International Review of Entrepreneurship, Article #1709, 21(4): pp. 485-520.

Teaching the Un-teachable? Developing Capabilities in Opportunity Identification through Entrepreneurship Education and Training: A Systematic Literature Review and Research Agenda

William Bracken
Richmond American University London, London, UK

Jun Li[1]
Huddersfield Business School, University of Huddersfield, UK

Juan Carlos Fernandez de Arroyabe
Essex Business School, University of Essex, Southend-on-Sea, UK

Abstract. The global growth in entrepreneurship education and training programmes (EET) has spawned an associated boom in academic scholarship assessing the merits of such interventions. This systematic literature review is the first to synthesise the growing number of empirical studies that consider the impact of EET on opportunity identification capabilities (OIC). In doing so, it reviews the extent to which EET has been observed to support entrepreneurial ideation, before elucidating on the mechanisms and boundary conditions surrounding how such an effect is transmitted. Amongst recommendations for future research, it highlights the need for greater empirical rigour, calls for more empirical studies to measure the impact from training specific cognitive techniques, and urges more attention to be focused on the boundary conditions of 'who' is most suited to attend these programmes and 'how' they are best delivered.

Keywords: entrepreneurship education, opportunity recognition, new venture ideas, opportunity identification.

1. Introduction

Opportunity identification has been described as the capability to identify a good idea and transform it into a business concept that adds value to the customer or society and generates revenues for the entrepreneur (Lumpkin and Lichtenstein, 2005). It is the first cognitive conception by an individual of the ostensive nature

1. Corresponding author: Jun Li, Huddersfield Business School, University of Huddersfield, Queensgate, Huddersfield HD1 3DH, United Kingdom. Email: j.li3@hud.ac.uk

of an entrepreneurial idea (Clausen, 2020). Such ideas have been described as the 'lifeblood' of entrepreneurship (Ward, 2004). Indeed the UK's Quality Assurance Agency Guidance on Enterprise and Entrepreneurship Education (2018) previously defined enterprise itself as 'the generation and application of ideas'.

In practice, the distance between the initial identification of an entrepreneurial opportunity, and the subsequent establishment of that idea into a wealth creating business, is vast. To successfully take an idea to market, entrepreneurs and their teams require skill-sets that extend far beyond the identification of opportunities. Subsequent success requires competencies with relationship to building, organizing, commitment and strategy (Man, Lau and Chan, 2002). Yet, with all new ventures requiring a starting point, entrepreneurial opportunities could not be brought into existence without the emergence of that first candidate idea (Hayton and Cholakova, 2012).

Opportunity identification therefore remains a key talent for entrepreneurs, something that discriminates between those who are more and less successful (Ames and Runco, 2005). Fluidity in idea generation is important, precisely because such a small proportion of initial ideas will ever be funded, let alone be sold to a customer (Timmons and Spinelli, 1994). Moreover, with longitudinal studies positing a link between the quality of the initial opportunity concept and the strategic potential of the ensuing venture (Kavanagh and Hisrich, 2010), the ability to undertake high quality ideation matters. Having a tank 'full with ideas' supports entrepreneurial intentions (Molaei *et al*., 2014), and at the very least, removes a significant barrier to embarking on the process. For although entrepreneurship is frequently cited as a desirable career for many individuals, aspirant entrepreneurs frequently cite difficulties in generating that first idea (Sieger *et al*., 2014).

Against this background, modules focusing on opportunity identification now constitute an important component within many entrepreneurship education and training courses (EET). EET has been defined as 'any pedagogical programme or process of education for entrepreneurial attitudes and skills' (Fayolle *et al*., 2006). An educational endeavour that began in 1947 with Harvard University offering 'new enterprise' courses for returning war veterans, EET has now become something of a global industry in its own right. As public and private institutions continue to make large investments into the field, the Department for Business, Innovation and Skills (2016) recently detailed how 196,300 undergraduate students were taking entrepreneurship modules in the UK alone.

As an educational discipline, the legitimacy of EET hinges on the very considerable body of academic scholarship that strives to assess, and potentially reaffirm, its positive impact (Kuratko, 2005). This body of academic work has been described as both overwhelming (Fellnhofer, 2019) and contentious (Hahn *et al*., 2017). As such it has provided fertile ground for systematic literature reviews seeking to make collective sense of the field. These reviews have previously considered the broader efficacy of EET (Pittaway and Cope, 2007;

Rideout and Gray, 2013; Nabi *et al*., 2017; Carpenter and Wilson, 2022), as well as more specific aspects of the EET intervention, such as the potency of experiential learning (Morland *et al*., 2021; Motta and Galina, 2023), the attitudes and values of teachers and leaders (Hardie *et al*., 2023), or the impact of EET on entrepreneurial intent (Fayolle and Gailly, 2015). To date though, no such review has been undertaken of the academic evidence that exists around the question of whether, and how, EET positively supports Opportunity Identification Capabilities (OIC). This is the gap into which this study looks to stride.

In doing so, this review makes two primary contributions. Firstly, by mapping the empirical terrain in this area, it seeks to clarify our understanding of the impact of EET on OIC, the means through which that impact is transmitted, and the related boundary conditions. Secondly, it then proposes a research agenda for future investigations in order to move research in this field forward. In doing so, it particularly highlights the need for: i) greater empirical rigour and definitional clarity in future studies, ii) plugging empirical gaps around the impact of training students in particular cognitive techniques, and iii) understanding how the 'to whom' and 'what' in terms of course delivery, flow through to the benefits in OIC that are extracted from these programmes.

This paper is structured as follows. It starts by detailing the systematic literature review methodology it utilises to take stock of knowledge of the impact of entrepreneurship education on capabilities in opportunity identification (Section 2). It then describes the characteristics of the empirical studies contained within the review (Section 3). Next it presents the findings of thematic analysis of these studies and identifies contentions and competing observations (Section 4). Section 5 proposes an agenda for future research in this area while Section 6 concludes.

2. Methodology

This literature review centres on the research question of whether entrepreneurship scholarship foresees EET programmes to contribute positively to opportunity identification capabilities. Using a systematic literature review methodology, it seeks to identify and synthesise the extant literature, so that it can provide evidence-based insights to inform the design and delivery of entrepreneurship education and training, and to shape a future research agenda to advance knowledge and understanding in this field.

Systematic reviews were first developed in medical science as a way of synthesising research findings in a transparent and reproducible way (Davis *et al*., 2014). In explicitly using systematic methods to garner and review the academic studies related to a particular question, bias is minimised, such that reliable and trustworthy findings can be drawn (Moher *et al*., 2009) Consistent with that approach, this study has sought to undertake a transparent and replicable multi-

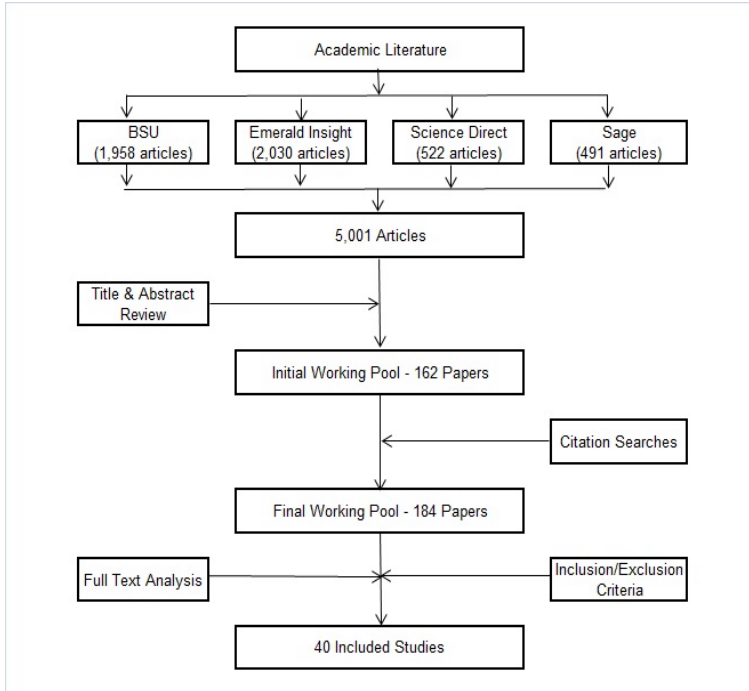
stage review (Tranfield *et al*., 2003; Littell *et al*., 2008). These stages are illustrated in Figure 1.

Firstly, a systematic search was performed on content within the electronic databases Business Source Ultimate, Science Direct, Sage and Emerald Insight to identify relevant research. In doing so this systematic search focused on 'article' and 'book' content within these databases, directing its search terms to query the 'full text field' of material within the databases. Given how EET programmes have predominantly developed within the last quarter of a century, the temporal timeframe of this search focused on material published since 1998. This systematic search used the Boolean terms "entrepreneurship education" or "enterprise training" or "enterprise education" or "entrepreneurship course" or "enterprise course" AND "opportunity recognition" or "opportunity ideation" or "opportunity identification" or "entrepreneurial alertness" or "business idea" or "new venture idea" within the 'full text' fields of the database.

Operationalising these searches returned 5,001 separate publications across the four databases. The abstract of these publications was then read to filter down this initial list of sources. In doing so, initial exclusion criteria were used, such that this study first screened out those results whose focus was evidently not primarily on the relationship between higher education programmes and entrepreneurial opportunities or entrepreneurial ideation. Duplicate items were also eliminated. This led to the establishment of an initial working pool of 162 papers. This pool increased to 184 articles after the citations at the end of each article revealed a further 22 papers with potential relevance.

Secondly, a number of inclusion and exclusion criteria were then deployed to ensure that the finalised pool of studies was directly relevant to the research question under consideration. The inclusion criteria stipulated that to be incorporated in this research, studies must, (i) contain a focus, either directly or indirectly on an output variable that related to capabilities in identifying entrepreneurial opportunities, and (ii) must observe that output variable in the context of entrepreneurial education and training delivered by a higher educational institution. Given that the focus of this study was to assess for evidence of an effect, the exclusion criteria was set to ensure that the final body of studies was evidence based. As such the exclusion criteria explicitly disregarded studies that, (i) failed to contain empirical research, and (ii) didn't themselves contribute primary data, for example excluding literature reviews on EET.

Figure 1 – The SLR Review Process



After the full text of each paper within the working pool was reviewed in line with these exclusion and inclusion criteria, a final cohort of 40 empirical based studies was identified. Of these 40 studies, three studies that specifically measure the impact of EET on entrepreneurial alertness (Cui *et al*., 2021; Zulfiqar *et al*., 2021; Saadat *et al*., 2022) are included because their specific measures of entrepreneurial alertness are considered to equate to opportunity identification. 39 of the 40 studies emanated from peer reviewed journals, with 1 further study (Albornoz and Amoros, 2017) drawn from a chapter within the 'Research handbook on entrepreneurial opportunities' (2017). It is contended that within the databases that were queried, these 40 studies amount to the core population of peer reviewed empirical research assessing the effectiveness of EET on OIC.

The 40 studies, due to their diversity of empirical methodologies and the range of different measures being assessed, are unsuitable to meta-analysis (Tranfield *et al*., 2003). Instead, the body of empirical literature was examined using a narrative synthesis methodology, which involved collating the studies and amalgamating them into a wider mosaic (Hammersley, 2001). In the context of this study, the thematic analysis has involved the use of three first order themes, (i) the nature and extent of the measured impact, (ii) the mechanisms through which such effects were said to be transmitted, and (iii) the contingency factors which were seen to influence the strength of that impact.

2.1. Methodological Limitations

The limited nature of the current sample reflects the extent to which entrepreneurship researchers have hitherto addressed this important question. At 40 studies, the size of this literature pool constitutes something of a limitation with this systematic review. It restricts the ability to undertake bibliographic coupling analysis and to construct and visualise bibliometric networks. The fact that so much literature within the review has emanated from the last 5 years suggests that the question of how EET programmes can support OIC is one to which entrepreneurship researchers are increasingly turning. As they do so, and the pool of relevant papers grows, it is envisaged that greater opportunities will emerge to utilize these additional forms of analysis in the future.

The narrow focus of this paper in specifically assessing the relationship between EET and OIC within the empirical literature constitutes the specific contribution of the study. In spite of contesting claims being made as to the potency of EET programmes in enhancing OIC, academic research in this area has not previously been subject to any systematic review. Although the pool of studies under review is comparatively low, the value of this particular research emanates from its assessment of those empirical studies within the context of the specific research question under consideration. Broadening the search criteria to include either conceptual papers, or research which examined the impacts of EET programmes on subsequent opportunity evaluation and development, would undoubtedly have brought more papers into the body under review. However, doing so would only have undermined and compromised this research's focus on the research question being posited.

3. The Studies in This Review

A full list of the 40 empirical studies included in this review is contained within Table 1. As detailed in Figure 2, research activity around the question of the impact of EET on OIC has grown in interest in recent years. Out of the 40 articles, 30 have been published within the last ten years (2014-2023), with 15 (37.5%) emanating from the last 5 years alone. As detailed in Figure 3, this cohort of research studies is also drawn evenly from across the world. Although the greatest number of studies emanate from the United States (6 studies) and the United Kingdom (5 studies), the literature pool under review contains a broad range of studies from across the rest of Europe, Asia, Africa, and South America.

Figure 2 –Publications by date period

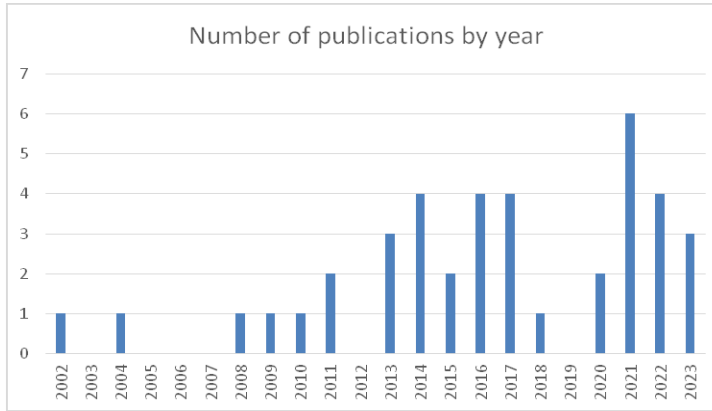


Figure 3 –Research samples by country

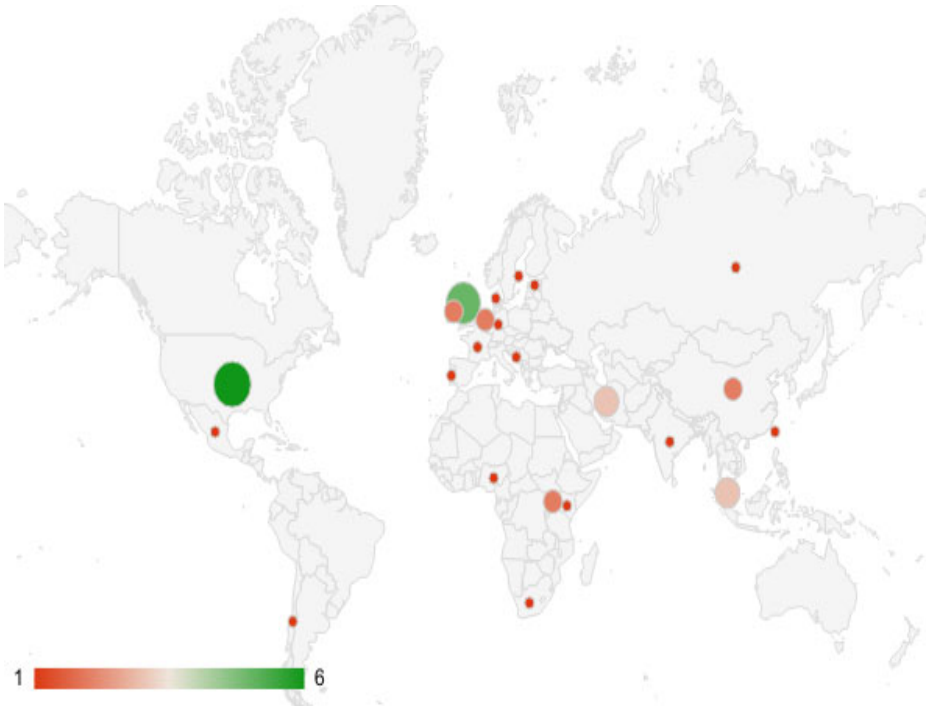


Table 1 – Summary of publications included within the Systematic Review

No.	Lead author	Date	Paper title	Journal	Grading	Relevance to study of EET and OIC
1	Saks, Naomi	2002	Can Opportunity Identification be taught?	Journal of Enterprising Culture	1	Semi structured interview study looking at how entrepreneurship programmes teach opportunity identification, drawing on the insights of leading educators.
2	DeTienne, Dawn	2004	Opportunity identification and its role in the entrepreneurial classroom: A pedagogical approach and empirical test	Academy of Management Learning & Education	4*	Experimental study that shows opportunity identification to be a competency that can be developed in the classroom through an SEEC creativity training programme. Highlights how both the number and innovativeness of venture ideas increased after SEEC.
3	Fiet, James	2008	Entrepreneurial discovery as constrained, systematic search	Small Business Economics	3	Experimental survey, founded upon a systematic search approach through which students are trained in idea sets. Using an experimental approach, it shows how training students in active search, led to more ideas being identified than through an alertness perspective.
4	Levie, Jonathan	2009	The effect of business or enterprise training on opportunity recognition and entrepreneurial skills of graduates and non-graduates in the UK	Frontiers of Entrepreneurship Research	n/a	Telephone based questionnaire assessing participant's perceived propensity to recognize business opportunities, in relation to 4 different types of EET intervention.
5	Lourenco, Fernando	2011	Enterprise education: the effect of creativity on training outcomes	International Journal of Entrepreneurial Behavior & Research	3	Self-report survey study that shows how students with higher perceptions of creativity tend to have higher tendencies to learn.
6	Von Graevenitz, Georg	2010	The effects of entrepreneurship education	Journal of Economic Behavior & Organization	3	Self-report study that looks at the impact of EET on entrepreneurial intent, but which also contains measures of students self-assessed capabilities including opportunity recognition
7	Nab, Jan	2013	Fostering the competence of science students in identifying business opportunities: A design research approach	International Journal of Entrepreneurial Venturing	1	Mixed method study that relies on survey data, interviews, and a comparison of ideational outputs. It looks to see if students are better able to discover opportunities following a course in which design principles are implemented

8	Karlsson, Tomas	2013	Improving perceived entrepreneurial abilities through education: Exploratory testing of an entrepreneurial self-efficacy scale in a pre-post setting	International Journal of Management Education	1	Survey based approach that measures impact of a course of EE on entrepreneurial self-efficacy, including confidence in searching and identifying business opportunities. Uses a pre and post test design, as well as a control group of innovation students.
9	Morris, Michael	2013	A competency-based perspective on entrepreneurship education: Conceptual and empirical insights	Journal of Small Business Management	3	Self-report study measuring core competencies (including opportunity recognition) before and after participating in a course which was high in experiential learning, with classroom coaching working in tandem with being embedded with early stage micro-entrepreneurs in Cape Town.
10	Breslin, Dermot	2014	Developing an evolutionary/ecological approach in enterprise education	International Journal of Management Education	1	Investigates the impact of an evolutionary approach within EET, whereby students develop practice based heuristics to make sense of their lived experiences. Measures results through ideational outcomes.
11	Chang, Wen-Long	2014	A study of the relationship between entrepreneurship courses and opportunity identification: An empirical survey	Asia Pacific Management Review	n/a	Self-report survey reporting on the link between well-established entrepreneurship courses and the enhancement of opportunity identification, suggesting that the relationship is mediated by entrepreneurial alertness, with the effect moderated by learners possession of prior knowledge.
12	Lim, WeiLee	2023	Delineating competency and opportunity recognition in the entrepreneurial intention analysis framework	Journal of Entrepreneurship in Emerging Economies	1	Self-report questionnaire that measures the number of ideas generated as a proxy for opportunity recognition competency, alongside self-assessed measures of absorptive capacity, entrepreneurial alertness and entrepreneurial knowledge.
13	Gundry, Lisa	2014	Seeing around corners: How creativity skills in entrepreneurship education influence innovation in business	International Journal of Management Education	1	Self-report survey study showing how key innovative behaviours emerge when students are taught the appropriate tools and creative methods for idea generation.
14	Nab, Jan	2014	Strategies of expert teachers for teaching identification of business opportunities	Industry and Higher Education	1	Semi structured interview study that uses the experiences of expert teachers to look at strategies that work to teach opportunity identification.

15	Karimi, Saeid	2016a	The impact of entrepreneurship education: A study of Iranian students' entrepreneurial intentions and opportunity identification	Journal of Small Business Management	3	Self-report study whereby participants measured their opportunity identification capability before and after a course of entrepreneurial training, alongside their entrepreneurial intention.
16	Bell, Robin	2015	Developing the next generation of entrepreneurs: Giving students the opportunity to gain experience and thrive	International Journal of Management Education	1	Self-report study which uses a series of reflective essays written by students post a course of experiential learning. Observes how an experiential approach develops entrepreneurial traits, including the generation of ideas.
17	Gielnik, Michael	2015	Action and action-regulation in entrepreneurship: Evaluating a student training for promoting entrepreneurship	Academy of Management Learning & Education	4*	Experimental study that involves a control and treatment group, which assesses the impact through surveys and transcribed interviews before, immediately after, and 12 months after, the course of treatment or control.
18	Gielnik, Michael	2016	Positive impact of entrepreneurship training on entrepreneurial behavior in a vocational training setting	Africa Journal of Management	2	Study on how a STEP training programme based around action learning supports entrepreneurship, and opens up avenues the identification of new opportunities. Measures the results in terms of ideational outcomes.
19	Barucic, Ajka	2016	Entrepreneurship education as a factor of entrepreneurial opportunity recognition for starting a new business	Management: Journal of Contemporary Management Issues	1	Self-report survey study that explores the correlation between entrepreneurship education and entrepreneurial opportunity recognition.
20	Lindberg, Erik	2017	Enhancing students' entrepreneurial mindset: A Swedish experience	Education + Training	1	Self-report survey study that shows how applied intervention methods have a positive impact on how participants perceive their opportunity identification and creative capabilities, which in turn impacts on an entrepreneurial mindset
21	Karimi, Saeid	2016b	Fostering students' competence in identifying business opportunities in entrepreneurship education	Innovations in Education and Teaching International	2	A pre and post-test study, and a control and experimental group study of Iranian agricultural science students. Found there to be a positive impact of creative exercises on the number of business ideas generated, with a smaller impact on the innovativeness of the ideas generated.

22	Gielnik, Michael	2017	Boosting and sustaining passion: A long-term perspective on the effects of entrepreneurship training	Journal of Business Venturing	4	A self-report study that suggests that processes post training are dynamic, and that entrepreneurial self-efficacy is needed to maintain passion. This in turn leads to greater experimentation and the creation of new ideas.
23	Albornoz, Carlos	2017	The effect of entrepreneurship education on opportunity recognition self-efficacy	Research handbook on entrepreneurial opportunities	n/a	A pre and post-test study of Chilean students taking a mandatory entrepreneurship course. Measuring their self-assessed opportunity recognition capabilities before and after the course.
24	Olugbola , Seun Azeez	2017	Exploring entrepreneurial readiness of youth and startup success components: Entrepreneurship training as a moderator	Journal of Innovation and Knowledge	1	Self-report survey study suggesting that entrepreneurial training can develop entrepreneurial abilities, and strengthen opportunity recognition capabilities
25	Costa, Silvia	2018	Recognizing opportunities across campus: The effects of cognitive training and entrepreneurial passion on the business opportunity prototype	Journal of Small Business Management	3	Self-report survey study that tests the causal relationship between training and opportunity recognition by means of a cognitive and experiential learning approach. Finds a moderating role for entrepreneurial passion.
26	Zulfiqar, Salman	2021	Opportunity recognition behavior and readiness of youth for social entrepreneurship	Entrepreneurship Research Journal	2	Self-report survey study that looks at how formal education and training can enhance opportunity recognition behaviour within the context of social entrepreneurship.
27	Hultén, Peter	2020	Building students' entrepreneurial mindsets: Results from an intervention at a Russian university	International Journal of Management Education	1	Study as to how an entrepreneurial course focused on developing the entrepreneurial mindset made a difference, such that engaging students in creative cognitive processes supported opportunity identification
28	Othman, Nor Hafiza	2020	The mediating effect of emotion on entrepreneurship education and business opportunity recognition	International Journal of Business and Society	n/a	Self-report survey study showing that entrepreneurial emotion has a strong effect on the relationship between EET and business opportunity recognition. Highlights the importance of stable emotions..
29	Cohen, Dan	2021	Identifying innovative opportunities in the entrepreneurship classroom: A new approach and empirical test	Small Business Economics	3	Study looking at the IDEATE teaching method. Measuring ideational outcomes, it finds ideas discovered through active search are more innovative than those identified through passive search.

30	Mathews, Robert	2021	An examination of the effect of new venture ideation exercises on entrepreneurial intentions	Entrepreneurship Education and Pedagogy	n/a	Self-report survey study that shows how entrepreneurial intent significantly increased after new venture training exercises, showing a link with self efficacy of ideation skills.
31	Muñoz, Christian	2011	Developing opportunity-identification capabilities in the classroom: Visual evidence for changing mental frames	Academy of Management Learning & Education	4*	A study that shows how the development of a student's ability to identify business opportunities is underpinned by a change in their mental frames.
32	Cui, Jun	2021	The impact of entrepreneurship education on the entrepreneurial mindset of college students in China: The mediating role of inspiration and the role of educational attributes	International Journal of Management Education	1	Self-report survey that considers the impact of extra-curricular activity, and curriculum attendance on an entrepreneurial mindset, including being alert to opportunities. Found that EE did not positively impact entrepreneurial mindsets.
33	Kremer, Florence	2021	Definition and testing of a skills framework to evaluate the effect of a pedagogical program in entrepreneurship	Journal of Enterprising Culture	1	A questionnaire self-reporting an assessment of entrepreneurial skills, including measures on opportunity identification, presented to those who had enrolled on an entrepreneurship course, and a separate control group.
34	Okolie, Chinonso	2021	Entrepreneurial competencies of undergraduate students: The case of universities in Nigeria.	International Journal of Management Education	1	Self-report study which finds that EE has a significant effect in opportunity identification, considering in particular the effect of compulsory EET participation.
35	Saadat, Soroush	2022	The effect of entrepreneurship education on graduate students' entrepreneurial alertness and the mediating role of entrepreneurial mindset	Education + Training	1	Self-report study which assesses the impact of EE alertness, and finds the relationship to be mediated by an entrepreneurial mindset.
36	Costin, Yvonne	2022	Entrepreneurial education: Maker or breaker in developing students' entrepreneurial confidence, aptitude and self-efficacy?	Industry and Higher Education	1	Self-report survey study that measures the impact of entrepreneurship education on confidence, self-efficacy and entrepreneurial aptitudes. Finds areas of improvements, but not in terms of idea generation.
37	Hou, Fei	2022	A multilevel model of entrepreneurship education and entrepreneurial intention: Opportunity recognition as a mediator and entrepreneurial learning as a moderator	Frontiers in Psychology	1	Self-report survey that measures a participant's level of entrepreneurial learning, suggesting this is a moderating factor influencing the extent to which opportunity recognition is a capability that can be fostered through EET programmes.

38	Mets, Tonis	2022	Putting entrepreneurial process competence into the focus in entrepreneurship education: Experience from Estonian universities	Administrative Sciences	n/a	Self-assessment questionnaire assessing entrepreneurship competence before and after entrepreneurship courses were taken at different Estonian Universities.
39	Silveyra-Leon, Geraldina	2023	Do entrepreneurship challenges raise student's entrepreneurial competencies and intention?	Frontiers in Education	n/a	Self-report study that measures a participant's perceived opportunity identification capability after undergoing a six week entrepreneurship challenge educational experience (ECH).
40	Tynan, Margaret	2023	The creative catalyst: Developing student competency in opportunity recognition	Industry and Higher Education	1	Structured qualitative interviews with 10 design educators in the Republic of Ireland. Found the educators to believe that programmes based on design thinking did develop students thinking and technical skills which they wouldn't then be able to move back from.

Note: Column 'Grading' refers to the journal ranking by the Chartered Association of Business Schools according to their 'Academic Journal Guide 2021'.

As detailed in Table 2, the papers reviewed in this study emanate broadly evenly from the entrepreneurship literature (21 out of 40; 52.5%) and the management education literature (18 out of 40; 45%), with 1 publication from the psychology literature (1 out of 40; 2.5%). Although both the specificity of this research, and the scarcity of relevant material, required a wide ranging search of publication sources that extended beyond purely the highest ranking journals, 11 of the 40 articles (27.5%) were published in journals graded by the Chartered Association of Business Schools 'Academic Journal Guide (2021)' at Grades of 4*, 4, or 3.

Table 2 – Publications used within this Systematic Review

Entrepreneurship and Management Literature	**Education**
Administrative Sciences (1 article)	Academy of Management Learning & Education (3 articles)
Africa Journal of Management (1 article)	Entrepreneurship Education and Pedagogy (1 article)
Asia Pacific Management Review (1 article)	Frontiers in Education (1 article)
Entrepreneurship Research Journal (1 article)	Industry and Higher Education (3 articles)
Frontiers of Entrepreneurship Research (1 article)	Education + Training (2 articles)
International Journal of Entrepreneurial Behavior & Research (1 article)	International Journal of Management Education (7 articles)
International Journal of Entrepreneurial Venturing (1 article)	Innovations in Education and Teaching International (1 article)
International Journal of Business and Society (1 article)	
Journal of Business Venturing (1 article)	**Psychology**
Journal of Economic Behavior & Organization (1 article)	Frontiers in Psychology (1 article)
Journal of Enterprising Culture (2 articles)	

Journal of Innovation and Knowledge (1 article)
Journal of Entrepreneurship in Emerging Economies (1 article)
Journal of Small Business Management (3 articles)
Management: Journal of Contemporary Management Issues (1 article)
Research handbook on entrepreneurial opportunities (1 article)
Small Business Economics (2 articles)

4. Thematic Analysis

4.1. Theme 1 – Does EET Support Entrepreneurial Ideation?

At an aggregate level, the majority of the empirical studies contained within this review find a positive relationship between EET programmes and the enhancement of capabilities in opportunity identification. As detailed in Table 3, amongst the 40 empirical studies, 32 (80%) report a positive impact, 2 (5%) find a partial or mixed effect, and 6 (15%) fail to find support for such a relationship.

In addition to the lack of uniformity in the findings, the variety of empirical approaches deployed within the study pool make it difficult to draw definitive singular conclusions. As illustrated in Table 3, the studies vary significantly in: (i) the methodology they deploy, (ii) the nature of the educational intervention being assessed, (iii) the sample size with which they are engaged, and (iv) the precise independent variable used to measure an effect. Accordingly, it would be a mistake to assume that each of the 40 empirical studies under consideration carries equal weight. In considering their empirical findings, the 40 studies are considered within three separate categories that best characterise their methodological approach: those assessing ideational outcomes, those drawing on semi-structured interviews, and those utilising self-report surveys.

Within the first grouping, there are 10 studies that look to measure ideational outcomes, through either counting or grading the venture concepts that students produce post a course of EET. To this extent their findings are based on tangible outputs. With the exception of the study by Muñoz *et al*. (2011), which purely considers a pre- and post-test responses, these studies harness experimental designs utilising separate treatment and control groups. Three studies (DeTienne and Chandler, 2004; Karimi *et al*., 2016b; Costa *et al*., 2018) combine both pre- and post-test observations with the use of a control and treatment group. In measuring ideational outcomes, normally with the use of external raters, these studies exude a degree of collective consistency. Although this approach is not without its limitations, with opportunity identification often being observed within a narrow time period and away from a fully natural environment, the degree of methodological homogony of these 10 studies, allied to their focus on

actual ideational outputs, allows this cohort to stake a claim to be the grouping carrying the greatest empirical weight.

Amongst this grouping, the evidence of EET interventions positively supporting OIC is strong. In their study, Muñoz *et al*. (2011) found that the ideational output from 12 of their 15 participants improved in studies before and after the EET intervention. Post their particular course of EET, Fiet and Patel (2008) found that those in its treatment group identified nine-fold more opportunities than those in their control group. Cohen *et al*. (2021) found that 10% of the idea innovativeness in their study could be attributed directly to their educational intervention. DeTienne and Chandler (2004) recorded how the response in terms of idea production increased from a mean of 2.17 to 2.87 ($p<0.05$) post EET training, with the innovativeness score of those ideas rising from 1.46 to 2.16 ($p<0.01$). Based on their action learning intervention, Gielnik *et al*. (2015) also found a significant effect from their action training programme on business opportunity identification ($B = 0.25$, $p<0.01$).

Table 3 – Empirical approach within this Systematic Review

Lead Author	Sample Size	Intervention	Relevant measurement variable in this context	Effect
1. Ideational outcomes				
Costa, Silvia (2018)	283	Cognitive entrepreneurial training in Germany/Portugal	Assessment of business prototype viability	Positive
Cohen, Dan (2021)	149	IDEATE EE programme, ten 75 minute courses in the US.	Number and level of innovative opportunities identified	Positive
DeTienne, Dawn (2004)	130	SEEC training intervention in a western US university	Number of ideas generated, innovativeness of the ideas	Positive
Fiet, James (2008)	52	8 week course in systematic search training	Number and wealth generating potential of ideas recorded in an idea log.	Positive
Gielnik, Michael (2015)	374	12 week training programme based on action learning in two Ugandan universities	Number of ideas, number considered profitable, number pursued	Positive
Gielnik, Michael (2016)	389	STEP training programme for vocational trainees at a Uganda university	Number of ideas generated, and the self perceived quality of those ideas	Positive
Muñoz, Christian (2011)	15	Students on a module at Nottingham University business school.	Number and quality of the ideas generated	Positive
Karimi, Saeid (2016b)	68	Entrepreneurship courses with specific creativity exercises	Number of ideas generated, and innovativeness of ideas	Positive
Nab, Jan (2013)	23	Mandatory entrepreneurship course at Utrecht university.	Number of business opportunities, level of divergent thinking	Partial
Breslin, Dermot (2014)	70	Evolutionary education approach tested on students at Sheffield university	Number of ideas generated, and quality of the ideas generated	No effect
2. Semi Structured Interviews				
Nab, Jan (2014)	9	n/a	Educators perception of ability to teach opportunity identification	Positive
Saks, Naomi (2002)	14	n/a	Educators perception of ability to teach opportunity identification	No effect

Tynan, Margaret (2023)	10	n/a	Educators perception of the impact of design based education	Positive
3. Self-report Measures				
Levie, Jonathan (2009)	5,000	Different forms of entrepreneurship training in the UK	Assessment of whether good opportunities exist for starting a business in their area	Positive
Lourenco, Fernando (2011)	384	Six month training course at a university in North West England	Creativity measure including perception of idea generating capability	Partial
Von Graevenitz, Georg (2010)	196	Compulsory entrepreneurship course at a German university	Students assessment of whether their opportunity recognition skills improved	Positive
Karlsson, Tomas (2013)	105	Year-long entrepreneurship masters programme in Denmark.	Students assessment of 3 measures relating to their confidence in searching for ideas	Positive
Morris, Michael (2013)	40	An entrepreneurial course involving classroom teaching and then team based work embedded with micro-entrepreneurs in Cape Town, interacting with coaching around these situations..	Student assessment of 2 measures relating to scanning/search and to association/connection designed to reflect their opportunity recognition competencies	Positive
Karimi, Saeid (2016a)	205	Fundamentals of entrepreneurship at Iranian Universities	Self-report scale to reflect participants opportunity identification perception	No effect
Gundry, Lisa (2014)	137	Part time MBA programme in the US.	Perception of own creativity skills	Positive
Chang, Wen-Long (2014)	268	Online entrepreneurship courses offered by Taiwan's SME Online University.	Participants assessment of 10 measures designed to reflect their perceived opportunity recognition capability.	Positive
Lim, WeiLee (2023)	247	Final year students who attended entrepreneurship courses at 2 private universities in Malaysia.	Students assessment of the number of ideas generated	Positive
Bell, Robin (2015)	27	Higher education module at a UK university	Reflective essays on how EET impacted a participant's entrepreneurial outlook.	Positive
Barucic, Ajka (2016)	48	University entrepreneurship education course in Bosnia/Herzegovina	4 part measure of perceived opportunity recognition capability	Positive
Lindberg, Erik (2017)	103	COPSS intervention in a Swedish university	3 part measure of perceived opportunity recognition capability.	Positive
Albornoz, Carlos (2017)	1,532	Mandatory entrepreneurship courses in Chile. Not just to business students.	5 part scale measuring opportunity recognition skills	Positive
Gielnik, Michael (2017)	27	Entrepreneurship training at a Kenya university.	A measure of entrepreneurial self-efficacy, including opportunity perception	Positive
Olugbola , Seun Azeez (2017)	490	Participants on a second year entrepreneurship course in Malaysia	4 part measure of perceived opportunity recognition capability	Positive
Zulfiqar, Salman (2021)	555	Social empathy, education and training in China, India, Pakistan	3 part scale relating to opportunity alertness	Positive
Hultén, Peter (2020)	70	COPSS intervention in a Russian university management course	3 part scale relating to opportunity identification capabilities	Positive
Othman, Nor Hafiza (2020)	152	152 students on a university education course in Malaysia	7 statements around opportunity recognition	Positive
Mathews, Robert (2021)	376	150 minute divergent thinking training programme in the US.	Measure of openness to experience, in response to undertaking ideation exercises.	Positive
Okolie, Chinonso (2021)	1,192	Compulsory university wide EE course in Nigeria	5 item opportunity recognition scale.	Positive
Kremer, Florence (2021)	444	20 hours entrepreneurship programme at the University of Bordeaux, France.	Self-report assessment of levels of entrepreneurial skills	No effect

Saadat, Soroush (2022)	91	Entrepreneurship course delivered at a Iranian university	Scale of entrepreneurial alertness developed by Tang et al (2012)	Positive
Hou, Fei (2022)	1,150	Students who had taken entrepreneurship course at 55 Chinese universities	Likert scale measuring students assessment of their ability to identify opportunities	Positive
Costin, Yvonne (2022)	23	Dedicated EE postgraduate EE programme in Ireland.	Response to the statement, ideas always come to me.	No effect
Mets, Tonis (2022)	304	EET programme delivery across separate Estonian universities	Response to statements around self perceived competence in identifying opportunities	Positive
Silveyra-Leon, Geraldina (2023)	525	Six week educational challenge experience EET programme delivered to freshmen in Mexico.	Self-report scale to reflect participant's opportunity identification perception.	Positive
Cui, Jun (2021)	1,428	Entrepreneurship courses across 15 Chinese universities	6 part scale relating to alertness to opportunity.	No effect

Moreover, the findings from the two studies within this group that failed to show the same positive effect may also be capable of explanation. Nab *et al*. (2013) found only partial support for the contention that teaching ideational heuristics flowed through to ideational outcomes, but their participant pool of 23 was far lower than the mean of 155 in this cohort of studies as a whole. Similarly, although they failed to find an improvement in idea production and quality, it is noteworthy that their intervention in the form of 'evolutionary learning' pedagogy, delivered to one treatment group in a 30-minute session, was narrower and less directly comparable to the nature of the interventions in this wider group of studies.

The second subset of studies, accounting for just 3 out of the 40 the papers in this review, concerns those whose research design involved semi-structured interviews with entrepreneurial educators. In assessing whether opportunity identification could be taught, this pair of studies came to directly contradictory results. Saks and Gaglio (2002) found that 12 out of the 14 educators that they interviewed believed opportunity identification to be un-teachable. By contrast, Nab *et al*. (2014) found that 6 of the 8 educators in their study believed that such capabilities could be developed. Tynan (2023) found that the 10 educators interviewed believe that design education pedagogies can develop the attributes, behaviours and skills associated with opportunity recognition. Although these three studies contained a low number of participants, the wider context of the studies is different. The Saks and Gaglio (2002) study which failed to advance the prospect of an EET impact was conducted some 12 years before the later Nab *et al*. (2014) study and 21 years before the Tynan (2023) study. It is worth noting that during this time interval, EET scholarship and techniques, notably those involving cognitive training and experiential learning, developed considerably.

The third and final batch of 27 studies relates to those who draw their findings from a student's perception of their own capabilities, typically graded on a Likert scale in response to a series of statements. The strength of this cohort lies in the population sizes, which at a mean of 560 participants, is some three and a half

times larger than the size of the grouping which considered ideational outcomes. However, the weakness of this evidence pool lies in that these studies equate an effect to a person's temporal reading of their own ideational abilities, albeit potentially inflating the impact based on a student's self-assessment rather than any independent evaluation of the impact.

Within these 27 self-report studies, a wide range of methodologies are also in play. These differences extend beyond the scale of the population samples, or the diversity in the dependent variables being measured, as already laid out in Table 3. A large number of these studies confine themselves to assessing the relationship between attendance in an EET course and a person's perceived capabilities with opportunity identification (Chang *et al*., 2014; Barucic and Umihanic, 2016; Olugbola, 2017; Cui *et al*., 2021; Zulfiqar *et al*., 2021; Hou *et al*., 2022; Lim *et al*., 2023). Others go further, using pre- and post-test surveys to measure the extent to which the participants believe their OIC improved post an EET intervention (Von Graevenitz *et al*., 2010; Morris *et al*., 2013; Nab *et al*., 2013; Albornoz and Amoros, 2017; Costin *et al*., 2022). Another study adopts the same approach but looks to see if the same self-report assessment holds true across different courses at different universities (Mets *et al*., 2022). Some take a quasi-experimental approach, comparing the self-report responses of those who have and have not undertaken a particular EET course (Karlsson and Moberg, 2013; Gielnik *et al*., 2016; Hultén and Tumunbayarova, 2020; Kremer and Jouison, 2021). Gielnik *et al*. (2015) and Gielnik *et al*. (2017) take a longitudinal approach, observing the impact of EET a participant's self-reported opportunity identification capabilities over a 12 month and 32 month period respectively.

Notwithstanding the methodological differences that exist within this grouping, 22 out of the 27 studies (82%) report empirical findings which support the contention that EET advances OIC, with a further study (Lourenco and Jayawarna, 2011) concluding that a positive relationship is conditional on a person's self-perception of creativity. Amongst the four self-report studies that fail to find supporting evidence of an effect, there may again be reasons for the contrasting findings. The first of these studies (Costin *et al*., 2022) had the smallest number of participants, which at 23, was significantly below the mean of 633 found amongst these self-report studies as a whole. The second (Kremer and Jouison, 2021) found an effect which was not statistically significant. The third of these studies (Karimi *et al*., 2016a), itself questioned the effectiveness of the opportunity identification intervention within the EET programme experienced by its participants, suggesting that teachers may not have paid the necessary attention to fostering this competency in their classes. The fourth (Cui *et al*., 2021) found that compulsory curricula attendance on a Chinese entrepreneurship course did not impact upon a participant's opportunity alertness. However, the same study found that extracurricular activities, such as use of entrepreneurial games and interactions with entrepreneurs, did have a positive effect. Given that many EET courses are actually increasingly founded around these types of

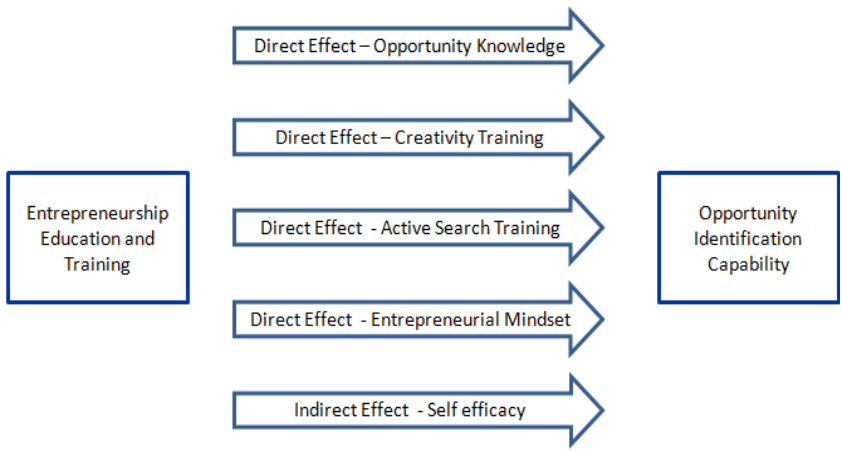
extracurricular activities, in a different study, it might thus be inferred that the same findings could have been used to provide support for an effect from an EET intervention.

When viewed in concert, the studies within these three groupings can largely be seen to support the contention that EET can impact positively upon opportunity identification capabilities. However, as Section 5 will develop, future research in this area would benefit from greater empirical standardisation and rigour.

4.2. Theme 2 – How Does EET Support Entrepreneurial Ideation?

Although the majority of the empirical studies within this review evidence a supportive effect from EET on OIC, there is no common agreement as to the transmission mechanism through which that effect occurs. As detailed in Figure 4, a number of transmission mechanisms are propagated, comprised of four direct training effects, alongside a potential indirect effect that is said to emanate from enhancements in self-efficacy.

Figure 4 – Transmission mechanisms



The first transmission mechanism described by the studies in this review revolves around the benefits that emerge from students garnering greater knowledge around the entrepreneurial opportunity concept. Drawing on human capital theory (Becker, 1962), EET is presented as imparting specific gains in knowledge that feed into higher levels of task performance (Olugbola, 2017; Othman and Othman, 2020; Silveyra-Leon *et al*., 2023). Amongst these knowledge gains, Gielnik *et al*. (2016) point to how EET can improve understanding of the sequences involved in opportunity identification, and the importance in thinking outside the box (Gielnik *et al*., 2015). Others emphasize

the benefits that flow from being able to identify a good opportunity as a result of EET, delivering a better understanding of the opportunity prototype (Nab *et al*., 2013; Costa *et al*., 2018). Whilst in a study on social entrepreneurs, EET is likened to a formal analytical tool, such that the provision of structural and experience-based knowledge allows the competitive interpretation of information and the creative location of gaps in the market (Zulfiqar *et al*., 2021).

Secondly, it is suggested that a transmission mechanism from EET to OIC emanates from the way in which EET programmes enhance the creative capacities of their learners by imparting knowledge of creative techniques and heuristics (DeTienne and Chandler, 2004; Muñoz *et al*., 2011; Gundry *et al*., 2014; Karimi *et al*., 2016b). For others, these benefits emanate as a consequence of students actively engaging with those creative activities, particularly through courses whose pedagogy is weighted towards action learning or experiential learning (Morris *et al*., 2013; Bell, 2015; Lindberg *et al*., 2017). Through active participation, creativity techniques are seen to transform from theoretical notions to a fresh way through which an individual perceives reality. Augmenting the validity of the educational intervention, practising these techniques is said to establish mental models that are apt for opportunity identification (Gielnik *et al*., 2016; Costa *et al*., 2018; Hultén and Tumunbayarova, 2020). Muñoz *et al*. (2011) use mind maps to illustrate how the development of these mental frames goes hand in hand with the development of OIC, likening these improvements to the building of an entrepreneurial asset. Tynan (2023) argues that the use of design thinking education pedagogies can develop opportunity identification competencies moving students from dependency to independence over time.

Thirdly, some studies tender that a direct effect arises as a result of EET programmes pointing students to where best to search for new opportunities (Fiet and Patel, 2008; Cohen *et al*., 2021). Conjecturing that calls just to 'stay alert' offer little practical guidance, these studies portray creativity training as an approach akin to 'passive search'. Instead, they proffer that novice entrepreneurs, often bereft of more specific work experience, will have greater success identifying potential opportunities when they are trained to undertake proactive search in just a few constrained areas, notably those in which they are most passionate. Proponents of this approach even intimate that the positive OIC results observed from studies considering creativity training, such as that of DeTienne and Chandler (2004), may in part be attributed to the seniority and greater work experience of that participant pool (Cohen *et al*., 2021). Stressing how opportunity discovery can't happen without the right information, they attribute the main training effect to come from teaching students to search for ideas in the areas where they possess the most detailed prior knowledge.

Fourthly, a number of the studies highlight how enhancements in OIC emerge through the ways in which EET programmes lead to developments in entrepreneurial alertness (Lim *et al*., 2023). Chang *et al*. (2014) highlight empirical findings which illustrate the mediating effect played by entrepreneurial

alertness. Whilst Saadat *et al*. (2022) make the case that this relationship between EET and OIC is mediated by the entrepreneurial mindset, they argue that entrepreneurship education can positively change a student's way of thinking. Rooting the entrepreneurial mindset in cognitive adjustment, they argue that this mental habit needs to be learned to take shape, such that when this is fostered through education it has a positive effect on entrepreneurial alertness.

Separate to the contentions put forward in these four direct training effects, a fifth group of studies point to OIC enhancements that develop indirectly, notably from improvements that EET programmes can imbue in an individual's perception of their own self-efficacy (Karlsson and Moberg, 2013; Albornoz and Amoros, 2017; Gielnik *et al*., 2017). Referencing the Theory of Planned Behaviour (Ajzen, 1985), it is suggested that one of the most significant contributions from EET programmes comes from the way in which they foster positive attitudes towards the identification of entrepreneurial opportunities (Lourenco and Jayawarna, 2011). In this way, EET programmes are seen to support positive emotions towards entrepreneurship, which in turn leads people to think more proactively, flexibly, and creatively, thereby improving their OIC (Othman and Othman, 2020).

Furthermore, it is also argued that by enhancing a student's confidence in their own intellectual ability to identify entrepreneurial opportunities, EET programmes create a state of worthiness (Bell, 2015). Feeding through into task motivation, EET makes students more likely to engage actively in opportunity identification post training (Hultén and Tumunbayarova, 2020). Referencing social cognitive theory (Bandura, 1986), it is further suggested that these gains in self-efficacy act as a cognitive-motivation resource that sustains passion over time post training (Gielnik *et al*., 2017).

Between them, these five groupings illustrate a range of different conduits through which EET interventions are shown to empirically feed through into improvements in OIC. These findings should be seen as complimentary rather than competitive forms of analysis. This is acknowledged within the studies themselves. Those highlighting the potency of creativity techniques also reference the impact that these techniques simultaneously have on entrepreneurial self-efficacy (Gielnik *et al*., 2017; Lindberg *et al*., 2017). Even those who advocate the merits of active search techniques acknowledge that this approach can work as a supplement to other initiatives designed to support entrepreneurial alertness and creative discovery (Cohen *et al*., 2021).

4.3. Theme 3 – What Contingency Factors Influence the Impact of EET on Opportunity Identification?

The final aspect of this thematic analysis considers those contingency factors which the extant literature suggests moderate the relationship. From the studies under review, these moderating factors can be split into two silos, those relating

to the actual recipient of the training (the student), and those connected to the nature of the intervention (the course of EET).

Focusing on who is attending an EET course, a number of scholars identify how person centric factors impinge upon training outcomes. Chief amongst these are a student's affective and motivational tendencies. Costa *et al*. (2018) find that the effect of EET on opportunity recognition is significantly moderated by entrepreneurial passion, such that EET has a significantly higher effect on individuals who embark on a course already possessing intense positive feelings towards entrepreneurial activities. Lourenco and Jayawarna (2011) demonstrate that those individuals who have a perception of being creative find entrepreneurship training to be easier to comprehend and use. This in turn leads them to better exploit their learning. This relationship is potentially inadvertently supported by Nab *et al*. (2013), who finding only partial evidence of a positive effect in OIC, simultaneously note how in their study, the participant's perceptions of their own creativity didn't rise post the EET intervention.

Considering other moderating factors which are specific to the participant, Hou *et al*. (2022) evidence the importance of entrepreneurial learning as a boundary condition that influences the link between the fluctuating effectiveness of EET programmes and the subsequent effective engagement in opportunity recognition. They suggest that those with higher experience of entrepreneurial learning, either experiential or vicarious, will be more sensitive to changes in situations. With more cognitive resources available, it is contended that they will respond more actively to the training intervention. By contrast, research by Albornoz and Amoros (2017), suggests that those with less prior exposure to business will gain the most from mandatory courses of EET. It finds the gains to be greater from those students not studying a business degree rather than those who were, from those without entrepreneurial parents or a family business background, and from those emanating from low-income households.

Further filling the silo of evidence around the moderating impact of inter-person variations, Gielnik *et al*. (2016) suggest that a person's starting level of opportunity identification capabilities pre training acts as a significant predictor of business opportunity identification after the training. Nab *et al*. (2014) even suggest that students for entrepreneurial courses might be selected based on the starting quality of their business ideas. Yet, even here the findings are not universal. In their earlier study, DeTienne and Chandler (2004) found that an individual's disposition to be innovative did not moderate the impact of EET training, such that those with a lesser predisposition for innovation derived the same benefits from the training as those with a greater disposition. Meanwhile, Karlsson and Moberg (2013) found that those students entering a course of training with low levels of Entrepreneurial Self-Efficacy (ESE) gained more from the intervention than those starting with higher levels of ESE.

The second silo within the literature pool under review points to how the impact of EET on OIC is moderated by the nature of the educational intervention

itself. Research from Levie *et al*. (2009) highlighted how university EET programmes had a far greater impact on opportunity recognition propensities than college or school-based programmes. Although they vary in the extent to which they pursue pedagogical comparisons empirically, the majority of the 40 studies highlight the tacit benefits that emanate from education pedagogies that encourage action learning and learning by doing (Muñoz *et al*., 2011; Morris *et al*., 2013; Gielnik *et al*., 2015). Thereafter the impact of EET is said to further hinge on the different ways in which these programmes are delivered, with Tynan (2023) pointing to the importance of the scaffolding used in teaching programmes, the repetition of exercises, and the use of peer challenge, in supporting structured reflection.

Reiterating the live debate that exists surrounding how EET courses are precisely delivered, the studies in this review point to how positive impacts can derive from a variety of course designs. Lindberg *et al*. (2017) point to the benefit of self-directed learning assignments. Barucic and Umihanic (2016) reference the importance of the structure and comprehensiveness of teaching material. Tynan (2023) details how the physical layout and visual aesthetic of the learning environment supported experimentation and creative freedom, whilst Chang *et al*. (2014) point to the benefits from the use of multimedia technology. Muñoz *et al*. (2011) guard against course designs that rely on formal written evaluations to assess their student's work. Focusing on the person delivering the training, others suggest that the educator should take on the role of a 'coach' (Nab *et al*., 2014; Hultén and Tumunbayarova, 2020; Tynan, 2023), with one paper highlighting the benefits of those with previous entrepreneurial experience performing that role (Okolie *et al*., 2021).

5. Recommendations for Future Research

Although the number of papers focusing on EET and OIC has risen notably in the last five years, this remains a comparatively embryonic area of study. Within the wider and deeper realm of academic research on EET programmes in general, the contrasting findings around their potential efficacy have been attributed to both empirical and conceptual inaccuracies (Nabi *et al*., 2017), and to a failure to understand the boundary conditions under which entrepreneurship education is effective (Martin *et al*., 2013; Bae *et al*., 2014). As detailed in Table 4, both of these concerns, allied to the benefit of conducting empirical investigations into the merits of individual cognitive techniques, feature in this paper's recommendations for future research around EET and OIC.

Table 4 – Recommendations for future research

Future empirical designs	
1	Greater emphasis on experimental designs
2	Increased clarity and definition around EET interventions
3	Longitudinal approaches
4	Emphasis on the study of unfolding effects
The potency of particular cognitive techniques	
5	Measuring the impact of individual cognitive techniques
Boundary conditions	
6	Understanding the personal features of those who benefit most from EET
7	Exploring the effectiveness of different modes of EET delivery

5.1. Future Empirical Designs

As detailed in Section 4, existing empirical research on EET and OIC exudes a diversity of empirical rigour. Research into EET and OIC, just as with EET research in general (Von Graevenitz *et al*., 2010), also fails to consolidate around any singular defined methodology or build upon one conceptual model. Echoing the calls made in the wider EET literature (Carpenter and Wilson, 2022), empirical studies on OIC would benefit from a qualitative grading so as to highlight the strongest sources of evidence. Allied to the benefits of such grading, this study further makes four recommendations in relation to the design of future empirical research in this area.

Firstly, when looking to measure the impact of EET interventions, it is recommended that future research prioritises the measurement of changes that occur in tangible ideational outputs, either through pre- or post-test designs, or by the use of experimental treatment and control groups. This approach avoids methodological strength being compromised by subjective measures (Nabi *et al*., 2017), not least as doubts have been cast as to the extent to which there is a correlation between self-perceived OIC and actual competence in opportunity identification (Baggen *et al*., 2018). Moreover, by moving towards a greater focus on ideational outputs, the field would then gravitate towards a narrower portfolio of independent variables, allowing for greater comparisons in the unfolding research. Within that context, future research should also ensure that it selects the measures that are most apt for the aims of the study in question. For example, the volume of ideas being generated is apt for research into capabilities with ideational fluency (Ames and Runco, 2005). Measures of idea innovativeness are the most relevant to research considering the spawning of high growth entities (Angulo-Guerrero *et al*., 2017). Whilst for those reflecting on what best constitutes an achievable and meaningful outcome for many EET participants, the

perceived usefulness and achievability of an idea may be the most relevant indicator (Suroso *et al*., 2020).

Secondly, there is a case for future empirical designs to be more explicit about the nature of the educational intervention whose effects they are investigating. A primary challenge within the extant research is the notion that educational intervention is monolithic (Piperopoulos, 2012). Yet as the 40 studies within this review show, EET interventions vary considerably in terms of their pedagogical philosophy, techniques, and even basic duration. Too often a course in entrepreneurship can be whatever an instructor wants it to be (Morris *et al*., 2013). Through the use of a shared lexicon, future studies should more adequately describe the pedagogies that they are testing such that it becomes easier to compare effects from similar interventions (Rideout and Gray, 2013). These distinctions would also help elucidate those EET interventions that have the greatest effect.

The need for empirical studies in this area to better define the variables under consideration also extends to the make-up of both the population pool in receipt of the educational intervention, and the educational institutions involved in delivering it. Findings from elite private colleges in America may well differ from large public institutions in Europe (Lüthje and Franke, 2002), or entrepreneurship courses delivered in China through a more didactic learning-based approach (Cui *et al*., 2021). With EET programmes becoming ever more diffused across a range of different campuses, the recipients are themselves ever more diverse in terms of their demographics, prior entrepreneurial exposure, and commitment (Hahn *et al*., 2017). Being clear as to who is receiving the training would once again allow similar comparisons to be drawn, in turn shedding light on the participant groupings that would most benefit from EET intervention. Without such clarity, the heterogeneous profiles of the students may only otherwise continue to explain a pattern of heterogeneous results (Martin *et al*., 2013; Naia *et al*., 2014).

Thirdly, future empirical designs should focus more explicitly on the long-term sustainability of EET interventions, not least as there remain questions as to the durability of idea generating exercises (Assenza, 2017). Given that many students may not embark on venture creation activities for a number of years after their university education ends, these longitudinal assessments matter. A previous wider meta-analysis into EET research noted that only 4 out of 42 studies measured the effects of EET programmes beyond short term outcomes (Martin *et al*., 2013). Amongst the 40 studies reviewed within this research on OIC, only two (Gielnik *et al*., 2015; Gielnik *et al*., 2017) looked at the associated impact of the effect over time.

Avoiding the problems with short term time frames that transpire from studies measuring outcomes purely at the end of particular ideational exercise, future empirical studies could compare the number of viable ideas that an individual student had at the start, and then the end, of a full course of entrepreneurship education. Alternatively, giving educational theory the chance

to blend further with real life business experience, future empirical studies might choose to track ideational performance some six months or twelve months after a course had finished. Once again using treatment and control groups, this form of longitudinal analysis would further advance understanding as to the extent to which entrepreneurship education is causal and beneficial to the subsequent entrepreneurship practice.

Finally in terms of future empirical designs, the field would benefit from studies that are able to illuminate how enhancements in opportunity identification capabilities are actually manifested. Amongst the 40 studies covered in this review, only one took a turning down this particular highway, as it deployed the use of mind-maps (Muñoz *et al*., 2011). Going forward there is the potential for a broadening in research designs such that they include in-depth interviews and verbal protocol analysis to elucidate changes occurring real time in the mindset of the student. Such an approach may also shed light on how opportunity identification capabilities develop at different points during an EET intervention, and in the context of a group learning environment, demonstrate the extent to which that capability is influenced through interactions with other participants.

5.2. The Potency of Particular Cognitive Techniques

The empirical studies considered in this review highlight a number of different transmission mechanisms between EET and OIC. However, within that extant body of research, there is a notable absence of empirical investigations into the merits of training entrepreneurship students in one particular cognitive technique or heuristic. Indeed, within the 40 studies under review, active search is really the only technique that is subjected to singular statistical analysis.

Although opportunity identification has been likened to a domain-specific form of creativity, one whose core competencies are interlinked with the application of creativity heuristics (Amabile, 1996), there is a dearth of EET studies investigating the impact of teaching particular creative techniques on OIC. This is again something of a surprise, not least given that creative self-efficacy is suggested as being more potent in opportunity identification than wider entrepreneurial self-efficacy (Sobakinova *et al*., 2020).

The lack of empirical studies investigating the impact of EET interventions that focus upon particular cognitive techniques, contrasts with the conceptual approach taken in the literature. In 2004, Baron advanced that novice entrepreneurs could be trained to be more successful in recognizing opportunities through pattern recognition (Baron, 2004). It was propagated that such training was feasible, first by developing prototypes which illustrated how to search for connections in changing situations (such as demographic changes and the restaurant industry), and second by mirroring an experienced entrepreneur's knowledge of exemplars by using EET to provide students with exposure to a

wide range of business opportunities. Yet in the two decades since Baron's original contention, it remains empirically untested.

More recently scholars have suggested that the ill-defined nature of entrepreneurial problems lies at odds with more traditional educational expectations that involve well defined processes, geared to reaching a single answer with guidance from instructors. Instead, they suggest that design thinking techniques represent a better paradigm through which EET can enhance OIC (Sarooghi *et al*., 2019). Conceptually, it has therefore been advanced that students would benefit from being instructed in a whole range of specific cognitive skills, such as abductive reasoning, analogical reasoning, framing, and mental simulation (Garbuio *et al*., 2018). Yet once again, the individual potency of each of these individual cognitive approaches through EET remains empirically unproven.

That same lack of empirical investigation extends to the exploration of meta-cognition, another aspect of the entrepreneurial mindset considered central to opportunity recognition (Hultén and Tumunbayarova, 2020). The development of meta-cognitive mechanisms is said to aid the transfer of knowledge across domains (Flavell, 1987), such that meta-cognitive awareness can facilitate opportunity recognition within an uncertain and dynamic context (Haynie *et al*., 2010). Meta-cognition is presented, not as a dispositional trait, but as a learned process, which can be enhanced through training (Schmidt and Ford, 2003). In the past, empirical analysis has reflected on the extent to which meta-cognitive training in an EET course supports the effective evaluation of profitable opportunities (Haynie *et al*., 2004), but as yet, no such analysis has been undertaken to consider its impact on the proceeding act of opportunity identification.

With opportunity identification being portrayed as an inherently creative activity (Hansen *et al*., 2011), future academic scholarship would benefit from empirical research to understand the extent to which training students in many of these respective techniques feeds through into medium term outcomes in terms of entrepreneurial ideation. Where such effects are proven, it would strengthen the case for these techniques to be put at the heart of future programme designs.

5.3. Boundary Conditions

As detailed in Section 4, empirical studies have already explored some of the boundary conditions that moderate the potential efficacy of EET interventions on OIC. This has included studies considering the role of entrepreneurial passion (Gielnik *et al*., 2017; Costa *et al*., 2018) and a student's perception of their own creative capabilities (Lourenco and Jayawarna, 2011). Yet when it comes to OIC, there remains much to understand in relation to the questions first posed by Rideout and Gray (2013) in terms of who EET is best delivered by, in what type

of university, to what type of student, with what type of goal, and in what set of circumstances. Developing empirical answers to these questions would seem directly relevant to the way in which courses on opportunity identification are offered in the future (Pittaway and Cope, 2007). Whilst practical and financial restraints may make prior screening of student aptitudes unrealistic, differing starting attitudes and aptitudes amongst the participating students (akin perhaps to those participating on sports training programmes), will intrinsically react differently with the EET intervention. Where possible, these are potential control variables that future empirical studies in this area might look to introduce.

With the success of EET programmes said to be largely dependent on the nature of the learner (Béchard and Grégoire, 2005), future empirical research needs to understand who benefits most from training in OIC. This goes further than exploring affective tendencies. Innate characteristics, whether in the form of a genetic openness to experience (Nicolaou *et al*., 2008) or a person's level of different cognitive capabilities, also impact on OIC. Yet, there remains little clarity on whether it is those with the highest or lowest starting levels of these capabilities, that are the ones who benefit most from training in opportunity identification, and who arguably therefore represent the cohort upon whom such courses should be focussed. Taking this one step further, conceptually it has been suggested that every individual has their own learning style (Dutta and Crossan, 2005), with this style said to impact a person's ability to respond to training in the identification of opportunities such that the role of the education should be to help each student uncover the strengths in their learning style (Corbett, 2007). It has been tendered that entrepreneurship courses looking at entrepreneurial opportunity recognition should be tailored differently for those whose cognitive styles are either intuitive or analytical (Molaei *et al*., 2014). Yet once again, there remains a dearth of empirical investigations to illustrate this contention, one that if proven, could be used in initiatives that look to personalize the way in which EET programmes might be delivered in the future (Thrane *et al*., 2016).

Developing on that theme, it would be beneficial for future empirical research to understand the extent to which the actual delivery of EET courses impacts OIC. Outside those studies referencing overarching pedagogies, or those considering the design of actual physical spaces in business schools (Pittaway *et al*., 2020), there is only limited empirical research into the impact of different educational techniques or educators. Variously it has been suggested that the innovativeness and risk-taking nature of the teacher (Peltonen, 2015), their passion (Wu and Jung, 2008), and their ability to act as a role model for their students (Ruskovaara and Pihkala, 2013), can all have a material impact on learning outcomes. Yet the extent to which the individual educator moderates a student's ability to benefit from EET in the context of opportunity identification appears statistically untested. To gauge such an impact, future research should look to observe the results in OIC that are obtained from different individuals, delivering the same course content to a similar cohort of students.

Beyond the moderating impact of the educator him or herself, there would also be merit in understanding the extent to which different educational environments moderate the effectiveness of EET on OIC. With digital technology characterized as an external enabler (Nambisan, 2017) and a tool to help students research, discover, and create more ideas (Ozgen, 2022), it would be informative to understand the comparative differences that emanate from courses which more fully engage with digital infrastructure. Similarly, where the involvement in business and university-based incubators is said to provide students with a 'community of practice' (Lave and Wenger, 1991) and support learning by doing (Refai and Klapper, 2016), it may be instructive to observe the extent to which this exposure moderates the impact of EET on OIC. In considering the nature of the education intervention, future empirical research could also extend to consider variables such as the number of students on a course, if a programme was elective or mandatory, and whether a student's enjoyment rating of their learning experience, moderated its impact.

6. Conclusion

The aim of this systematic review is two-fold: to identify and synthesise past empirical research into the impact of EET interventions on OIC, and to consider ways through which future empirical study could both be enhanced and beneficially extended. Given that so many of the publications within this review are weighted to the last few years, the potential impact of EET programmes upon opportunity identification capabilities appears to be a matter of growing interest in the field. Accordingly, the timing of these recommendations is becoming more apt.

The focus of this study has not extended to consider the potential by-products of ideational training. As such, it has not diversified into the auxiliary debate as to whether ideational training supports entrepreneurial ambitions (Molaei *et al*., 2014; Seun and Kalsom, 2015; Mathews *et al*., 2021), or suppresses them (Oosterbeek *et al*., 2010; Piperopoulos, 2012). Instead, the focus has been on the extent to which this particular subset of entrepreneurial capabilities can be developed by education and training. This focus has implications for two of the most central questions in entrepreneurship scholarship, firstly why some individuals perform better at opportunity recognition than others (Shane and Venkataraman, 2000), and secondly on the extent to which opportunity identification skills can be actively developed (Drucker, 1985).

In the past it has been suggested that individuals interested in becoming entrepreneurs should be trained in opportunity recognition before they are taught other technical competencies (Pittaway and Cope, 2007). The empirical data reviewed in this study points to the efficacy of EET interventions in supporting OIC. This applies in particular to the cohort of studies that specifically measure

the impact of EET on actual ideational outcomes. Concentrating on the fuzzy front end of entrepreneurial ideas, this review reaffirms the legitimacy of entrepreneurship education as a discipline (Kuratko, 2005; Katz, 2008). Set against the two aforementioned central questions in entrepreneurship research, those empirical studies considering EET and OIC suggest that entrepreneurs can both be taught this capability, and that the possession of knowledge and confidence in how to undertake this particular task can act as a differentiator between people. However, as has been detailed, the current results are also somewhat fledgling and ill-defined, with a number of aspects in need of further confirmation.

Against this background, and with the successful ideas described as the 'lifeblood of entrepreneurship' (Ward, 2004), further empirical exploration around the question of EET and OIC would certainly appear to constitute a worthwhile undertaking.

References:

Ajzen, I. (1985), "From intentions to actions: A theory of planned behavior", in: Kuhl, J. and Beckmann, J. (Eds.), *Action-control: From Cognition to Behavior*, p 11-39. Heidelberg: Springer.

Albornoz, C. and Amoros, J.E. (2017), "The effect of entrepreneurship education on opportunity recognition self-efficacy", in: Leger-Jarnio, C. and Tegtmeier, S. (Eds.), *Research Handbook on Entrepreneurial Opportunities*, p 285-304. Cheltenham, UK: Edward Elgar Publishing. **(**)**

Amabile, T. (1996), *Creativity and Innovation in Organizations*. Boston, MA: Harvard Business School.

Ames, M. and Runco, M. (2005), "Predicting entrepreneurship from ideation and divergent thinking", *Creativity and Innovation Management*, 14(3): p 311-315.

Angulo-Guerrero, M.J., Pérez-Moreno, S. and Abad-Guerrero, I.M. (2017), "How economic freedom affects opportunity and necessity entrepreneurship in the OECD countries", *Journal of Business Research*, 73: p 30-37.

Assenza, P. (2017), "Inspiring innovation and creativity: An example of effectuation in the entrepreneurial classroom", *Global Journal of Entrepreneurship*, 1(1): p 43-56.

Bae, T., Qian, S., Miao, C., and Fiet, J. (2014), "The relationship between entrepreneurship education and entrepreneurial intentions: A meta–analytic review", *Entrepreneurship Theory and Practice*, 38(2): p 217-254.

Baggen, Y., Kampen, K., Naia, A., Biemens, H., Lans, T. and Mulder, M. (2018), "Development and application of the opportunity identification competence assessment test (OICAT) in higher education", *Innovations in Education and Teaching International*, 55(6): p 735-745.

Bandura, A. (1986), *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall.

Baron, R.A. (2004), "The cognitive perspective: A valuable tool for answering entrepreneurship's basic 'why' questions", *Journal of Business Venturing*, 19(2): p 221-239.

Barucic, A., and Umihanic, B. (2016), "Entrepreneurship education as a factor of entrepreneurial opportunity recognition for starting a new business", *Management: Journal of Contemporary Management Issues*, 21(2): p 27-44. **(**)**

Béchard, J. and Grégoire, D. (2005), "Entrepreneurship education research revisited: The case of higher education", *Academy of Management Learning & Education*, 4(1): p 22-43.

Becker, G.S. (1962), "Investment in human capital: A theoretical analysis", *Journal of Political Economy*, 70(5, Part 2): p 9-49.

Bell, R. (2015), "Developing the next generation of entrepreneurs: Giving students the opportunity to gain experience and thrive", *International Journal of Management Education*, 13(1): p 37-47. **(**)**

Breslin, D. and Jones, C. (2014), "Developing an evolutionary/ecological approach in enterprise education", *International Journal of Management Education*, 12(3): p 433-444. **(**)**

Carpenter, A, and Wilson, R. (2022), "A systematic review looking at the effect of entrepreneurship education on higher education student", *International Journal of Management Education*, 20(2): article 100541.

Chang, W., Liu, W. and Chiang, S. (2014), "A study of the relationship between entrepreneurship courses and opportunity identification: An empirical survey", *Asia Pacific Management Review*, 19(1): p 1-24. **(**)**

Clausen, T. (2020), "Entrepreneurial thinking and action in opportunity development: A conceptual process model", *International Small Business Journal*, 38(1): p. 21-40.

Cohen, D., Hsu, D.K. and Shinnar, R.S. (2021), "Identifying innovative opportunities in the entrepreneurship classroom: A new approach and empirical test", *Small Business Economics*, 57(4): p 1931-1955. **(**)**

Corbett, A.C. (2007), "Learning asymmetries and the discovery of entrepreneurial opportunities", *Journal of Business Venturing*, 22(1): p 97-118.

Costa, S., Santos, S., Wach, D., and Caetano, A. (2018), "Recognizing opportunities across campus: The effects of cognitive training and entrepreneurial passion on the business opportunity prototype", *Journal of Small Business Management*, 56(1): p 51-75. **(**)**

Costin, Y., O'Brien, M., and Hynes, B. (2022), "Entrepreneurial education: Maker or breaker in developing students' entrepreneurial confidence, aptitude and self-efficacy?", *Industry and Higher Education*, 36(3): p 267-278. **(**)**

Cui, J., Sun, J., and Bell, R. (2021), "The impact of entrepreneurship education on the entrepreneurial mindset of college students in China: The mediating role of inspiration and the role of educational attributes", *International Journal of Management Education*, 19(1): article 100296. **(**)**

Davis, J., Mengersen, K., Bennett, S. and Mazerolle, L. (2014), "Viewing systematic reviews and meta-analysis in social research through different lenses", *Springer Plus*, 3: article 511.

Department for Business, Innovation and Skills (2016), "Entrepreneurship modules: Student numbers, August 2014 to July 2015 academic year", *BIS Occasional Statistics*. Published 10 March 2016. Available at: https://www.gov.uk/government/publications/entrepreneurship-modules-student-numbers-august-2014-to-july-2015-academic-year.

DeTienne, D., and Chandler, G. (2004), "Opportunity identification and its role in the entrepreneurial classroom: A pedagogical approach and empirical test", *Academy of Management Learning & Education, 3*(3): p 242-257. **(**)**

Drucker, P. (1985), *Entrepreneurship and Innovation: Practice and Principles*. New York: Harper & Row.

Dutta, D. and Crossan, M. (2005), "The nature of entrepreneurial opportunities: Understanding the process using the 4I organizational learning framework", *Entrepreneurship Theory and Practice*, 29(4): p 425-449.

Fayolle, A. and Gailly, B. (2015),"The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence", *Journal of Small Business Management*, 53(1): p 75-93.

Fayolle, A., Gailly, B. and LassasClerc, N. (2006), "Assessing the impact of entrepreneurship education programmes: A new methodology", *Journal of European Industrial Training*, 30(9): p 701-720.

Fellnhofer, K. (2019), "Toward a taxonomy of entrepreneurship education research literature: A bibliometric mapping and visualization", *Educational Research Review*, 27: p 28-55.

Fiet, J. and Patel, P. (2008), "Entrepreneurial discovery as constrained, systematic search", *Small Business Economics*, 30(3): p 215-229. **(**)**

Flavell, J. (1987), "Speculations about the nature and development of metacognition", in: Weinert, F.E. and Kluwe, R.H. (Eds), *Metacognition, Motivation and Understanding*, p 21-29. Hillside, NJ: Lawrence Erlbaum Associates.

Garbuio, M., Dong, A., Lin, N., Tschang, T. and Lovallo, D. (2018), "Demystifying the genius of entrepreneurship: How design cognition can help create the next generation of entrepreneurs", *Academy of Management Learning & Education*, 17(1): p 41-61.

Gielnik, M., Frese, M., Kahara-Kawuki, A., Wasswa Katono, I., *et al.* (2015), "Action and action-regulation in entrepreneurship: Evaluating a student training for promoting entrepreneurship", *Academy of Management Learning & Education*, 14(1): p 69-94. **(**)**

Gielnik, M., Frese, M., Bischoff, K., Muhangi, G. and Omoo, F. (2016), "Positive impact of entrepreneurship training on entrepreneurial behavior in a vocational training setting", *Africa Journal of Management*, 2(3): p 330-348. **(**)**

Gielnik, M., Uy, M., Funken, R. and Bischoff, K. (2017), "Boosting and sustaining passion: A long-term perspective on the effects of entrepreneurship training", *Journal of Business Venturing*, 32(3): p 334-353. **(**)**

Gundry, L., Ofstein, L. and Kickul, J. (2014), "Seeing around corners: How creativity skills in entrepreneurship education influence innovation in business", *International Journal of Management Education*, 12(3): p 529-538. **(**)**

Hahn, D., Minola, T., Van Gils, A. and Huybrechts, J. (2017), "Entrepreneurial education and learning at universities: Exploring multilevel contingencies", *Entrepreneurship & Regional Development*, 29(9-10): p 945-974.

Hammersley, M. (2001), "On systematic reviews of research literatures: A narrative response to Evans and Benefield", *British Educational Research Journal*, 27(5): p 543-554.

Hansen, D., Lumpkin, G. and Hills, G. (2011), "A multidimensional examination of a creativitybased opportunity recognition model", *International Journal of Entrepreneurial Behavior & Research*, 17(5): p 515-533.

Hardie, B., Highfield, C. and Lee, K. (2023), "Attitudes and values of teachers and leaders towards entrepreneurship education", *Research Papers in Education*, 38(4): p 690-714.

Haynie, J., Grégoire, D. and Shepherd, D. (2004), "Informing entrepreneurial cognition: The role of metacognition and analogical training in strategic decision-making", in: *Frontiers of Entrepreneurship Research*, p 584-595. Wellesley, MA: Babson College.

Haynie, J., Shepherd, D., Mosakowski, E. and Earley, P. (2010), "A situated metacognitive model of the entrepreneurial mindset", *Journal of Business Venturing*, 25(2): p 217-229.

Hayton, J. and Cholakova, M. (2012), "The role of affect in the creation and intentional pursuit of entrepreneurial ideas", *Entrepreneurship Theory and Practice*, 36(1): p 41-68.

Hou, F., Su, Y., Qi, M., Chen, J. and Tang, J. (2022), "A multilevel model of entrepreneurship education and entrepreneurial intention: Opportunity recognition as a mediator and entrepreneurial learning as a moderator", *Frontiers in Psychology*, 13: article 837388. **(**)**

Hultén P. and Tumunbayarova, Z. (2020), "Building students' entrepreneurial mindsets: Results from an intervention at a Russian university", *International Journal of Management Education,* 18(2): article 100380. **(**)**

Karimi, S., Biemans, H., Lans, T., Chizari, M., and Mulder, M. (2016a), "The impact of entrepreneurship education: A study of Iranian students' entrepreneurial intentions and opportunity identification", *Journal of Small Business Management*, 54(1): p 187-209. **(**)**

Karimi, S., Biemans, H., Lans, T., Aazami, M., and Mulder, M. (2016b). "Fostering students' competence in identifying business opportunities in entrepreneurship education", *Innovations in Education and Teaching International*, 53(2): p 215-229. **(**)**

Karlsson, T. and Moberg, K. (2013), "Improving perceived entrepreneurial abilities through education: Exploratory testing of an entrepreneurial self-efficacy scale in a pre-post setting", *International Journal of Management Education*, 11(1): p 1-11. **(**)**

Katz, J. (2008), "Fully mature but not fully legitimate: A different perspective on the state of entrepreneurship education", *Journal of Small Business Management*, 46(4): p 550-566.

Kavanagh, P. and Hisrich, R. (2010), "The relationship between the quality of the idea and the strategic potential of a new venture: A longitudinal study of five Irish campus companies", *Managing Global Transitions*, 8(3): p 261-281.

Kremer, F. and Jouison, E. (2021), "Definition and testing of a skills framework to evaluate the effect of a pedagogical program in entrepreneurship", *Journal of Enterprising Culture*, 29(1): p 21-39. **(**)**

Kuratko, D. (2005), "The emergence of entrepreneurship education: Development, trends, and challenges", *Entrepreneurship Theory and Practice*, 29(5): p 577-597.

Lave, J. and Wenger, E. (1991), *Situated Learning: Legitimate Peripheral Participation*. Cambridge, UK: Cambridge University Press.

Levie, J., Hart, M. and Anyadike-Danes, M. (2009), "The effect of business or enterprise training on opportunity recognition and entrepreneurial skills of graduates and non-graduates in the UK", *Frontiers of Entrepreneurship Research*, 29(23): article 1. **(**)**

Lim, W., Lee, Y. and Mamun, A. (2023), "Delineating competency and opportunity recognition in the entrepreneurial intention analysis framework", *Journal of Entrepreneurship in Emerging Economies*, 15(1): p 212-232. **(**)**

Lindberg, E., Bohman, H., Hultén, P. and Wilson, T. (2017), "Enhancing students' entrepreneurial mindset: A Swedish experience", *Education + Training*, 59(7-8): p 768-779. **(**)**

Littell J., Corcoran, J. and Pillai V. (2008), *Systematic Reviews and Meta-Analysis*. Oxford, UK: Oxford University Press.

Lourenço, F. and Jayawarna, D. (2011), "Enterprise education: The effect of creativity on training outcomes", *International Journal of Entrepreneurial Behavior & Research*, 17(3): p 224-244. **(**)**

Lumpkin, G. and Lichtenstein, B. (2005), "The role of organizational learning in the opportunity recognition process", *Entrepreneurship Theory and Practice*, 29(4): p 451-472.

Lüthje, C. and Franke, N. (2002), "Fostering entrepreneurship through university education and training: Lessons from Massachusetts Institute of Technology", In: EURAM 2nd Annual

Conference on Innovative Research in Management, Stockholm, Sweden, 9-11 May 2002, Conference Proceedings.

Man, T.W., Lau, T. and Chan, K.F. (2002), "The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies", *Journal of Business Venturing*, 17(2): p 123-142.

Martin, B., McNally, J. and Kay, M. (2013), "Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes", *Journal of Business Venturing*, 28(2): p 211-224.

Mathews, R., Wessel, R. and Goldsby, M. (2021), "An examination of the effect of new venture ideation exercises on entrepreneurial intentions", *Entrepreneurship Education and Pedagogy*, 4(4): p 637-665. (**)

Mets, T., Raudsaar, M., Vahejoe, K., Kaseorg, M., and Vettik-Leemet, P. (2022), "Putting entrepreneurial process competence into the focus in entrepreneurship education: Experience from Estonian Universities", *Administrative Sciences*, 12(2): article 67. **(**)**

Moher, D., Liberati, A., Tetzlaff, J. and Altman D.G. (2009), "Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement", *BMJ*, 2009: article 339. doi: https://doi.org/10.1136/bmj.b2535

Molaei, R., Reza Zali, M., Hasan Mobaraki, M. and Yadollahi Farsi, J. (2014),"The impact of entrepreneurial ideas and cognitive style on students entrepreneurial intention", *Journal of Entrepreneurship in Emerging Economies*, 6(2): p 140-162.

Morland, L., Scott, J.M. and Thompson, J. (2021), "Experiential entrepreneurship education and the student-focused entrepreneurial university", *Education + Training*, *63*(9): p 1258-1275.

Morris, M., Webb, J., Fu, J., and Singhal S. (2013), "A competency-based perspective on entrepreneurship education: Conceptual and empirical insights", *Journal of Small Business Management*, 51(3): p 352-369. **(**)**

Motta, V. and Galina. S. (2023), "Experiential learning in entrepreneurship education: A systematic literature review", *Teaching and Teacher Education*, 121: article 103919.

Muñoz, C., Mosey, S. and Binks, M. (2011), "Developing opportunity-identification capabilities in the classroom: Visual evidence for changing mental frames", *Academy of Management Learning & Education*, 10(2): p 277-295. **(**)**

Nab, J., Bulte, A. and Pilot, A. (2013), "Fostering the competence of science students in identifying business opportunities: A design research approach", *International Journal of Entrepreneurial Venturing*, 5(1): p 28-47. **(**)**

Nab, J., Van Keulen, H. and Pilot, A. (2014), "Strategies of expert teachers for teaching identification of business opportunities", *Industry and Higher Education*, 28(2): p 97-111. **(**)**

Nabi, G., Linán, F., Fayolle, A., Krueger, N. and Walmsley, A. (2017), "The impact of entrepreneurship education in higher education: A systematic review and research agenda", *Academy of Management Learning & Education*, 16(2): p 277-299.

Naia, A., Baptista, R., Januário, C. and Trigo, V. (2014), "A systematization of the literature on entrepreneurship education: Challenges and emerging solutions in the entrepreneurial classroom", *Industry and Higher Education*, 28(2): p 79-96.

Nambisan, S. (2017), "Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship", *Entrepreneurship Theory and Practice*, 41(6): p 1029-1055.

Nicolaou, N., Shane, S., Cherkas, L., Hunkin, J. and Spector, T.D. (2008), "Is the tendency to engage in entrepreneurship genetic?", *Management Science*, 54(1): p 167-179.

Okolie, U.C., Igwe, P.A., Ayoola, A.A., Nwosu, H.E., Kanu, C. and Mong, I.K. (2021), "Entrepreneurial competencies of undergraduate students: The case of universities in Nigeria", *International Journal of Management Education*, 19(1): article 100452. **(**)**

Olugbola, S. (2017), "Exploring entrepreneurial readiness of youth and startup success components: Entrepreneurship training as a moderator", *Journal of Innovation & Knowledge*, 2(3): p 155-171. **(**)**

Oosterbeek, H., Van Praag, M. and IJsselstein, A. (2010), "The impact of entrepreneurship education on entrepreneurship skills and motivation", *European Economic Review*, 54(3): p 442-454.

Othman, N.H. and Othman, N. (2020), "The mediating effect of emotion on entrepreneurship education and business opportunity recognition", *International Journal of Business and Society*, 21(3): p 1479-1493. **(**)**

Ozgen, E. (2022), "Digital technologies for discovering opportunities in entrepreneurship education: Future trends", *Journal of International Business Disciplines*, 17(1): p 45-62.

Peltonen, K. (2015), "How can teachers' entrepreneurial competences be developed? A collaborative learning perspective", *Education + Training*, 57(5): p 492-511.

Piperopoulos, P. (2012), *Entrepreneurship, Innovation and Business Clusters*. London: Routledge.

Pittaway, L. and Cope, J. (2007), "Entrepreneurship education: A systematic review of the evidence", *International Small Business Journal*, 25(5): p 479-510.

Pittaway, L., Aissaoui, R., Ferrier, M. and Mass. P. (2020), "University spaces for entrepreneurship: A process model", *International Journal of Entrepreneurial Behavior & Research*, 26(5): p 911-936.

Quality Assurance Agency for Higher Education. (2018), *Enterprise and Entrepreneurship Education: Guidance for UK Higher Education Providers (January 2018)*. Gloucester, UK: Quality Assurance Agency for Higher Education

Refai, D. and Klapper, R. (2016), "Enterprise education in pharmacy schools: Experiential learning in institutionally constrained contexts", *International Journal of Entrepreneurial Behavior & Research*, 22(4): p 485-509.

Rideout, E. and Gray, D. (2013), "Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of universitybased entrepreneurship education", *Journal of Small Business Management*, 51(3): p 329-351.

Ruskovaara, E. and Pihkala, T. (2013), "Teachers implementing entrepreneurship education: Classroom practices", *Education + Training*, 55(2): p 204-216.

Saadat, S., Aliakbari, A., Alizadeh Majd, A. and Bell, R. (2022), "The effect of entrepreneurship education on graduate students' entrepreneurial alertness and the mediating role of entrepreneurial mindset", *Education + Training*, 64(7): p 892-909. **(**)**

Saks, N. and Gaglio, C. (2002), "Can opportunity identification be taught?", *Journal of Enterprising Culture*, 10(4): p 313-347. **(**)**

Sarooghi, H., Sunny, S., Hornsby, J., and Fernhaber, S. (2019), "Design thinking and entrepreneurship education: Where are we, and what are the possibilities?", *Journal of Small Business Management*, 57(S1): 78-93.

Schmidt, A. and Ford, J. (2003), "Learning within a learner control training environment: The interactive effects of goal orientation and meta-cognitive instruction on learning outcomes", *Personnel Psychology*, 56(2): p 405-429.

Seun, A.O. and Kalsom, A.W. (2015), "New venture creation determinant factors of social Muslimpreneurs", *Pertanika Journal of Social Sciences and Humanities*, 23(S): p 17-32.

Shane, S. and Venkataraman, S. (2000), "The promise of entrepreneurship as a field of research", *Academy of Management Review*, 25(1): p: 217-226.

Sieger, P., Fueglistaller, U. and Zellweger, T. (2014), *Student Entrepreneurship Across the Globe: A Look at Intentions and Activities*. St. Gallen, Switzerland: KMU-HSG.

Silveyra-Leon, G., Rodriguez-Aceves, L., and Banos-Monroy, V. (2023), "Do entrepreneurship challenges raise student's entrepreneurial competencies and intention?", *Frontiers in Education*, 8: article 1055453. **(**)**

Sobakinova, D., Zhou, Y. and Durrani, D. (2020), "The role of human capital outcomes in generating business ideas", *VINE Journal of Information and Knowledge Management Systems*, 50(1): p 163-183.

Suroso, A., Rafinda, A. and Gal, T. (2020), "The evaluation of entrepreneur incubation program at higher education", *International Journal of Entrepreneurial Knowledge*, 8(2): p 14-26.

Thrane, C., Blenker, P., Korsgaard, S., and Neergaard, H. (2016), "The promise of entrepreneurship education: Reconceptualizing the individual-opportunity nexus as a conceptual framework for entrepreneurship education", *International Small Business Journal*, 34(7): p 905-924.

Timmons, J. and Spinelli, S. (1994), *New Venture Creation: Entrepreneurship for the 21st Century* (Fourth Edition). Burr Ridge, IL: Irwin Publishing.

Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-informed management knowledge by means of systematic review", *British Journal of Management*, 14(3): p 207-222.

Tynan, M. (2023), "The creative catalyst: Developing student competency in opportunity recognition", *Industry and Higher Education*, 37(4): p 496-511. **(**)**

Von Graevenitz, G., Harhoff D. and Weber, R. (2010), "The effects of entrepreneurship education", *Journal of Economic Behavior & Organization*, 76(1): p 90-112. **(**)**

Ward, T. (2004), "Cognition, creativity, and entrepreneurship", *Journal of Business Venturing*, 19(2): p 173-188.

Wu, S. and Jung, J.Y. (2008), "Is non-traditional entrepreneurship training helpful to nascent entrepreneurs? Yes and no", *Journal of Entrepreneurship Education*, 11: p 43-51.

Zulfiqar, S., Nadeem, M.A., Khan, M.K., Anwar, M.A., Iqbal M.B. and Asmi F. (2021), "Opportunity recognition behavior and readiness of youth for social entrepreneurship", *Entrepreneurship Research Journal*, 11(4): article 20180201. **(**)**

(**) reflects studies included in the final cohort of 40 studies reviewed in this literature review.