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Fostering University Students' Entrepreneurial Opportunity Identification Capability: A Systematic Literature Review

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Abstract

Fostering university students' Opportunity Identification (OI) capability has received much attention from entrepreneurship scholars. There is, however, a lack of comprehensive understanding of "*why*" some students can better identify business opportunities and "*how*" their OI capability can be improved. This systematic review aims to synthesize the research findings on university students' OI capability to answer the above questions and propose evidence-informed guidance for entrepreneurship educators when developing programs designed to enhance this key entrepreneurial capability. In this regard, 44 empirical studies (out of 945 peer-reviewed articles) on OI, dating from 2000 through 2022, were reviewed. The findings were categorized by answering five essential questions raised by the adopted teaching model framework, i.e., "why?", "for whom?", "for which results?", "what?", and "how?". The findings

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indicate that students' prior knowledge, entrepreneurial alertness, and creativity are the most influential factors in the OI process. The research found that developing students' opportunity identification capability requires guiding them through three distinct stages, namely, triggering, idea generation, and idea evaluation, within a constructively aligned learning environment. The paper concludes by presenting several suggestions and directions for future research.

Keywords
opportunity identification, university students, entrepreneurship education

Introduction

According to the Entrepreneurship Education (EE) Framework, also known as EntreComp, entrepreneurship is defined as "*...a transversal competence, which can be applied by citizens to all spheres of life from nurturing personal development, to actively participating in society, to (re)entering the job market as an employee or as a self-employed person, and to starting up ventures*" (Bacigalupo et al., 2016, p. 6). That is to say, entrepreneurship and entrepreneurial capabilities are no longer viewed as key elements only in the business domain, for example via venture creation and small business management (European Commission, 2008). Entrepreneurship is increasingly viewed as relevant to all as a capability enabling individuals—whether as business founders, innovative employees, or proactive citizens—to address and provide solutions to societal challenges. This shift in perspective is echoed by international reports, such as those from the European Commission (2008) and the OECD's Entrepreneurship360 initiative (Lackéus, 2015), which advocate for EE to be at the core of any nation's education policy. This perspective has led to EE becoming one of the core subjects addressed in universities worldwide (Schultz, 2021).

In general, EE at universities has a "dual" function, aligning with the narrow and broad definition of entrepreneurship (see Lackéus, 2015). As per the narrow definition, it aims to equip university students with the capabilities for business development, self-employment, venture creation, and growth, essentially preparing them to become "entrepreneurs" (Lackéus, 2015). In a broader sense, EE is viewed as a means to assist university students in enhancing their personal development, creativity, self-reliance, initiative, and action orientation, ultimately helping them become more "entrepreneurial" (Lackéus, 2015). This interpretation of EE emphasizes the cultivation of what is often termed an "entrepreneurial mindset" (Ratten & Jones, 2021). Possessing such a mindset allows university students to "create value by recognizing and acting on opportunities, making decisions with limited information, and staying adaptable and resilient in frequently uncertain and complex situations" (Daspit et al., 2021, p. 6). This

may help them to better cope with change and uncertainty resulting from the complex and high-impact societal issues they face (Baggen et al., 2021).

Within these two perspectives of EE, opportunity identification (OI) remains at the core of educational practice. Scholars define the capability to identify opportunities as the proficiency to "*identify ideas for new products, processes, practices or services in response to a particular pain, problem, or new market need*" (Baggen et al., 2015, p. 417). This capability plays a critical role in successful entrepreneurship and new venture creation (Mitchelmore & Rowley, 2010). Moreover, it has been shown to be crucial for those aiming to strengthen their resilience in navigating uncertainty (Shepherd et al., 2007), embracing surprises (Sarasvathy et al., 2014), and generating creative solutions to emerging challenges (Gielnik et al., 2012). Given these insights, OI has become a central topic in EE (Lumpkin et al., 2004), especially in higher education (Nab et al., 2010).

There is a strong consensus among scholars that the OI capability is not a natural gift that only some people possess (see Baron & Ensley, 2006) and that it can be developed through teaching (DeTienne & Chandler, 2004; Saks & Gaglio, 2002). Thus, there must be factors that can be changed during the learning process to make individuals more capable of identifying opportunities (Muñoz et al., 2011). This viewpoint has received research attention since 2000 (Filser et al., 2020) and precipitated many studies that investigated the role of possible antecedents in developing OI, such as creativity (Gielnik et al., 2012), social networks (Ozgen & Baron, 2007), and prior knowledge (Shane, 2000). Scholars have also reported successful practices that foster university students' capability to identify business opportunities (e.g., DeTienne & Chandler, 2004; Fiet & Patel, 2008).

Problem Statement

The fast-growing body of empirical research that attempts to explore and teach OI has led to difficulties in accumulating and systematizing the findings (George et al., 2016). Although previous review studies (e.g., George et al., 2016; Hansen et al., 2011, 2016) have made significant theoretical contributions to our understanding of OI, they fall short of offering a comprehensive understanding of "*why*" some students can better identify business opportunities than others (Ozgen & Minsky, 2013). Moreover, there is still no established base of evidence demonstrating "*how*" this capability can be taught in educational contexts (McNally et al., 2018). In light of these gaps, there is a pressing need for a systematic analysis that not only synthesizes existing empirical findings but also provides actionable insights for enhancing educational practices.

Research Purpose and Questions

This review study aims to address the identified gap in the literature by systematically analyzing empirical studies that focus on fostering university students' OI capability. Given that OI capability is strongly influenced by individual traits (Ardichvili et al.,

2003), findings from studies that examine how these traits impact university students' OI capability have also been incorporated, even when fostering OI is not the primary focus. The results of this comprehensive review provide evidence-informed guidance for entrepreneurship educators regarding the essential components of EE programs that are effective in fostering OI capability among university students.

In line with Hägg and Gabrielsson's (2019) review study, Fayolle and Gailly's (2008) generic teaching model for EE was adopted as a theoretical framework to guide this review and to help formulate the research questions. This framework is inspired by Biggs's (1996) principle of constructive alignment which suggests that optimal learning is achieved when teaching and assessment methods align with the learning outcomes students need to achieve. Building on this, Fayolle and Gailly (2008) argued that to develop an effective EE program, educators should design the program around five essential components, addressing the corresponding questions in this order: (1) "why?", (2) "for whom?", (3) "for which results?", (4) "what?", and (5) "how?". According to Fayolle and Gailly (2008), the why question primarily addresses the overall and specific objectives of the EE program. Once these objectives are established, it is important to identify for whom the program is designed, as individual characteristics may influence its learning outcomes. Following this, it is necessary to determine for which results data should be gathered and analyzed to assess the program's effectiveness. With these aspects clarified, the next step is to define what content should be included in the program. Finally, decisions must be made regarding how this content will be delivered to best support the targeted objectives. Accordingly, the following research questions are formulated to guide this systematic review:

RQ1. What learning objectives can be targeted to foster university students' OI capability?
RQ2. What individual characteristics and environmental factors affect university students' OI capability?
RQ3. What measurement approaches could be used to assess university students' OI capability development?
RQ4. What content could be included in programs that aim to foster university students' OI capability?
RQ5. How should education be conducted in programs that aim to foster university students' OI capability?

Method

This study follows a systematic review method as a replicable and transparent review process to provide a clear understanding of advancements in the small business and entrepreneurship field (Kraus et al., 2023). The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework (see Moher et al., 2009) was adopted and used to develop a review protocol. The PRISMA framework highlights four key phases for conducting review studies: *identification*, *screening*,

eligibility, and *analysis* (see Figure 1). It is important to note that, due to its nature as a review, this study did not require ethical approval.

Identification Phase

This review used a systematic search strategy based on three sets of keywords that overlapped with the research questions: one set refers to entrepreneurial capability, i.e., opportunity identification, one set to the goal of the study, and one set to the study context. In the first step, synonyms or related keywords for each set were identified using Merriam-Webster's Online Thesaurus combined with George et al.'s (2016)

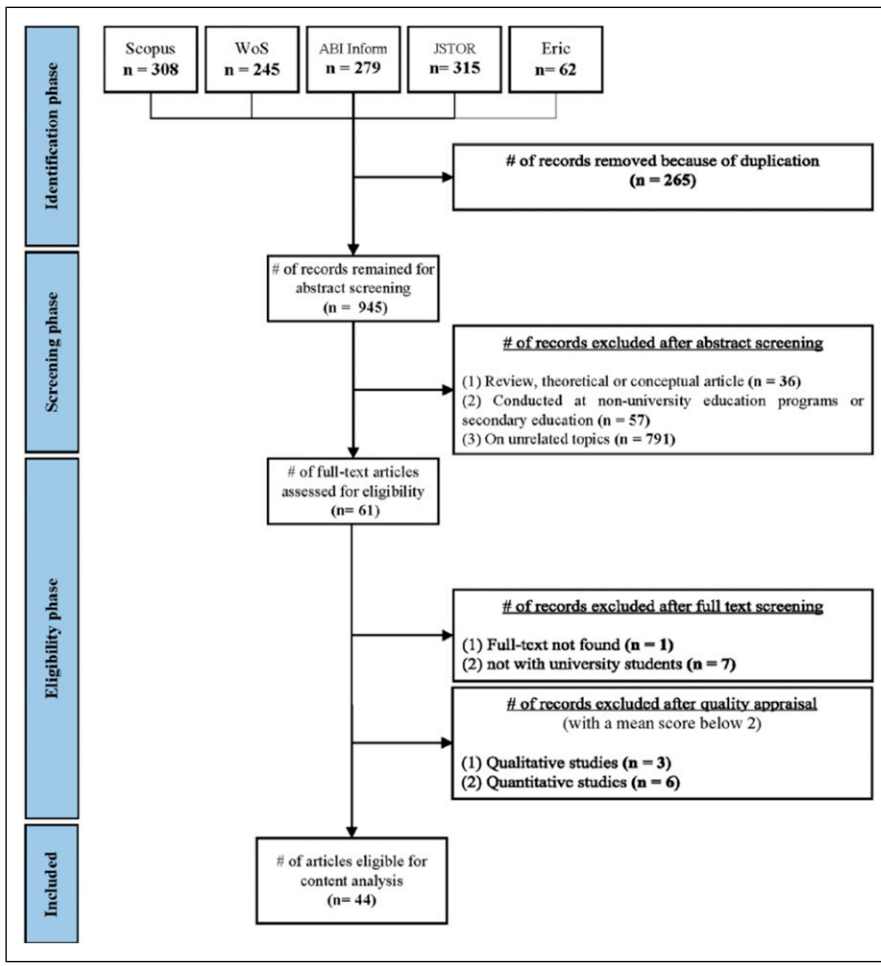

Figure 1. The adapted PRISMA flow diagram.

review to find the most used terms for OI capability. The final search words used within each set are shown in Table 1.

In the second step, the sets were overlapped with the Boolean operator "AND," and the related asterisk-marked keywords within each set were combined using "OR" to arrive at the final search string. The search keywords might appear in an article's title, keywords, and/or abstract. The leading researcher conducted the literature search in February 2022. Given the interdisciplinary nature of OI capability, it was expected that related research would appear in entrepreneurship, education, and/or psychology journals. The following bibliographic databases were selected to cover these disciplines and ensure full access to relevant articles: *Scopus*, *Web of Science* (WoS), *ABI/INFORM* (ProQuest), *JSTOR*, and the *Education Resources Information Center* (ERIC). Prior systematic review studies on EE have also used various combinations of these databases (e.g., Hägg & Gabrielsson, 2019; Nabi et al., 2017; Wong & Chan, 2022), ensuring that, collectively, they provide comprehensive coverage for this review study.

As part of the first set of inclusion criteria, the search parameters were set to focus on peer-reviewed scientific journals used as a proxy for "validated knowledge" (Liñán & Fayolle, 2015) and include only English-language articles. The search was also limited to articles published from 2000 onwards due to the growing interest among scholars since then (Filser et al., 2020), resulting in 945 articles after removing 265 duplicated articles.

Screening Phase

In the next phase, the titles and abstracts of the 945 retrieved articles were screened to identify potentially relevant articles. Based on the second set of inclusion criteria, only articles included were (1) empirical in design, (2) conducted in the higher education context, and (3) aimed at fostering and/or exploring OI capability. In total, 884 articles were excluded since they were either: (1) a review, theoretical, or conceptual article; (2) conducted in secondary education or non-university EE programs; or (3) unrelated

Table 1. Final Keywords Used in the Query.

Sets	Keywords
Capability	"opportunity identification", "opportunity recognition", "opportunity detection", "opportunity perception", "opportunity seeking", "opportunity discovery", "opportunity creation", "opportunity search", "opportunity formation", "spotting opportunity", "discerning opportunity"
Goal	"improving", "developing", "fostering", "promoting", "supporting", "teaching", "enhancing", "learning", "training", "educating", "instructing", "exploring", "influencing", "impacting", "affecting"
Context	"higher education", university, college, graduate, postgraduate, undergraduate, student, youth

topics (e.g., exploring the effect of OI on individuals' entrepreneurial intention, readiness, or behavior).

Eligibility Phase

In this phase, the remaining 61 full-text articles were thoroughly read to find the most suitable and relevant. Under the third set of inclusion criteria, articles were deemed eligible to be included for content analysis: (1) they were conducted with higher education students; (2) they addressed at least one aspect of an EE program (e.g., learning objectives, factors affecting individuals' OI, learning outcomes, content, and/or pedagogical approach). The studies conducted with entrepreneurs, full-time employees, or interested academians (e.g., teachers and scientists) participating in professional development programs at universities were identified and excluded from the review during this phase. In the next step, the first and the second authors assessed the quality of the remaining 53 articles (eight qualitative, 42 quantitative, and three mixed methods) using Theelen et al.'s (2019) criteria (see Appendix A). For the quality appraisal, the remaining articles were evaluated based on various criteria and scored between 0 (i.e., no elaboration) and 3 (i.e., extensive elaboration). In total, nine articles (three qualitative and six quantitative) were excluded for further analysis after quality appraisal (with a mean score below 2), which resulted in 44 articles deemed eligible for content analysis.

Analysis Phase

The selected articles were entered into ATLAS.ti 8 for content analysis. In the first step, the researchers read each article and formulated summary phrases that captured its specific findings regarding OI capability and other relevant information answering the research questions. These summaries reflected the main findings qualitatively. For instance, a summary phrase could be "The prior knowledge of customer problems leads to identifying more opportunities and opportunities that are more innovative." Articles were also coded to extract general information such as country of study, type of study, sample size, gender, etc. Following this, a coding scheme was developed in two phases explained below.

In the first phase, the researchers developed an initial version of the coding scheme inductively, in a group discussion, using the educational dimensions of the adopted generic teaching model framework (Fayolle & Gailly, 2008). The purpose of this phase was to provide a theory-based structure to ground the categories observed. In the second phase, the coding scheme was applied to the selected articles, which resulted in refined codes and sub-codes. The first researcher applied an iterative process of testing the codes, iteratively summarizing the data, identifying new codes, connecting codes to one another, developing new themes, and applying the revised codes, until reaching a saturation point (i.e., no new codes or themes were generated). During this process, other members of the research team checked the themes and codes independently of the

lead researcher. Finally, each code was operationally defined so that any coder could identify relevant content. To establish coding reliability, the first and second authors randomly picked four articles (9%) and blind-coded them. Cohen's Kappa statistic was used to examine the inter-rater reliability, testing the coding quality. The test indicated a high agreement between reviewers' coding ($\kappa = .86$, $p < .001$), which confirmed the reliability of the final coding scheme. After finalizing the coding scheme, the lead researcher coded all identified articles to synthesize their findings.

Results

More detailed information was obtained regarding the empirical research on university students' OI capability through a review and coding of the selected articles. A complete list of the 44 included articles is provided in Table 2. Most of the reviewed articles ($n = 30$) were published from 2016 to 2022, showing an increase in attention from scholars in recent years. The distribution of journals reflects the interdisciplinary nature of the topic, including journals that primarily publish in the fields of educational research (e.g., *Innovations in Education and Teaching International* and *Studies in Higher Education*), entrepreneurship research (e.g., *Entrepreneurship Theory and Practice* and *Journal of Business Venturing*), or both (e.g., *Education and Training* and *Academy of Management Learning and Education*).

Most studies have been conducted in the USA ($n = 11$) and Europe, e.g., The Netherlands ($n = 6$), Sweden ($n = 3$), and Finland ($n = 3$). Many articles ($n = 36$) contain quantitative data analysis, while *five* articles contain an analysis of qualitative data, and *three* articles used mixed methods. The educational context of the reviewed articles varied among students in undergraduate ($n = 25$), graduate ($n = 19$), and postgraduate ($n = 4$) degree programs. 15 studies were done with business students (e.g., in management, entrepreneurship, business, and marketing programs), 17 studies recruited non-business students (e.g., engineering, social science, and environmental science programs), and seven studies were conducted with both business and non-business students.

It is important to note that RQ2, which focused on identifying how individual traits impact university students' OI capability, was addressed by synthesizing findings from studies that explored OI capability ($n = 27$). The other research questions were answered based on findings from studies aimed at fostering university students' OI capability ($n = 21$). Some of the reviewed articles had a dual focus—both exploring and fostering OI capability—and thus contributed to all research questions. Consequently, the total number of articles reviewed remains 44.

RQ1. What Learning Objectives Can Be Targeted to Foster University Students' OI Capability?

The general objective of all 21 selected articles was to improve university students' capability to identify business opportunities as one of the main attributes of a successful

Table 2. A Complete List of the Reviewed Articles.

Author(s) and year	Country of study	Type of analysis	Sample size	Gender (*N*)	Educational level	Field of Study	Type of course	Type of learning	Time of the measurement	Research focus
Arentz et al. (2013)	USA	Mixed	64	Male (40)/ Female (24)	N/A	N/A	Elective	Individual	Shortly after	Fostering OI
Baggen et al. (2015)	Netherlands	Quantitative	113	Male (36)/ Female (77)	Graduate	Non-Business	-	-	-	Exploring OI
Baggen et al. (2017)	Netherlands	Quantitative	257	Male (103)/ Female (154)	Graduate/ Undergraduate	Non-Business	-	-	-	Exploring OI
Carrier (2008)	USA	Qualitative	12	N/A	N/A	Business	Elective	Collaborative	Shortly after	Fostering OI
Cohen et al. (2020)	USA	Quantitative	149	Male (67)/ Female (82)	Undergraduate	Business	Compulsory	Individual	Shortly after	Fostering OI
Costa et al. (2016)	Netherlands	Quantitative	70	Male (21)/ Female (49)	Graduate/ Undergraduate	Non-Business	-	-	-	Exploring OI
Costa et al. (2018)	Portugal/ Germany	Quantitative	283	Male (126)/ Female (157)	All	Both	Elective	Both	Shortly after	Fostering OI

(continued)

Table 2. (continued)

Author(s) and year	Country of study	Type of analysis	Sample size	Gender (*N*)	Educational level	Field of Study	Type of course	Type of learning	Time of the measurement	Research focus
Craig and Johnson (2006)	USA	Quantitative	103	N/A	Graduate	Both	-	-	-	Exploring OI
DeTienne and Chandler (2004)	USA	Quantitative	130	Male (70)/ Female (57)	Undergraduate	Business	Compulsory	Both	Shortly after	Fostering OI
DeTienne and Chandler (2007)	USA	Quantitative	95	Male (53)/ Female (42)	Undergraduate	Business	-	-	-	Exploring OI
Eller et al. (2020)	Germany	Quantitative	107	Male (30)/ Female (77)	All	Both	-	-	-	Exploring OI
Fiet and Patel (2008)	USA	Quantitative	31	Male (21)/ Female (10)	Graduate	Business	Elective	Individual	Shortly after	Fostering OI
González and Husted (2011)	Mexico	Quantitative	168	Male (106)/ Female (62)	Graduate	Business	-	-	-	Exploring OI
Heinonen et al. (2011)	Finland	Quantitative	117	Male (62)/ Female (55)	Undergraduate	Business	-	-	-	Exploring OI

(continued)

Table 2. (continued)

Author(s) and year	Country of study	Type of analysis	Sample size	Gender (*N*)	Educational level	Field of Study	Type of course	Type of learning	Time of the measurement	Research focus
Hytti et al. (2010)	Finland	Quantitative	117	Male (62)/ Female (55)	Undergraduate	Business	Compulsory	Collaborative	Shortly after	Both
Karimi, Biemans, Lans, Aazami (2016)	Iran	Quantitative	68	Male (19)/ Female (49)	Undergraduate	Non-Business	Elective	Collaborative	Shortly after	Fostering OI
Karimi, Biemans, Lans, Chizari (2016)	Iran	Quantitative	205	Male (86)/ Female (119)	Undergraduate	Non-Business	Both	Collaborative	Shortly after	Both
Khalid and Sekiguchi (2018)	Japan/Pakistan	Quantitative	251	Male (187)/ Female (64)	Undergraduate	Business	Elective	Individual	Shortly after	Fostering OI
Kickul et al. (2010)	USA	Quantitative	138	Male (73)/ Female (65)	Graduate	Business	-	-	-	Exploring OI
Kim et al. (2018)	Korea	Quantitative	203	Male (148)/ Female (55)	Undergraduate	Both	-	-	-	Exploring OI

(continued)

Table 2. (continued)

Author(s) and year	Country of study	Type of analysis	Sample size	Gender (*N*)	Educational level	Field of Study	Type of course	Type of learning	Time of the measurement	Research focus
Kubberød and Pettersen (2018)	Norway	Qualitative	8	Male (7)/ Female (1)	Graduate	Non-Business	N/A	Individual	0–5 years after	Both
Li et al. (2015)	China	Quantitative	208	Male (129)/ Female (79)	Graduate/ Undergraduate	Both	-	-	-	Exploring OI
Lim et al. (2021)	Malaysia	Quantitative	247	Male (91)/ Female (156)	Undergraduate	Business	-	-	-	Exploring OI
Lindberg, Bohman, and Hultén (2017)	Sweden	Quantitative	73	Male (41)/ Female (32)	Undergraduate	Business	Compulsory	Collaborative	Shortly after	Fostering OI
Lindberg, Bohman, and Hultén (2017)	Sweden	Quantitative	100	Male (41)/ Female (59)	N/A	Business	Compulsory	N/A	Shortly after	Fostering OI
Mehdizadeh et al. (2021)	Iran	Quantitative	127	Male (65)/ Female (62)	Undergraduate	Non-Business	-	-	-	Exploring OI
Muñoz et al. (2011)	UK	Mixed	15	Male (5)/ Female (10)	Undergraduate	Business	Elective	Collaborative	Shortly after	Fostering OI

(continued)

Table 2. (continued)

Author(s) and year	Country of study	Type of analysis	Sample size	Gender (*N*)	Educational level	Field of Study	Type of course	Type of learning	Time of the measurement	Research focus
Muñoz et al. (2020)	Chile	Qualitative	13	Male (8)/ Female (5)	Postgraduate	Non-Business	Elective	Collaborative	Shortly after[a]	Fostering OI
Musteen et al. (2018)	USA/UK/ Spain	Qualitative	86	N/A	Undergraduate	N/A	N/A	Collaborative	Shortly after	Fostering OI
Nab et al. (2013)	Netherlands	Mixed	23	Male (13)/ Female (10)	Graduate	Non-Business	Compulsory	Both	Shortly after	Fostering OI
Nam and Xiong (2021)	Korea	Quantitative	508	Male (200)/ Female (308)	Graduate/ Undergraduate	Non-Business	-	-	-	Exploring OI
Ngah et al. (2020)	Malaysia	Quantitative	225	Male (90)/ Female (135)	Undergraduate	Non-Business	-	-	-	Exploring OI
Oftedal et al. (2018)	Norway/ Sweden/ Finland/ UK/USA	Quantitative	196	Male (69)/ Female (127)	Graduate/ Undergraduate	Business	-	-	-	Exploring OI
Othman and Othman (2020)	Malaysia	Quantitative	152	Male (37)/ Female (115)	Graduate	Non-Business	-	-	-	Exploring OI

(continued)

Table 2. (continued)

Author(s) and year	Country of study	Type of analysis	Sample size	Gender (*N*)	Educational level	Field of Study	Type of course	Type of learning	Time of the measurement	Research focus
Ploum et al. (2018)	Netherlands	Quantitative	96	Male (45)/ Female (51)	Undergraduate	Non-Business	-	-	-	Exploring OI
Ploum et al. (2019)	Netherlands	Quantitative	398	Male (189)/ Female (209)	Undergraduate	Non-Business	-	-	-	Exploring OI
Prandelli et al. (2016)	Italy	Quantitative	137	Male (n/a)/ Female (n/a)	Graduate	N/A	N/A	Individual	N/A	Both
Promsiri et al. (2018)	Thailand	Quantitative	120	N/A	Undergraduate	N/A	N/A	Individual	Shortly after	Fostering OI
Ramsgaard and Østergaard (2018)	Denmark	Qualitative	33	N/A	Graduate	Non-Business	Elective	Individual	Shortly after	Fostering OI
Sahai and Frese (2019)	Singapore	Quantitative	73	Male (36)/ Female (37)	Undergraduate	Business	-	-	-	Exploring OI
Shepherd and DeTienne (2005)	USA	Quantitative	78	N/A	Graduate	Business	N/A	Individual	Shortly after	Fostering OI
St-Jean et al. (2017)	Canada/ Belgium/ France/ Algerian	Quantitative	1540	Male (36)/ Female (37)	All	Both	-	-	-	Exploring OI

(continued)

Table 2. (continued)

Author(s) and year	Country of study	Type of analysis	Sample size	Gender (*N*)	Educational level	Field of Study	Type of course	Type of learning	Time of the measurement	Research focus
Vandor and Franke (2016)	Austria	Quantitative	46	Male (22)/ Female (24)	Graduate	N/A	-	-	-	Exploring OI
Wang et al. (2019)	China	Quantitative	466	Male (102)/ Female (364)	Graduate/ Undergraduate	Both	-	-	-	Exploring OI

Note. N = Number of students; N/A = Not Available.
[a]In this study, students' OI competence was also measured 0–5 years after the study.

entrepreneur. To achieve this objective, the content analysis of selected articles revealed that scholars targeted different specific objectives based on *cognitive*, *affective*, and *social* factors that play a role in identifying opportunities (see Table 3).

Cognitive Objectives. The most targeted cognitive objective for improving students' capability to identify opportunities was creative thinking skills (42.9%). Scholars reported that developing students' creativity skills could improve their OI (Lindberg, Bohman, & Hultén, 2017; Lindberg, Bohman, Hulten, et al., 2017) or, more specifically, their ability to discover a greater number of ideas (DeTienne & Chandler, 2004; Karimi, Biemans, Lans, Aazami, & Mulder, 2016; Promsiri et al., 2018) that are more innovative (DeTienne & Chandler, 2004; Karimi, Biemans, Lans, Aazami, & Mulder, 2016). Moreover, Lindberg, Bohman, and Hultén (2017) reported that creativity exercises and activities could help students develop specific mental frameworks that contribute to students' OI capability by increasing their alertness to new opportunities. Empirical findings indicated that applying convergent and divergent thinking styles, representing the dual aspects of creative thinking, can help students develop a richer OI mental frame (Muñoz et al., 2011) which enables them to identify more innovative opportunities (Muñoz et al., 2011, 2020; Promsiri et al., 2018).

Another cognitive objective frequently targeted (28.6%) is market knowledge. Arentz et al. (2013) showed that enriching students' knowledge of ways to serve markets and customer problems, as different kinds of specific human capital, could

Table 3. Learning Objectives Targeted by EE Programs Aimed to Foster OI Capability.

Domain	Learning objective	Percentage (%)	Citation
Cognitive	Creative thinking skills	42.9	Carrier (2008); DeTienne and Chandler (2004); Karimi, Biemans, Lans, Aazami, and Mulder (2016); Lindberg, Bohman, Hultén et al. (2017); Lindberg, Bohman, and Hultén (2017); Muñoz et al. (2011); Muñoz et al. (2020); Nab et al. (2013); Promsiri et al. (2018)
	Market knowledge	28.6	Arentz et al. (2013); Cohen et al. (2020); Costa et al. (2018); Fiet and Patel (2008); Shepherd and DeTienne (2005); Promsiri et al. (2018)
	Perspective-taking	9.5	Prandelli et al. (2016); Khalid and Sekiguchi (2018)
Social	Networking/ Collaboration	19.0	Hytti et al. (2010); Kubberød and Pettersen (2018); Musteen et al. (2018); Ramsgaard and Østergaard (2018)
Affective	Empathic concern	4.8	Khalid and Sekiguchi (2018)
	Motivation	4.8	Shepherd and DeTienne (2005)

heighten their alertness, increasing their ability to discover more business ideas. Similarly, improving students' specific human capital has been shown to lead to the identification of more opportunities (Shepherd & DeTienne, 2005), which were also more innovative (Cohen et al., 2020; Shepherd & DeTienne, 2005). Costa et al. (2018) reported that asking students to explore their knowledge about the technological, social, political, and economic changes in their surroundings could help them later identify a more viable business opportunity in a presented scenario compared to a control group.

Some studies highlighted the importance of students' perspective-taking for identifying potential business opportunities (9.5%). According to Prandelli et al. (2016), asking students to take a person's perspective in a scenario-based study helped develop their cognitive understanding of the person's needs, wants, and preferences, and increased their intrinsic motivation to find an appropriate solution. Similarly, Khalid and Sekiguchi (2018) reported that students who took a user perspective could discover higher-quality ideas than students who did not.

Social Objectives. Scholars reported the positive effect of networking, in the form of establishing a community of practice consisting of students (Musteen et al., 2018) or students and experts (Kubberød & Pettersen, 2018; Ramsgaard & Østergaard, 2018), on students' (self-perceived) capability to identify business opportunities. Musteen et al. (2018), for example, reported that forming teams consisting of students from different countries working on the same entrepreneurial project could help develop cross-cultural competencies and knowledge, further improving students' perception of internationally viable opportunities. Hytti et al. (2010) showed that students' collaboration with their peers can enhance the effect of intrinsic motivation on students' perceived OI capability. Scholars also reported that using internships to establish a community of practice between students and experts could play a role in bridging the theory-practice gap, developing students' professional identity, and improving their ability to identify potential opportunities (Kubberød & Pettersen, 2018; Ramsgaard & Østergaard, 2018).

Affective Objectives. Khalid and Sekiguchi (2018) asserted that empathic concern, or the affective (i.e., feeling-related and emotional) component of empathy, can enhance the effect of perspective-taking on opportunity discovery. They argued that empathic concern leads to feelings of compassion, defined as the motivation or desire to help others, which further increases the likelihood of discovering opportunities that favor other people's needs and problems. Their findings supported the idea, demonstrating that using both perspective-taking and empathic concern, improves the feasibility, desirability, and market alignment of discovered ideas when compared to perspective-taking only. Shepherd and DeTienne (2005) reported that strengthening students' motivation by promising financial rewards helped with the discovery of more business opportunities. They also showed that students with a high level of market knowledge would be more intrinsically motivated to discover opportunities, meaning that their motivation is not solely driven by financial reward.

RQ2. What Individual Characteristics and Environmental Factors Affect University Students' OI Capability?

Table 4 shows individual characteristics and environmental factors that impact students' capability to identify entrepreneurial ideas.

Individual Characteristics. Students' prior knowledge (18.5%) and entrepreneurial alertness (14.8%) were the most reported cognitive characteristics that played a role in the OI process. Scholars showed that different types of prior knowledge have different roles in students' OI capability. For instance, González and Husted (2011) reported that students with higher general human capital (i.e., knowledge acquired through formal education and/or work experience applicable to more than one job or firm) could identify more opportunities. Their findings indicated that students who possessed both higher levels of specific (e.g., knowledge of customer needs) and general human capital could identify more opportunities that were also more innovative. According to Prandelli et al. (2016), however, students' knowledge of markets, as a specific human capital, negatively correlated with their OI capability, it could positively moderate the relationship between user perspective-taking and students' OI. Li et al. (2015) showed that students' specific human capital in terms of knowledge of markets and means to serve could indirectly affect their OI through its influence on alertness. Similarly, Mehdizadeh et al. (2021) reported that in addition to its strong positive direct effect, students' specific human capital could indirectly improve their perceived OI by affecting their entrepreneurial alertness.

Students' attitudes toward entrepreneurship (11.1%) and moral antecedents (11.1%) were the most frequently reported psychological factors playing a role in identifying entrepreneurial opportunities. Eller et al. (2020) showed that students' entrepreneurial attitude positively moderates the relationship between solution identification and sustainable opportunity identification. They asserted that higher entrepreneurial attitudes enable students to identify particular features of solutions that can be developed into potential businesses. Also, concerning sustainable OI, scholars reported that students' moral antecedents, such as their moral competencies (Ploum et al., 2018, 2019), pro-environmental behavior values (Ploum et al., 2018), and awareness of adverse consequences of existing environmental conditions (Eller et al., 2020), have a positive effect on the number of ideas identified for sustainable development.

The findings also indicated the significant role of students' socio-demographic characteristics in OI. Baggen, Kampen et al. (2017) reported that master's students scored significantly higher than bachelor's students in all aspects of the OI competence assessment test. In the same vein, Oftedal et al.'s (2018) findings also indicated that master's students had a higher ability to see opportunities than bachelor's students. They related this result to master students' higher entrepreneurial knowledge acquired through EE programs. The findings also highlighted the differences between business, engineering, and social sciences students concerning OI capability. Craig and Johnson (2006) showed that engineering students perceive less proficiency in identifying

Table 4. Individual Characteristics and Environmental Factors That Affect OI Capability.

Domain		Characteristic/Factor	Percentage (%)	Citations
Individual characteristics	Cognitive	Prior knowledge	18.5	González and Husted (2011); Li et al. (2015); Lim et al. (2021); Mehdizadeh et al. (2021); Prandelli et al. (2016)
		Entrepreneurial alertness	14.8	Li et al. (2015); Lim et al. (2021); Mehdizadeh et al. (2021); Nam and Xiong (2021)
		Innovative behavior and creativity	11.1	Heinonen et al. (2011); Kim et al. (2018); Ngah et al. (2020)
		Problem-solving skills	7.4	Baggen et al. (2015); Kim et al. (2018)
		Cognitive style	7.4	Kickul et al. (2010); Nab et al. (2013)
		Tendency toward automaticity	3.7	Sahai and Frese (2019)
	Psychological	Attitude toward entrepreneurship	11.1	Costa et al. (2018); Eller et al. (2020); Karimi, Biemans, Lans, Chizari, and Mulder (2016)
		Moral antecedents	11.1	Eller et al. (2020); Ploum et al. (2018, 2019)
		Entrepreneurial emotion	3.7	Othman and Othman (2020)
		Motivation	3.7	Hytti et al. (2010)
	Socio-demographic	Educational level	7.4	Baggen et al. (2017); Oftedal et al. (2018)
		Field of study	7.4	Craig and Johnson (2006); Kubberød and Pettersen (2018)
		Gender	7.4	DeTienne and Chandler (2007); Oftedal et al. (2018)
Environmental factors	-	Social networks	14.8	Mehdizadeh et al. (2021); Nam and Xiong (2021); St-Jean et al.(2017); Wang et al. (2019)
		University supports	11.1	Mehdizadeh et al. (2021); Oftedal et al. (2018); Vandor and Franke (2016)

business opportunities than their business-trained counterparts due to their lower entrepreneurial alertness. Finally, gender was found to affect students' perceived OI capability (Oftedal et al., 2018) and the types of general and specific human capital they utilized when identifying opportunities (DeTienne & Chandler, 2007).

Environmental Factors. Several scholars reported the effect of university students' membership in social networks (Mehdizadeh et al., 2021; Nam & Xiong, 2021), network embeddedness (Wang et al., 2019), and contact with business mentors (St-Jean et al., 2017) on their perceived OI capability. Their findings indicated that social networks could directly affect students' OI capability as it enables them to acquire more entrepreneurship information, improving their human capital (Mehdizadeh et al., 2021; Nam & Xiong, 2021). Mehdizadeh et al. (2021) showed that having social networks could also indirectly affect students' ability to identify opportunities by improving their entrepreneurial alertness. University students' network scale (i.e., the number of members in their social networks) (Nam & Xiong, 2021; Wang et al., 2019) and network intensity (i.e., the closeness of their relationships) (Wang et al., 2019) have been found to positively affect their perceived ability to identify entrepreneurial opportunities. St-Jean et al.'s (2017) findings, however, specified that networking by itself does not necessarily impact university students' OI, and it is essential to be in touch with persons who are more knowledgeable in the field, via business mentoring. Scholars also reported that university support, such as providing students with entrepreneurship courses and initiatives (Mehdizadeh et al., 2021; Oftedal et al., 2018) and allowing them to have cross-cultural experiences (Vandor & Franke, 2016), can positively affect their ability to identify entrepreneurial opportunities.

RQ3. What Measurement Approaches Should Be Used to Assess University Students' OI Capability Development?

The findings indicated that scholars employed several *objective* and/or *subjective* measurement approaches for assessing students' OI capability development. Moreover, two themes emerged when analyzing the objective measurement approaches: (1) measuring the *quantity* of ideas and (2) evaluating the *quality* of ideas (see Table 5). The descriptive analysis revealed that in most of the studies reviewed (19 out of 21), measurements of the outcomes were conducted shortly after the intervention was completed.

Objective Measurement Approaches. Several scholars measured the students' OI capability by assessing the quality and/or quantity of the generated ideas, respectively, by counting the total number of generated ideas (i.e., also known as fluency) and calculating their *average* quality based on specific criteria. The content analysis of selected articles showed that scholars employed two different criteria set for evaluating ideas' quality: *general creativity criteria,* such as innovativeness and novelty, and/or more *business-related criteria,* such as alignment with market needs, feasibility, cash flow,

and manageable risk. Despite the favorability of these objective measurement approaches in the reviewed articles, Muñoz et al. (2011) argued that these approaches should be augmented or replaced by more innovative methods utilizing visual representations, which are useful in unveiling the tacit aspects of OI capability. They used a visualization technique called mind mapping to illustrate the changes in students' OI mental frames from the beginning to the end of their study.

Subjective Measurement Approaches. The review's analysis showed that many scholars adopted different subjective measurement approaches, such as OI capability questionnaires (e.g., Karimi, Biemans, Lans, Aazami, & Mulder, 2016; Muñoz et al., 2020), self-reported data in interviews (Musteen et al., 2018; Ramsgaard & Østergaard, 2018), and students' entrepreneurial OI self-efficacy (e.g., Lindberg, Bohman, & Hultén, 2017).

RQ4. What Content Should Be Included in Programs that Aim to Foster University Students' OI Capability?

The findings indicated that scholars were not transparent about their EE programs' content. In most reviewed articles, the curricula content was only generally described in terms of course names and topics in different sessions. Despite this shortcoming, an in-depth review of some articles revealed that scholars included different kinds of content with *professional*, *spiritual*, and *theoretical* dimensions in their EE program to facilitate students' OI capability development (see Table 6).

Professional Content. The professional content of EE programs relates specifically to practical knowledge (i.e., *know-how*) and a lesser extent, to theoretical knowledge (i.e., *know-what*) crucial for initiating an entrepreneurial activity. The most included content in the reviewed EE programs (57.1%) belongs to practical knowledge that scholars used in the form of action-oriented exercises to help students learn how to generate ideas (e.g., DeTienne & Chandler, 2004; Nab et al., 2013), write a business plan (e.g., Lindberg, Bohman, Hulten, et al., 2017; Musteen et al., 2018), develop business opportunity prototypes and criteria (Costa et al., 2018; Nab et al., 2013), improve the quality of opportunities (e.g., Cohen et al., 2020), and work efficiently as a team to identify creative ideas (Lindberg, Bohman, Hulten, et al., 2017). A few scholars in the reviewed articles (9.5%) also included know-what knowledge in their EE programs to help university students respond better to a given entrepreneurial situation, such as informing them about what makes ideas valuable (e.g., Cohen et al., 2020) and what they need to consider as a source of change to develop opportunities (e.g., Promsiri et al., 2018).

Theoretical Content. The content analysis of articles showed that theoretical knowledge was the second most common content (28.6%) included in the EE programs in the forms of improving students' knowledge of basic theories "about" entrepreneurship

Table 5. The Measurement Approaches Used to Assess OI Capability.

Measurement type	Focus	Percentage (%)	Citation
Objective	Quantity of business ideas		
	Number of ideas	42.9	Arentz et al. (2013); DeTienne and Chandler (2004); Fiet and Patel (2008); Karimi, Biemans, Lans, Aazami, and Mulder (2016); Muñoz et al. (2011, 2020); Promsiri et al. (2018); Sahai and Frese (2019); Shepherd and DeTienne (2005)
	Quality of business ideas		
	Innovativeness	38.1	Cohen et al. (2020); DeTienne and Chandler (2004); Karimi, Biemans, Lans, Aazami, and Mulder (2016); Muñoz et al. (2011); Nab et al. (2013); Sahai and Frese (2019); Promsiri et al. (2018); Shepherd and DeTienne (2005)
	Alignment with market needs	19.0	Costa et al. (2018); Khalid and Sekiguchi (2018); Nab et al. (2013); Prandelli et al. (2016)
	Feasibility	14.3	Khalid and Sekiguchi (2018); Nab et al. (2013); Prandelli et al. (2016)
	Desirability	9.5	Khalid and Sekiguchi (2018); Prandelli et al. (2016)
	Wealth generating potential	9.5	Costa et al. (2018); Fiet and Patel (2008)
	Manageable risk	4.8	Costa et al. (2018)
	Novelty	4.8	Promsiri et al. (2018)
	OI mental frames	4.8	Muñoz et al. (2011)
Subjective	Self-perceived OI capability	52.4	Carrier (2008); Costa et al. (2016); Hytti et al. (2010); Karimi, Biemans, Lans, Chizari, and Mulder (2016); Kubberød and Pettersen (2018); Lindberg, Bohman, and Hultén (2017); Lindberg, Bohman, and Hultén (2017); Muñoz et al. (2020); Musteen et al. (2018); Nab et al. (2013); Ramsgaard and Østergaard (2018)

(Lindberg, Bohman, Hulten, et al., 2017) and central theories and research related to creativity and OI (e.g., Muñoz et al., 2020; Nab et al., 2013).

Spiritual Content. The spiritual content in EE programs aims to help individuals understand *why* they should pursue entrepreneurship and *when* the right time is to act

based on their knowledge and resources. This involves enabling individuals to position themselves within the entrepreneurial landscape by identifying situations that align with their profile and recognizing the moments when it is both possible and desirable to engage in entrepreneurial activities (Fayolle & Gailly, 2008). Such spiritual content has been incorporated in some of the reviewed articles by inviting entrepreneurs as guest speakers to influence their students' entrepreneurial attitudes and intentions (Karimi, Biemans, Lans, Chizari, & Mulder, 2016) and asking external entrepreneurs to give students feedback to help them establish the best time to develop their projects further (Lindberg, Bohman, & Hultén, 2017).

RQ5. How Should Education Be Conducted in Programs that Aim to Foster University Students' OI Capability?

The content analysis of the studies revealed that scholars employed several *teaching methods* and *learning activities* to improve students' capability to identify opportunities (see Table 7).

Teaching Methods. The most used teaching method in the reviewed articles was teaching "*for*" entrepreneurship, which mainly focused on providing students with practical skills (e.g., teamwork, problem identification, idea generation, and idea evaluation) and knowledge (e.g., specific human capital) required to identify entrepreneurial opportunities. Scholars offered workshops that provided exercises such as the "Marshmallow Challenge" to help students practice teamwork (Lindberg, Bohman,

Table 6. The Content of EE Programs Aimed to Foster OI Capability.

Dimension	Type of content	Percentage (%)	Citation
Professional	Know-how	57.1	Carrier (2008); Costa et al. (2018); Cohen et al. (2020); DeTienne and Chandler (2004); Karimi, Biemans, Lans, Aazami, and Mulder (2016); Karimi, Biemans, Lans, Chizari, and Mulder (2016); Lindberg, Bohman, Hultén et al. (2017); Lindberg, Bohman, and Hultén (2017); Muñoz et al. (2011, 2020); Musteen et al. (2018); Nab et al. (2013)
	Know-what	9.5	Cohen et al. (2020); Promsiri et al. (2018)
Theoretical	-	28.6	Karimi, Biemans, Lans, Aazami, and Mulder (2016); Lindberg, Bohman, and Hultén (2017); Lindberg, Bohman, and Hultén (2017); Muñoz et al. (2011. 2020); Nab et al. (2013)
Spiritual	Know-why	4.8	Karimi, Biemans, Lans, Chizari, and Mulder (2016)
	Know-when	4.8	Lindberg, Bohman, and Hultén (2017)

Table 7. The Pedagogical Approach of EE Programs Aimed to Foster OI Capability.

Category		Sub-category	Percentage (%)	Citation
Teaching approaches	Teaching for	Workshops	52.4	Carrier (2008); Cohen et al. (2020); Costa et al. (2018); DeTienne and Chandler (2004); Karimi, Biemans, Lans, Aazami, and Mulder (2016); Lindberg, Bohman, Hultén et al. (2017); Lindberg, Bohman, and Hultén (2017); Muñoz et al. (2011, 2020); Nab et al. (2013); Promsiri et al. (2018)
		Role-playing	33.3	Arentz et al. (2013); Cohen et al. (2020); Costa et al. (2018); Karimi, Biemans, Lans, Chizari, and Mulder (2016); Khalid and Sekiguchi (2018); Prandelli et al. (2016); Shepherd and DeTienne (2005)
		Team working	9.5	Hytti et al. (2010); Musteen et al. (2018)
	Teaching about	Lecturing	38.1	Karimi, Biemans, Lans, Aazami, and Mulder (2016); Karimi, Biemans, Lans, Chizari, and Mulder (2016); Lindberg, Bohman, Hultén et al. (2017); Lindberg, Bohman, and Hultén (2017); Muñoz et al. (2011, 2020); Nab et al. (2013); Ramsgaard and Østergaard (2018)
		Writing business plan	23.8	Karimi, Biemans, Lans, Aazami, and Mulder (2016); Karimi, Biemans, Lans, Chizari, and Mulder (2016); Lindberg, Bohman, Hultén et al. (2017); Lindberg, Bohman, and Hultén (2017); Musteen et al. (2018); Nab et al. (2013)
		Guest speaker	14.3	Karimi, Biemans, Lans, Chizari, and Mulder (2016); Nab et al. (2013); Costa et al. (2018)
	Teaching through	Mentoring	23.8	Hytti et al. (2010); Muñoz et al. (2011, 2020); Lindberg, Bohman, Hultén et al. (2017); Lindberg, Bohman, and Hultén (2017)
		Internships	9.5	Kubberød and Pettersen (2018); Ramsgaard and Østergaard (2018)

(continued)

Table 7. (continued)

Category		Sub-category	Percentage (%)	Citation
Learning activities	-	Self-reflection	38.1	Costa et al. (2018); Heinonen et al. (2011); Lindberg, Bohman, Hultén et al. (2017); Lindberg, Bohman, and Hultén (2017); Muñoz et al. (2011, 2020); Nab et al. (2013); Ramsgaard and Østergaard (2018)
		Peer-evaluation	23.8	Cohen et al. (2020); Costa et al. (2018); DeTienne and Chandler (2004); Musteen et al. (2018); Nab et al. (2013)
		Securing ideas	19	DeTienne and Chandler (2004); Fiet and Patel (2008); Karimi, Biemans, Lans, Aazami, and Mulder (2016); Promsiri et al. (2018)
		Elevator pitch	19	Cohen et al. (2020); DeTienne and Chandler (2004); Karimi, Biemans, Lans, Aazami, and Mulder (2016); Muñoz et al. (2011)

Hulten, et al., 2017) and "the 5Ws plus H" and the "Bugs Report" to improve their problem identification skills (Karimi, Biemans, Lans, Aazami, & Mulder, 2016). Regarding the latter, some offered a workshop to help students find problems by reading newspapers and searching on the internet (Lindberg, Bohman, Hulten, et al., 2017) or discussing the characteristics of so-called "migraine headache" problems in contrast with problems addressing a matter of inconvenience or a "nice-to-have" item (Cohen et al., 2020). Many scholars offered several creativity workshops to develop students' idea-generation skills using hands-on exercises such as brainstorming (DeTienne & Chandler, 2004; Lindberg, Bohman, & Hultén, 2017), brainwriting (DeTienne & Chandler, 2004), *nominal group technique* and mind mapping (Carrier, 2008), creative problem-solving (Muñoz et al., 2011, 2020), SCAMPER and slice and dice techniques (Nab et al., 2013). Promsiri et al. (2018) also asked the students to follow a design process wherein they could practice creativity and critical thinking to create viable ideas. Some offered other workshops to students that included learning experiences through which they could develop mental prototypes that were essential for evaluating a business idea's viability (Costa et al., 2018) and selecting quality ideas (Cohen et al., 2020; Nab et al., 2013).

Role-playing based on an entrepreneurial scenario and teamwork were other kinds of teaching "for" approaches used. Role-playing was primarily used to improve student's specific human capital (Arentz et al., 2013; Shepherd & DeTienne, 2005), facilitate user perspective-taking (Khalid & Sekiguchi, 2018; Prandelli et al., 2016), or increase students' awareness of the importance of OI in the entrepreneurship process (Cohen et al., 2020; Costa et al., 2018). According to Costa et al. (2016), the nature of business opportunities discussed in the scenarios determines the specific features of opportunities that are important for individuals. Based on their findings, students focused more on the elements related to customer needs and satisfaction in the scenarios that discussed an opportunity to create a new venture. In contrast, in the scenarios about business reformulation opportunities, the risk element was more important to students.

The second common teaching method used concerned educating students "*about*" theoretical aspects of entrepreneurship. Lecturing was the most common teaching "about" method used to transfer basic theories to students about how to prepare a business model (e.g., Karimi, Biemans, Lans, Chizari, & Mulder, 2016), central theories and research related to creativity and OI (e.g., Muñoz et al., 2020; Nab et al., 2013), and idea evaluation rubrics (e.g., Costa et al., 2018). A non-traditional lecture format was also utilized in some reviewed studies to teach students about entrepreneurship theories by encouraging them to engage in problem-solving dialogues that clarified the differences between existing entrepreneurship theories through pair-wise discussions (Lindberg, Bohman, & Hultén, 2017; Lindberg, Bohman, Hulten, et al., 2017).

Developing a business plan for presenting identified opportunities to external experts (Lindberg, Bohman, Hulten, et al., 2017) and participating in business plan competitions (e.g., Nab et al., 2013) were frequently used teaching methods for helping students learn about the key steps to identify, describe, and analyze a

business opportunity. Lindberg, Bohman, and Hultén (2017), however, believed that "formal" elements of business plans could impede the participants' creative thinking, promoting idea convergence rather than thinking outside the box. They proposed using non-formal business plans instead of formal ones to support the OI process. Carrier (2008) contended that despite the benefits of developing business plans, this initiative is generally used too early in the teaching process, while students still have vague or poorly defined ideas. Carrier suggested exercises for clarifying students' initial business ideas in an exploration phase before preparing a business plan.

Allowing students to carry out projects in which they deal with real business people and have real-life entrepreneurial experiences, also known as teaching "*through*" entrepreneurship, was another teaching method used in the reviewed articles. Some invited experienced entrepreneurs (Lindberg, Bohman, & Hultén, 2017) or business advisors (Hytti et al., 2010) to their courses as mentors to give feedback on the students' business ideas from a practical perspective (Lindberg, Bohman, & Hultén, 2017; Muñoz et al., 2011), supported them in developing a product prototype (Lindberg, Bohman, Hulten, et al., 2017), helped them to acquire skills such as problem-solving (Muñoz et al., 2011). In some studies, students engaged in a real entrepreneurial process in the organization hosting their internships (e.g., Kubberød & Pettersen, 2018).

Learning Activities. Many scholars referred to students' self-reflection as an essential element of EE programs that foster entrepreneurial OI, such as developing a professional identity (Ramsgaard & Østergaard, 2018). This identity contributes to students' ability to identify valuable opportunities for the organization hosting the internship. Nab et al. (2013) proposed that students need to conceptualize their OI experiences and use self-reflection to build their own criteria to identify potential opportunities better. Costa et al. (2018) highlighted the importance of students' abstract conceptualization and reflective observation while engaging in real-life experiments to develop their "entrepreneurial creativity". They proposed that students' self-efficacy increases in EE programs that include self-reflection.

Peer evaluation was another common learning activity used in the reviewed articles, mostly in the idea evaluation phase (e.g., Costa et al., 2018; Nab et al., 2013). According to Costa et al. (2018), through peer evaluation, students would re-create entrepreneurs' mental frameworks and develop their cognitive abilities to assess the quality of ideas. DeTienne and Chandler (2004) posited that activities such as keeping a written opportunity log might significantly enhance students' ability to secure ideas. They argued that learning activities such as the elevator pitch, wherein students should present their ideas to their peers for feedback, allow students to experience "low-cost failure," which ultimately contributes to their learning and provides a basis for creativity.

Discussion and Implications for Practice

This review used Fayolle and Gailly's (2008) generic teaching model framework to synthesize the OI research from the past two decades. The synthesis of findings suggests that an effective learning environment for fostering OI capability should be organized around three distinct but non-exclusive stages: *triggering*, *idea generation*, and *idea evaluation* (see Figure 2). Each stage should be supported by specific teaching and learning activities primarily driven by the targeted (specific) learning objectives, influenced by various individual characteristics and environmental factors, and nourished by relevant course content.

Next, each stage is explained in more detail, providing insights into how the results of the current review study in relation to the different dimensions can be integrated and used to design constructively-aligned EE programs that foster the development of students' OI capability.

Triggering Stage

The role of triggers of idea generation has spurred attention from creativity scholars (Reiter-Palmon & Murugavel, 2018) and some entrepreneurship researchers (e.g., Baron, 2006). This is likely because any creative activity requires an initial spark or catalyst that not only inspires novel thinking but also sets the stage for the subsequent idea generation process. The triggering stage involves external stimuli or internal motivations that prompt individuals to explore opportunities, while the idea generation stage is the deliberate process of developing concrete ideas in response to these triggers (Vogel, 2017). Based on this review's findings, three distinct strategies have been identified to trigger business idea generation among students, leading to the more focused phase of generating and refining these ideas.

The *first* strategy involves enriching students' knowledge about existing needs and problems in a market, i.e., their specific human capital. This strategy aligns well with the Kirznerian perspective on business opportunities, which posits that opportunity discovery merely requires differential access to existing information (Kirzner, 1983). Based on this perspective, those with a rich knowledge of markets are more interested in identifying business opportunities (Arentz et al., 2013) and are able to generate more business ideas (Canavati et al., 2021) by better connecting the dots (Baron, 2006) and drawing meaningful parallels between problems in the market and the capabilities and resources available to address these problems (Grégoire et al., 2010).

The *second* triggering strategy is to enhance students' knowledge of technological changes and provide them with exercises to explore changes occurring due to these new technologies. This strategy aligns with a Schumpeterian perspective (Bulut et al., 2013; Vogel, 2017), suggesting that innovation stems from new knowledge outside the market (Buenstorf, 2007). As changes in technology, political forces, regulation, macro-economic factors, and social trends occur they trigger new ideas in the form of "external enablers" (Davidsson et al., 2020). In this view, therefore, the entrepreneurial

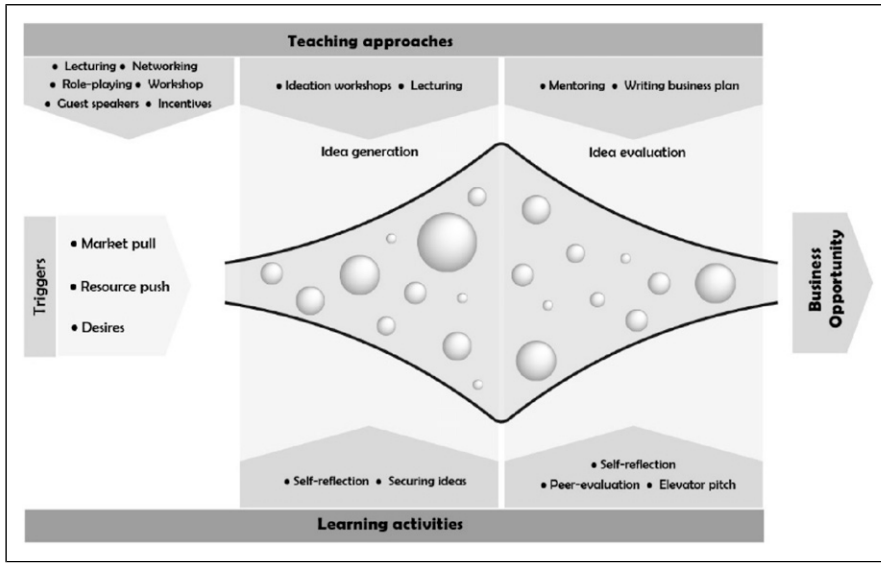

Figure 2. The essential stages an EE program should facilitate to effectively foster OI capability.

process does not begin with pre-existing goals; instead, the focus is on what individuals can control and apply (i.e., the resources or means at their disposal) to produce positive or negative (and thus uncertain) outcomes (Ryman & Roach, 2022).

The *third* triggering strategy was stimulating students' "desire" to start their own businesses. According to Vogel (2017), entrepreneurial activity can be initiated if the individual views entrepreneurship as desirable. The desire to act entrepreneurially can result from individuals' intrinsic (e.g., enjoyment, entrepreneurial passion, and the desire for autonomy) and/or extrinsic motivations (e.g., monetary payoff and recognition) (Antonioli et al., 2016; Degeorge & Fayolle, 2011). In the same vein, the current study's findings indicated that increasing students' intrinsic motivation through stimulating their empathy and inviting guest speakers to give inspirational talks in their classes and extrinsic motivation by providing students with financial rewards can affect a desire to act entrepreneurially and increase engagement with OI.

Idea Generation Stage

The idea generation stage was a distinct part of programs to foster university students' OI capability. Creativity scholars believe idea generation requires retrieving and combining various aspects of existing knowledge into new ideas using divergent thinking skills (Puccio et al., 2020). Although having rich knowledge of the context is essential for triggering idea generation, the ability to think divergently is crucial. Similarly, entrepreneurship scholars acknowledged the importance of creative thinking

skills and thinking outside the box in generating business ideas and identifying opportunities (e.g., Ardichvili et al., 2003; Carrier, 2008; Gielnik et al., 2012). Scholars, therefore, suggest facilitating idea-generation sessions by providing individuals with methods that stimulate creativity and promote idea-generation (Ritter & Mostert, 2018). Similarly, scholars in the reviewed articles strived to develop students' creative thinking skills at this stage to enhance their idea-generation outcomes and enable them to generate as many ideas as possible. Various teaching approaches were employed, ranging from lectures on central theories of OI (such as effectuation, causation, and bricolage; see Fisher, 2012) and research related to creativity, to hands-on workshops aimed at enhancing students' creative thinking skills and/or teaching them how to generate ideas.

Various learning activities are used to support students' idea generation, such as self-reflection and securing ideas. Corbett (2005) argued that students' self-reflection while engaging in real-world experiments would facilitate integrating new information into their existing cognitive frameworks by triggering assimilative learning. Similarly, scholars in the reviewed articles posited that students should complete reflective reports designed to help consolidate their ideation experience (e.g., Heinonen et al., 2011; Muñoz et al., 2020). Securing ideas (e.g., having a written idea log) is viewed to help hold onto ideas generated and is considered a typical skill for successful entrepreneurs (McGrath & MacMillan, 2000), also playing a role in boosting creativity (Epstein, 1996).

Idea Evaluation Stage

The findings suggest that idea evaluation is the final stage of OI. This aligns well with the cognitive psychology perspective on the OI process. Advocates of this perspective argue that OI begins with forming preliminary and imaginary business ideas (Vogel, 2017). These ideas are only vaguely formed (Pryor et al., 2016) as they are under the influence of various "ceaselessly changing factors" (Eckhardt & Shane, 2003, p. 341), such as individuals' prior knowledge and experiences (Baron, 2006). To decide on these vague ideas, individuals should engage in idea evaluation (Canavati et al., 2021) and select ideas with a higher chance of being a successful product or business after exploitation (Mendoza-Abarca & Parry, 2017) using their convergent thinking skills (Cropley, 2006). To improve OI capability, therefore, educators should not only provide support for individuals' divergent thinking skills but also support their convergent thinking (McMullen & Kier, 2017).

In the reviewed articles, some educators encouraged students to choose their highest-quality idea after idea generation using intuition, while others provided instructional support to facilitate idea evaluation, such as providing a rubric for idea evaluation, or teaching students how to develop a business model to help them be aware of the essential attributes of a business opportunity. Some educators also invited experienced entrepreneurs to give feedback on students' ideas. According to Lindberg, Bohman, and Hultén (2017), expert feedback is essential to initiate a "structural

alignment" process (see Grégoire et al., 2010), as the students have to make sense of the feedback and compare this new information with what they already possess.

Toward Designing Constructively-Aligned EE Programs

The synthesis of empirical findings shows that effectively developing OI capability requires supporting a range of cognitive processes occurring in three stages: triggering, idea generation, and idea evaluation. This insight has at least three significant implications for the design of effective EE programs aimed at enhancing university students' OI capabilities, outlined below.

First, and foremost, viewing OI as a multi-stage process underscores the need for incorporating "hybrid teaching models" (see Béchard & Grégoire, 2005) for the comprehensive development of OI capability. In such an approach, the three stages are supported by targeting multiple learning objectives that align with cognitive processes in each stage. This underscores the importance of utilizing diverse measurement approaches (objective and/or subjective), curricular content (professional, theoretical, and/or spiritual), and teaching methods (teaching "for," "about," and/or "through") corresponding to each objective. It's important to note that the choice and combination of teaching methods should be tailored to the unique characteristics and needs of the students. For instance, as demonstrated by Schultz (2021), the combination of teaching "about" and "for" (also known as the supply-demand model) is particularly effective for students with relatively low entrepreneurial intentions. In contrast, for those with higher motivation and entrepreneurial intentions, focusing on teaching "through" (also known as the competence model) appears to be more impactful.

Second, viewing OI as a multi-stage process also highlights the importance of distinguishing between business ideas and opportunities. The progression through these three stages underscores OI's iterative nature, where initial imaginary ideas, triggered by external or internal factors, gradually develop and transform into viable business opportunities. This aligns with Vogel's (2017) perspective, which posits that business opportunities should not be viewed as isolated insights, but rather as emerging from the continuous shaping and refining of business ideas. Similarly, Dimov (2007) describes opportunity development as a process in which opportunities "emerge in an iterative process of shaping and development" as initial business ideas are "elaborated, refined, changed, or even discarded" (p. 714). By understanding this difference between ideas and opportunities, educators can more effectively guide students in recognizing how certain ideas transform into viable opportunities, while others do not. This approach not only fosters a deeper comprehension of the idea-to-opportunity transition but also cultivates a more nuanced perspective on the inherent value-generating potential of business concepts. It encourages students to critically evaluate and refine their ideas, understanding that not all ideas automatically translate into profitable opportunities, thereby instilling a mindset geared towards innovation and practical implementation.

Third, the new insights into key stages for business OI emphasize the necessity of dual-level alignment—both *inter-stage* and *intra-stage*—when developing EE programs aimed at fostering OI capability. The inter-stage alignment involves meticulously coordinating educational components within each stage—learning objectives, individual factors, measurement approaches, curriculum content, and teaching methods—to ensure they collectively contribute to achieving the goals of each stage. More significantly, it is essential to recognize these stages as interrelated components of a cohesive process rather than isolated steps. With intra-stage alignment, educators should ensure that the design of each stage not only meets its specific goal but also seamlessly integrates with the preceding and following stages. For instance, the learning objectives and teaching methods in the triggering stage should lay a foundational understanding and curiosity that smoothly transitions into the idea generation stage. Similarly, the idea evaluation stage should build upon the outcomes of idea generation, guiding students to critically assess and refine their own ideas. Moreover, due to the iterative nature of OI, the design of education should permit students to move back and forth between different stages. This approach would help students shift from a mindset of preventing failure to one that appreciates it as a valuable source of feedback and a learning opportunity during entrepreneurial activities (Bolinger & Brown, 2015).

The current study's findings can serve as a starting point and a source of inspiration for establishing such constructive alignments in entrepreneurship courses aimed at enhancing OI capabilities. For instance, in the triggering stage, some programs may focus on increasing students' awareness of current market needs and problems, in alignment with the Kirznerian perspective on opportunities. In this context, educators might employ methods that encourage active exploration and experimentation (Norton & Hale, 2011), such as engaging students in systematically searching their surroundings to identify unmet problems (Lindberg, Bohman, Hulten, et al., 2017). Alternatively, some could encourage students to adopt others' perspectives to better understand their needs through role-playing (Khalid & Sekiguchi, 2018), or provide even richer learning experiences by facilitating interactions with real stakeholders, helping students gain deeper insights into their needs and challenges (Kubberød & Pettersen, 2018). Regarding the latter, scholars have shown that such an approach more effectively facilitates perspective-taking and understanding of others, greatly inspiring students to pursue entrepreneurship as a means to create high social impacts (Mooney & Cockburn, 2023). In either approach, differences in students' ability to identify problems could, however, affect the outcomes. Thus, it is crucial that the chosen curriculum content and teaching methods be carefully aligned with this objective to effectively address such differences. For example, students could be provided with professional content in the form of "know-how" workshops like "the 5Ws plus H" and "Bugs Report" to enhance their problem-identification skills. This could also include training to distinguish between significant problems, akin to "migraine headaches", and less critical issues, such as minor inconveniences or "nice-to-have" items. These distinguishing features can then serve as criteria for measuring the outcome of the

triggering stage. Inspired by the findings of the current study, similar arrangements and considerations could be discerned for other stages.

Limitations and Avenues for Future Research

Despite its valuable contribution to the EE field, using a well-established theoretical framework developed by Fayolle and Gailly (2008) and employing a thorough systematic data collection process (PRISMA), this study has several limitations that pave the way for future research. First, the proposed muli-stage process of OI was primarily based on studies carried out in higher education settings, with a primary focus on exploring/enhancing students' OI capability. This narrow focus raises questions about the applicability of the review study's findings to different groups (such as academics, entrepreneurs, etc.) and contexts outside the university environment. While it is believed that, with certain considerations (particularly regarding influential factors), the findings of the review study may still be applicable to other groups and contexts, conducting a future review study with a broader scope can offer a more comprehensive understanding of how EE courses should be designed to more effectively support the development of OI capability.

Second, the proposed muli-stage process of OI was developed solely based on the synthesis of available empirical findings. While it offers a comprehensive overview of findings related to each essential educational component for designing effective EE programs, it falls short of fully demonstrating the interactive nature of these components and their interrelationships. This limitation was primarily due to the scarcity of empirical studies that examined such relationships, determining how, under which conditions, and which teaching approach is more appropriate to facilitate students' learning toward achieving an objective associated with either of the identified stages. As a result, future empirical studies are needed to place specific emphasis on each stage and determine how various educational components should be aligned to assist students in achieving the intended outcome in that particular stage. Such empirical findings could, for instance, explore the type of curricular content (e.g., professional, theoretical, spiritual) that best supports increasing students' intrinsic motivation—a common objective in the triggering stage—when employing a particular teaching approach.

Third, and from a broader perspective, a similar issue arises concerning the interrelationships among the various identified stages. This also stems from the absence of empirical studies in the literature that illustrate how the three stages should be strategically positioned to effectively nurture OI capability. For instance, there is a need to understand how setting learning objectives in one stage impacts the selection of objectives in other stages, as well as how performance in each stage influences an individual's performance in subsequent stages. Moreover, while numerous individual characteristics and environmental factors have been identified as factors influencing students' OI outcomes in general, the mechanisms through which they affect the OI process remain unclear. This could be clarified by investigating the influence of these factors on the outcomes of each stage. For example, motivation and attitudes toward

entrepreneurship might influence OI performance due to their effect on the outcomes of the triggering stage, whereas creativity and problem-solving skills might exert their influence on OI capability through their impact on idea-generation outcomes. Future empirical studies in these areas would not only help us understand the nature of these relationships, the optimal combination of conditions, the influence of one factor on another, and the stability of such influences but would also further our understanding of how EE programs can be designed more effectively to develop students' OI capability.

Fourth, this study focused on reviewing research articles rather than curriculum designs and lesson plans. While research articles provide valuable insights into the effects of educational interventions, examining curriculum materials could offer a more direct evaluation of how specific content and teaching methods impact OI capability development. This limitation suggests that future studies could analyze the curricula of existing EE programs (e.g., Sirelkhatim & Gangi, 2015; Tiberius et al., 2023) to provide deeper insights into the educational strategies employed in these programs aimed at fostering OI capability.

In addition to the above research avenues, there are important calls for studies to improve our understanding of each stage identified as outlined in Table 8.

It is also important to note that the findings indicated that outcomes were mostly measured shortly after participating in a course. The impact on such short-term subjective and/or objective outcomes, however, provides a rather limited view of the effectiveness of EE programs. No study linked students' OI capability improvement to future behaviors. Consequently, it is not possible to tell if fostering students' OI capability leads to a higher rate of employability, increases the number of graduate start-ups and entrepreneurial businesses, and/or improves their ability to cope with uncertainties. Additionally, there are significant concerns regarding the reliability of subjective measurements. Such measures may not fully capture OI capability, as interviews and self-assessments often reflect perceptions, feelings, and impressions rather than actual behavior (Grégoire et al., 2010). The findings of the current review also reinforced these concerns. Munez et al. (2011) reported that although many students believed their capability improved as a result of participating in the course, these perceived improvements were not reflected in measurable changes to their OI mental frameworks. Similarly, Baggen, Kampen et al. (2017) found no correlation between self-perceived improvements and objective assessments of OI capability. Moreover, the reliability of findings using subjective approaches is strongly influenced by the number of participants and the robustness of the study design (cf. Glackin & Phelan, 2020; Morris et al., 2013).

Therefore, future research is needed to measure the sustainability of training effects over time, and studies that focus on higher-level impacts, such as students' societal contributions (Nabi et al., 2017) and firm founding (George et al., 2016), would be valuable. Here, scholars can also consider using self-perceived questionnaires for measuring other key indicators of OI capability, such as optimism and uncertainty/ambiguity tolerance (Nabi et al., 2017), especially if they view OI as associated with the entrepreneurial mindset, which aligns with the broader function of EE programs at

Table 8. Avenues for Future Research on Fostering University Students' OI Capability.

OI as a multi-stage process
Triggering stage 1- Most studies reviewed tend to investigate the effectiveness of one strategy for triggering idea generation without considering the alternatives. There is thus a need for methodologically rigorous studies comparing the effectiveness of different strategies to their alternatives while taking into consideration the impact of context- and/or person-specific factors (Nabi et al., 2017; Pittaway & Cope, 2007). 2- There is an ongoing debate among scholars about whether a desire to act entrepreneurially is driven by intrinsic, extrinsic, or both types of motivations (see Murnieks et al., 2020). Although some studies explored the effect of stimulating intrinsic (e.g., by stimulating perspective-taking) or extrinsic motivations (e.g., by offering financial rewards) on students' idea generation outcomes, there is a need for studies to explore both forms of motivation simultaneously while controlling for the impact of influential individual and environmental factors. 3- Comparing the influence of various forms of triggers, derived from Kirznerian and Schumpeterian views, on the nature of ideas generated (see de Jong & Marsili, 2015). Given the effect of students' majors on their tendency toward an incremental development of existing products or radically new market-oriented innovations (see Berglund & Wennberg, 2006), an empirical study can explore the influence of students' majors on the effectiveness of triggering idea generation from different perspectives.
Idea generation stage 1- According to the dual pathway to creativity model, "creative performance is a function of cognitive flexibility, cognitive persistence, or some combination of the two" (Nijstad et al., 2010, p. 63). Therefore, future studies should explore creativity training methods that can foster students' cognitive flexibility, preferences, or even both during the idea generation stage (see Farrokhnia et al., 2025). 2- Research findings indicated that workshops that support structured idea generation techniques, such as SCAMPER, TRIZ, and/or C-Sketch, help students generate a greater number of quality ideas (e.g., Shah et al., 2001; Yeo & Quek, 2014) mainly by overcoming "the fixation effect" (Moreno et al., 2016). The current study's findings also revealed a similar effect, i.e., the Einstellung effect, that could impede students' divergent thinking, resulting in the generation of less innovative business ideas. A future study could investigate whether the above techniques help overcome this effect. 3- In most studies reviewed students generated ideas in teams. Creativity scholars have, however, called for a hybrid approach combining individual and group brainstorming sessions (Ritter & Mostert, 2018). Future research could explore the role of different combinations of individual and group settings in identifying business opportunities. 4- Within the reviewed articles there is an emphasis on cognitive learning objectives but less attention is focused on affective objectives. Positive and/or negative affects (i.e., feelings and moods) can, however, enhance individual creativity (Baron, 2008; George & Zhou, 2007) and moderate the impact of an individual's alertness on discovering opportunities (Baron, 2008). Future studies could thus explore more deeply cognitive versus affective learning in the context of idea generation and how it may impact ideation outcomes.

(continued)

Table 8. (continued)

OI as a multi-stage process
Idea evaluation stage 1- Evaluations of business ideas in the entrepreneurial process can be carried out using an intuitive and/or rational (criteria-based) approach and there is much debate about the benefits of each method within the context of EE (Eling et al., 2015; Magnusson et al., 2014; Pryor et al., 2016). A future study could compare the influence of various approaches and their combinations (e.g., first intuitive and then rational evaluation, and vice versa) on the quality of students' evaluation decisions. 2- Using the criteria-based evaluation approach requires engaging in a deliberate assessment process guided by specific and well-defined evaluation criteria (Magnusson et al., 2014). Several studies have been done to identify the essential criteria that should be used for evaluating business opportunities. There is no consensus among scholars, however, about the essential criteria for making early-stage evaluation decisions in the OI process, especially for use by novices. As such, a future study is needed to identify the essential criteria for evaluating business ideas.

higher education institutions (Farrokhnia et al., 2022). However, given the limitations of subjective measurements, it is recommended to incorporate objective assessments as well when evaluating higher-level impacts, such as tracking graduates' employability rates, the number of start-ups founded, and their ability to cope with uncertainties. This would provide more concrete evidence of the effectiveness of EE programs in fostering OI capability.

Concluding remark

In recent years, there has been an increasing scholarly interest in exploring and fostering higher education students' entrepreneurial OI capability. Guided by a theory-driven teaching model framework, we systematically reviewed high-quality empirical studies to thematically organize their findings, proposing an integrative process for effectively fostering OI capability. This process underscores the complex nature of OI capability, necessitating the development of constructively aligned EE programs that encompass three distinct yet interconnected stages: triggering, idea generation, and idea evaluation. The proposed approach is not necessarily prescriptive in nature, but allows educators to reflect on their EE programs and design or change them in such a way that it considers constructive alignment and fits their learning goals. Beyond its practical implications, this study identifies two main ways of moving forward for future researchers. Firstly, the study provides an up-to-date and empirically rooted call for research on higher education students' OI capability. Secondly, by applying a generic teaching model framework, the study identifies several research gaps and intriguing and under-emphasized areas for development.

Appendix A. Criteria for the Quality Appraisal

	0	1	2	3
	No elaboration	Some elaboration	Good elaboration	Extensive elaboration
Criteria for qualitative studies				
Study is clear methodologically	1	4	5	1
Study theoretically situated	-	3	5	3
Ethical process transparent	3	2	4	2
Researcher(s') relation to participants is clear	3	2	6	-
Researcher(s') relation to the data is clear	1	2	7	1
Researcher(s') takes a critical stance toward own research	3	-	8	-
Congruence between methodology and methods used for data collection, analysis, and interpretation	1	3	7	-
Participants' involvement in data interpretation	2	1	6	2
Limitations voiced	2	4	5	-
Criteria for quantitative studies				
Is the source population or source area well-described?	-	4	29	3
Were interventions and comparisons well-described and appropriate?	-	12	20	4
Were outcome measures reliable?	1	3	26	6
Were outcomes relevant?	3	10	19	4
Were the analytical methods appropriate?	2	4	27	3
Are the study results internally valid (i.e., unbiased)?	-	8	26	2
Are the findings generalizable to the source population (i.e., externally valid)?	10	6	19	1

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