personal level	
Assuming responsibility	“I can take individual and group responsibility.”
Motivation and perseverance	“I can stay focused on my tasks.”
Reflecting	“I can reflect on failures and learn from them.”
Self-awareness and self-efficacy	“I do not let myself be disturbed even under heavy workloads.”
Team level	
Spotting opportunities	“I’m interested in creating an activity by looking at it as a whole.”
Communicating successfully	“I can communicate the vision for my venture in a way that inspires and persuades others.”
Sharing and protecting concepts	“I can explain that ideas can be shared and circulated and can be protected by certain rights.”
Working together in heterogeneous groups	“In group works I can contribute constructively.”

## 4.2 Data Analysis

Data gathered from the 226 useable questionnaires (main test) were analyzed using SPSS and MPlus. To ensure the internal consistency of the scales, a factor analysis based on the factor-derived scale’s responses was carried out, followed by the calculation of reliability estimates to measure the consistency of items within the same construct. The reliability analyses produced internal consistency values (Cronbach’s alpha), with estimates ranging between 0.643 (“Working together in heterogeneous groups”) to 0.883 (“Communicating successfully”).

## 5 Results

### 5.1 Internal Consistency

Table 2 shows the number of items per scale and the values of Cronbach's alpha (for the main test) as well as the descriptive values of the scales. Although some scales do not make the usual threshold for Cronbach's alpha, the test shows overall satisfactory to good internal consistency values.

**Table 2** Reliability, standard deviation, and means<sup>a</sup>

Scale in questionnaire	#of items	$\alpha$	Mean	Standard deviation
Understanding economic concepts	2	0.666	3.4376	0.74485
Vision	4	0.845	3.6029	0.86885
Working strategically	5	0.791	3.9148	0.56783
Using resources	4	0.563	4.4170	0.47855
Making the most of your time	4	0.827	3.6599	0.73748
Managing resources	5	0.783	3.5688	0.66413
Planning and organizing	3	0.707	4.1942	0.56236
Being flexible and able to adapt to changes	3	0.816	3.8780	0.73559
Developing strategies and business concepts	6	0.844	3.5596	0.65633
Calculating and managing risks	4	0.738	3.7319	0.57323
Problem-solving	4	0.755	4.0602	0.59650
Developing ideas and shaping values	2	0.682	3.7146	0.61939
Behaving ethically	3	0.718	3.8153	0.75219
Assessing ethical impacts and thinking sustainably	5	0.781	3.8221	0.27548
Assuming responsibility	3	0.736	3.9867	0.73657
Being target-oriented	5	0.733	3.8440	0.65257
Being resilient	3	0.790	3.7581	0.68236
Reflecting	3	0.674	3.9742	0.62692
Acting strength-based	6	0.827	3.9218	0.65436
Shaping one's own future	2	0.573	3.9027	0.65780
Analyzing interrelationships	3	0.726	3.6308	0.80955
Spotting challenges	3	0.728	3.6719	0.68570
Making requirements visible	3	0.665	4.0688	0.59717
Communicating successfully	7	0.883	3.9142	0.66183
Using media effectively	4	0.857	4.0060	0.70291
Sharing and protecting concepts	3	0.789	2.9275	0.90701
Working together in heterogeneous groups	6	0.643	4.2606	0.44621
Networking	3	0.648	3.6364	0.56800

<sup>a</sup> Values are shown for the main study only



## 5.2 *Discriminant Validity*

In the first exploratory factor analysis (principal component analysis with Varimax rotation), a 40-factor structure emerged based on the Eigenvalue-greater-than-1 method. Although most items could be allocated to the theoretically expected factors, 31 items had to be discarded due to confusion with other factors. These items were not deemed necessary to reflect the complexity of the respective constructs; accordingly, they were deleted and not used in further analyses. The remaining items loaded on 28 different factors (see Table 2) with some cross-loadings, mostly indicating the theoretically assumed relations among the factors.

## 5.3 *Construct Validity*

Using confirmatory factor analysis (CFA), the model was tested separately for each of the three levels (individual, team, and economic levels). For each level, a g-factor solution was compared to a solution based on the number of theoretically assumed factors (with the three conceptual levels—economic, team, and individual—as reference points). Analyses were carried out with data from both studies and brought similar results. In the following, the results of the main study will be reported. For each level, the analysis showed that a g-factor solution was not indicative. Instead, for the individual level, a 6-factor structure yielded reasonable results (CFI = 0.901; RMSEA = 0.068; SRMR = 0.053). For the economic level, the expected 13-factor structure brought mediocre results for the CFI but good results for the RMSEA and the SRMR (CFI = 0.887; RMSE = 0.047; SMSR = 0.056). For the team level, the expected 7-factor structure showed reasonable results (CFI = 0.906; RMSE = 0.056; SMSR = 0.056). All in all, the confirmatory factor analyses supported our theoretical assumptions.

## 6 **Discussion and Conclusion**

There have been few validated instruments to assess entrepreneurial competencies to evaluate entrepreneurial programs in the school context (Fayolle, 2013; Egbert, 2014). At the same time, there is a need for the identification and evaluation of students' competencies that should be acquired in entrepreneurship courses (Martínez-Gregorio et al., 2021). This study sought to contribute to the literature on entrepreneurship education by developing a theoretically founded instrument to determine (school) students' entrepreneurial competencies. The study identified 15 entrepreneurial key competencies and, accordingly, developed an instrument with 28 individual factors on three levels. The main benefit of our new framework is that it is based on a sound review of different conceptual frameworks. Second, it

distinguished three levels (economic, personal, and team) and their corresponding competencies. The instrument was developed with a pilot and a main study and involved students in schools. Both studies showed that the instrument developed proved to be reliable and valid. Accordingly, the instrument advanced the framework designed by Bacigalupo et al. (2016), which “has not yet been adapted to, or tested in real settings” (Bacigalupo et al., 2016, p. 7). This assessment tool can thus be applied in entrepreneurial programs to assess students’ competencies. Its results may help teachers decide which content to highlight as part of their entrepreneurial course programs to further enhance the students’ competence development. Further insights into the impact of entrepreneurial education programs will help “inform the development of effective entrepreneurial programs” (Morris et al., 2013, p. 365). Thus, the instrument can have a practical impact on the context of fostering entrepreneurial mindsets. Furthermore, at a broader theoretical level, the findings also have implications for the emerging research on entrepreneurial programs or interventions, and the empirical evidence from this study provides a foundation for research on long-term impacts of EE. By pointing out the relevant competences fostered by entrepreneurial programs, this study will also help set the standards for the desired learning outcomes because, currently, there are no common standards yet due to the heterogeneity of existing entrepreneurship programs.

### ***6.1 Limitations of the Study and Future Research Suggestions***

Despite the strengths of this survey, there are certain limitations to this study that should be noted. First, the data from this study are based on self-reported measures, thereby showing the usual problems of self-reported data; however, in this case, some of the constructs were conceptualized as self-reports and should, thus, be rather valid. Nevertheless, a second source of data would be particularly useful for some constructs, e.g., the extent of economic competencies. Second, this study was conducted with participants of a particular kind of student companies only, without considering other entrepreneurial programs. Thus, there is a limitation in terms of generalizability. At the same time, this limitation also reduced contextual variance in the data. Another limitation is that other competencies might also be relevant for entrepreneurial success, which were not assessed by the instrument.

Notwithstanding these limitations, several future research questions emerged from our study. First, the instrument should be used more frequently, as well as in other contexts, to further establish its reliability and validity and to strengthen the generalization of results. This could include students from other institutions (for example, higher education) or different countries so that future research would be extended to an international basis. The instrument was already successfully applied to assess students’ competence development in mini-companies at school (Grewe & Brahm, 2020). Furthermore, research on the long-term effects of EE and training can

demonstrate the likelihood of not only becoming an entrepreneur but also founding a start-up. Thus, this could provide a more objective measurement of the success of EE. Moreover, further studies are needed to explore, more specifically, different forms of entrepreneurial learning as well as assess variants of the programs offered in terms of the duration of the program or voluntary versus mandatory participation.

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