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How does entrepreneurship education promote creativity and innovation?

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Abstract: The aim of this paper is to synthesise the literature on how entrepreneurship education fosters creativity and innovation in entrepreneurs. Entrepreneurship education (EE) has long been a priority for higher education institutions around the world, as it encourages creativity and innovation. However, literature yields conflicting results. Therefore, it is critical to comprehend how entrepreneurship education can be restructured to better foster creativity. For this bibliometric study, the Web of Science (WoS) database was used, and 374 journal articles were retrieved. VOSviewer, the Science of Science tool, and Gephi were used to analyse the results. The findings identified four major themes: *EE and entrepreneurial intent*, *EE and innovation and creativity*, *entrepreneurial intent and innovation and creativity*, and *innovation and creativity and entrepreneurial success*, none of which have matured and are regularly researched. The study contributes by identifying ways to improve the effectiveness of EE in improving creativity and innovation.

Keywords: entrepreneurship education; creativity; innovation; self-efficacy; review; intent; success; motivation.

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1 Introduction

Creativity and innovation are considered to be bedrock for entrepreneurship (Zahra and Covin, 1994; Strobl et al., 2018). They serve as a foundation on which an entrepreneur identifies opportunity, arranges resources from the market, and serves the customers distinguishing itself from the competitors (Farhana and Bimenyimana, 2015; Semuel et al., 2017). Major entrepreneurial ventures such as Google, Amazon, Apple, and Uber have become successful because they were backed by continuous creativity and innovation in serving their customers. Similarly, several ventures fail because they do not sustain their innovative culture and thus lost their attraction amongst the customers (Shepherd and Patzelt, 2017; Shirshitskaia et al., 2021). Thus, entrepreneurship may be considered toothless without creativity and innovation (Alkaabi and Ramadani, 2022). One of the major issues faced by entrepreneurs is how to acquire creativity and innovation required for sustaining the business. The literature offers useful but mixed insights to this challenge. Few studies suggest that entrepreneurs are born rather than created. For instance, Karabulut (2016) suggests that entrepreneurial traits such as need for achievement, risk appetite, and locus of control in a person are inherent to them and

drive their entrepreneurial intent (EI) (Pattanayak and Kakati, 2021). Similarly, Cao et al. (2022) suggested that traits such as visionary, creative, ethical, and hardworking that make good entrepreneurs are inherent to a person and promote venture success.

Contrary to the above vision is a school of thought that focuses on nurturing entrepreneurial talent by providing right guidance and education (Wei et al., 2019). It is based on two notions:

1 people may be trained to become more creative or innovative by providing entrepreneurship education (EE) (Arcese et al., 2020)

2 even if such traits are present in the employees, they can be enhanced through proper education (Valeri and Baggio, 2021).

Continuing with this notion, the higher educational institutes worldwide have incorporated the subject of entrepreneurship within their education curricula (Agarwal et al., 2020; Dixit et al., 2022; Ramadani et al., 2022). The focus of new educational policies of countries is also on developing creativity and thinking through providing education (Sharna, 2022). EE is essential because it prepares young executives to deal with the technological and economic disruptions brought about by a changing world (Halkias et al., 2022). It helps students and emerging entrepreneurs in *reskilling* and *upskilling*, that benefits, students, institutions, training partners and the labour market (Diaz et al., 2022).

Despite the focus of the institutes, it is observed that there has been a mixed reaction from the industry and academia on the role of EE and the success of business ventures through business creativity and innovation. For instance, Linton and Klinton (2019), Li et al. (2021) and Liu (2022) observed that EE has shown positive results in incorporating the innovation and creativity. Whereas, if we look at some of the most significant entrepreneurs, we realise that they did not have that much exposure to a systematic EE. In fact, in the modern world of digitalisation, the number of entrepreneurs without any recognised education is far greater than those with systematic EE (Elmo et al., 2020). It is also observed that curriculum in most of the countries, particularly in developing nations, is more of theoretical giving much less weightage to practical aspects (Gupta et al., 2021; Kumar et al., 2022). All this undermines the credibility of the EE and makes one wonders whether there is a need for an overhaul of EE to adapt to the changing times.

There exists literature on how education promotes creativity and innovation (Vidican, 2009; Soh, 2015; Egan et al., 2017). For instance, Sahlberg (2009) examined the role of education on creativity and suggested that schools have the potential to unlock the creativity potential by addressing the barriers. Similarly, the importance of education on creativity has been studied by Sirajudin et al. (2021). There also exist several literature reviews (LRs) and bibliometrics covering aspects of EE (Sirelkhatim and Gangi, 2015; Banha et al., 2022; Carpenter and Wilson, 2022; Shabbir et al., 2022; Motta and Galina, 2023). However, a systematised and synthesised literature focusing on EE and how it influences creativity and innovation is missing in the literature in recent times. Addressing this gap, the present study synthesises the existing literature on how EE has fostered creativity and innovation through a bibliometric analysis. While doing so, it identifies the major contributions and contributors on the topic for the help of upcoming researchers. It then prepares a framework to enhance the creativity and innovation through proper education. The developed framework will help in identifying the pitfalls

in education system. The objectives of the study can be summarised in the form of following research questions:

RQ1 What are the major contributions and who are the top contributors to the identified research topic?

RQ2 What are the major research themes on the topic and how have these themes evolved over the past years?

RQ3 How can education institutes modify their EE to further enhance creativity and innovation?

The *International Journal of Technology Enhanced Learning* (*IJTEL*) is a leading journal that promotes multidisciplinary research in e-learning and the use of emerging technologies in long-term learning. The special issue of *IJTEL* on 'Entrepreneurship education and learning reflections on mindset innovation and technology' seeks to promote research on how EE helps businesses capture value in the digital era. Through a review of the literature, the current study identifies how EE can help students improve their creativity and innovation skills. It uses digital tools to conduct a bibliometric analysis to synthesise the existing literature on the subject. The study is consistent with the goals of the journal and the special issue because it focuses on creativity and innovation, which are important value creation and capture strategies in entrepreneurship. The study contributes to EE theory by highlighting how such programmes can be strengthened by incorporating research gaps in EE strategies. It then encourages the use of digital tools or technology-enhanced learning, which can be applied in other areas of entrepreneurship. The study also includes a framework for improving the EE curriculum. Technology will play a critical role in improving educational effectiveness, paving the way for future research not only in the domain of EE but also in the field of technology-enhanced learning.

2 Methodology

A LR is a powerful and a common utilised tool in research for exploring research ideas and concepts (Kraus et al., 2020; Baltazar et al., 2023). Standalone LR studies have gained prominence in the recent years to summarise and synthesise the literature (Shekhar and Valeri, 2023). A LR is advised to be undertaken if:

1 No such previous reviews exist on the topic, or no similar reviews have been undertaken in the past five years.

2 The concept has undergone substantial change due to an unforeseen event (Shekhar, 2022b, 2022a).

On the topic of EE, there exists fragmented reviews and a comprehensive review dedicated to the research on how EE has promoted creativity and innovation is missing in the literature. In addition, due to the rapid advancement of infusion of digital technologies and their adoption and the focus of educational institutes on EE, its role has substantially increased and evolved over the years. Therefore, a need for LR is essential in the field of EE and its impact on innovation and creativity.

Once the need for a LR is established, next is to determine which of the method and approach must be followed to address the desired objectives. A LR could follow several approaches such as systematic review, structured review, a reflection, or a bibliometric review. Bibliometric reviews as a standalone review study have gained immense popularity in the last few years due to their strength in reflecting the past research themes using software, thereby limiting the scope for bias and manipulation in the results (Shekhar et al., 2021; Shekhar and Valeri, 2022). In addition, the use of tables and graphs in visualising and representing the data further makes study more appealing and comprehensible. A bibliometrics is defined as a study that uses statistics to analyse the content of the articles, books, or journals (Donthu et al., 2021; Kumar et al., 2021; Lim et al., 2021). Its application has been widely appreciated and used in streams such as medicines, tourism, marketing, finance, computer science, and operations. Thus, based on its strengths, the present study conducts the review of themes on EE and its role in promoting innovation and creativity using a bibliometric analysis.

Alike other forms of reviews, several authors have put forward and adopted a cohesive protocol for conducting bibliometric analysis. The present study adopts one of the protocols given by Khanra et al. (2020) to address the research questions formed in the study. On the statistical front, the study uses VOSviewer, Science of Science (Sci2) tool, Gephi, OpenRefine, and Inkscape to conduct the desired analysis. RQ1 is answered using the bibliographic data collected from the Web of Science (WoS) database, refined using OpenRefine, and analysed by conducting bibliographic coupling (BC), citation analysis, and prestige analysis using the VOSviewer and Sci2. RQ2 is answered by conducting a keyword co-occurrence, co-citation and dynamic co-citation analysis using Sci2 and visualised and corrected using Gephi and Inkscape, respectively. Based on the findings of the themes and identifying the research gaps under them, the study puts forward a framework to enable the educational institutes to improve their EE as an answer for RQ3.

3 Literature selection

The present study adopts a bibliometric protocol to retrieve the literature published in the WoS database to answer the formulated research question. The WoS database has been widely used in the studies as a reliable data source for studies because of its stringent and superior quality checks than its peer databases (Shekhar and Valeri, 2023). In addition, the benefit of downloading all the bibliographic data together makes the WoS database a popular choice among its peer. The adopted protocol follows a three-step process to collect the required sample using a set of search string and some researcher defined criteria controls. These three steps, scanning, *curating*, and *analysing (reporting)* are discussed in the following subsections.

3.1 Scanning stage

This is a stage where the search begins for collecting the required sample for the analysis. It involves writing a query consisting of keywords, Boolean operators, and selecting desired fields where the keyword should be searched. In the study, the basic keywords selected are EE, creativity and innovation. On further enquiry of the literature, it was revealed that several scholars have used synonyms for creativity and innovation. These

keywords were also added to the search string. The Boolean operators used are 'AND' and 'OR'. The search fields selected is *topic* that locates the keywords under *abstract*, *title* and *keywords*. Thus, the initial search string followed in the study is: Topic ((('entrepreneurship education' OR 'entrepreneurship course' OR 'entrepreneurship curriculum') AND ('innovation' OR 'innovativeness' OR 'creation' OR 'creativity' OR 'imagination' OR 'inventive')).

3.2 Curating stage

This is the stage for filtering and refining the data using some pre-defined filters. To ensure that sample consists of homogeneous data only, the study limits to the literature published in the *English* language. In addition, only journal articles were included in the sample and other publication types such as conference papers, books, books chapters were excluded because of concerns over the review quality. The refined sample was then searched by one of the authors to remove duplicity. Another author then read the abstracts of the remaining literature to ensure that it conforms to the studied topic. It led to removing certain articles from computer science and medical fields that were directly not related with studied topic. Both, the duplicity check and the list remaining after abstract verification were rechecked by another author to ensure that no bias is involved in data retrieval. After refining, 353 documents were shortlisted in our sample for analysis.

3.3 Analysing or reporting stage

The 353 articles shortlisted after the second stage formed the basis of our sample. The earliest article in the sample is from 1993 indicating the studied topic has been attracting the attention of the academia since the last three decades. However, such attention was minimum during the 1993–2010 phase. In addition, it reflects that there has been a substantial increase in the publication in the last few years (Figure 1). It is because in the last three years, because of disruption in the traditional employment sector and lack of expertise in handling entrepreneurship venture, more people are focusing on acquiring a systematic education. The increase in publication also warrants a need for temporal and geospatial inquiry of the publication and further strengthens the need for synthesising the literature to highlight future research topics. It will also highlight which countries are heavily investing in EE to promote innovation and creativity. The descriptive results in Table 1 show that research on studied topic is rigorously researched in China, the USA and England. In addition, *Frontiers in Psychology*, *Sustainability*, and *Education and Training* are the most preferred publication titles in the field. Among the authors, G. Secundo has the highest publications on the topic followed by G. Mele and A. Maritz. The author count for total publication (TP) is low highlighting that an in-depth exploration by the researchers is missing on the topic. Further inquiry in the topic will reveal useful insights to the topic.

Figure 1 Publication trend on the topic (see online version for colours)

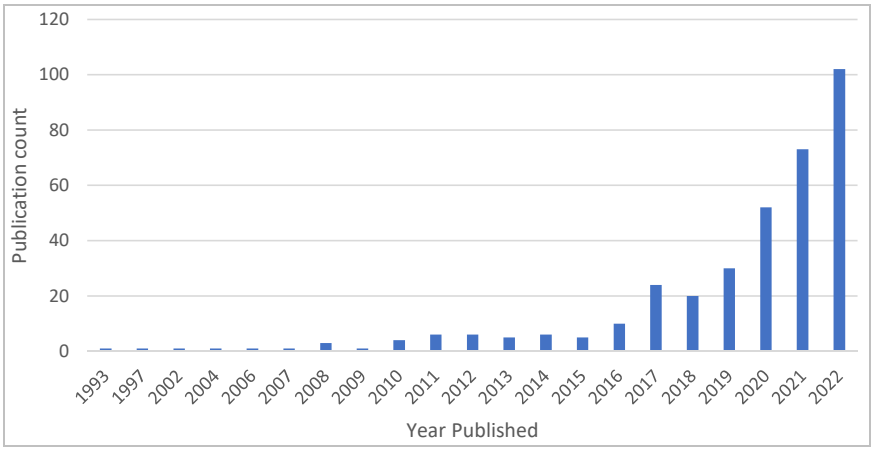


Table 1 Top contributors based on TPs

Author	*TP*	*Institutions*	*TP*
Secundo, G.	6	University of Salento	7
Mele, G.	5	Wenzhou Medical University	6
Maritz, A.	4	Stanford University	5
Del Vecchio, P.	3	University of Lincoln	5
Deng, B.J.	3	University System of Ohio	5
Igwe, P.A.	3	Gachon University	4
Liu, Y.B.	3	Nord University	4
Passiante, G.	3	South China Normal University	4
Wang, Q.	3	University of North Carolina	4
Wu, J.	3	Aarhus University	3
Country	*TP*	*Publication title*	*TP*
Peoples R. China	152	*Frontiers in Psychology*	56
USA	55	*Sustainability*	28
England	24	*Education and Training*	22
Taiwan	16	*Mathematical Problems in Engineering*	14
France	14	*International Journal of Entrepreneurial Behavior Research*	12
Italy	14	*International Journal of Management Education*	11
South Korea	14	*Mobile Information Systems*	9
Australia	13	*Journal of Technology Transfer*	8
Spain	12	*Scientific Programming*	8
Germany	11	*International Journal of Engineering Education*	7

4 Bibliometric analysis

4.1 Bibliographic coupling

BC as a bibliometric technique is very useful in revealing the top contributions in a research theme. As per the analysis, if two or more papers cite a same document, then the documents citing it is related (Kessler, 1963). Thus, it helps in identifying which of the articles have strong linkages with the other articles. In VOSviewer, such linkages are identified through total link strength (TLS). The findings reveal that G. Secundo have the highest linkages with 405.33 score of followed by G. Mele and Q. Wang. The list differs slightly with the top contributors list based solely on publication count. Among the countries, similar to ranks based on publication count, China, the USA, and England score the highest contribution linkages. For institutions, Wenzhou Med. University, authors have the highest score followed by those from Hangzhou Normal University and University of Salento. Higher presence of universities from China is reflected in a greater number of authors and collaboration among them.

Table 2 Top contributors based on BC

Author	*TLS*	*Institutions*	*TLS*	*Country*	*TLS*
Secundo, G.	405.33	Wenzhou Med. Univ.	246.18	Peoples R. China	2,553.91
Mele, G.	398.95	Hangzhou Normal Univ.	206.21	USA	2,547.28
Wang, Q.	100.71	Univ. Salento	105.54	England	1,692.56
Zhang, H.	73	Univ. Lincoln	69.1	France	1,046.38
Liu, Y.	51.47	Vrije Univ. Amsterdam	55.78	Sweden	705.49
Li, Y.	45	Nord Univ.	50.44	Australia	682.04
Zhang, L.	43.23	Jiaxing Univ.	49.04	Pakistan	639.74
Chen, X.	21	Beijing Normal Univ.	47.33	Germany	621.47
Zhang, Y.	21	South China Normal Univ.	47	Spain	603.2
Maritz, A.	20.83	Educ. Univ. Hong Kong	43.16	Italy	560.89

4.2 Citation analysis

Another commonly used approach for measuring the top contributions is citation analysis. Under this approach, if two or more articles cite a same article, then the citing articles are related to each other (Donthu et al., 2021). Though the approach is simple and widely used, it is often criticised to be biased towards the older publications. The findings (Table 3) reveal a similar but slightly deviated ranking of authors and countries while a major deviation is observed in institution ranking as compared to ranking based on publication count and BC. Among the authors, G. Secundo is the top contributor followed by L. Zhang and G. Mele. For countries, the USA is ranked one followed by China and England. In the institution ranking, authors from Tallinn University of Technology have scored highest followed by University of Lancaster and University of Salento.

Table 3 Top contributions based on citation analysis

Author	*TLS*	*Institutions*	*TLS*	*Country*	*TLS*
Secundo, G.	59	Tallinn Univ. Technol.	95	USA	1,629
Zhang, L.	56	Univ. Lancaster	91	Peoples R. China	452
Mele, G.	52	Univ. Salento	83	England	394
Maritz, A.	43	Stanford Univ.	79	Malaysia	335
Li, Y.	16	Univ. Lincoln	33	Italy	320
Wang, H.	13	Vrije Univ. Amsterdam	25	Netherlands	256
Chen, X.	8	Wenzhou Med. Univ.	23	Germany	195
Wang, Q.	8	Natl. Taichung Univ. Sci. & Technol.	17	Pakistan	195
Liu, Y.	6	Beijing Normal Univ.	10	Wales	182
Wang, Y.	4	Educ. Univ. Hong Kong	9	Sweden	178

Adding to the citation analysis, the study then ranks the most cited publication based on two matrices:

1 local citation count (LCC) which reflects the total number of citations received by articles in the sample from the other articles in dataset

2 global citation count (GCC) reflected in the citations received by an article from all the WoS indeed articles (Table 4).

Table 4 Top articles based on citation analysis

S. no.	*Article*	*Year*	*Citations*
Global citation count			
1	The influence of personality traits and demographic factors on social entrepreneurship start up intentions	2010	312
2	Opportunity identification and its role in the entrepreneurial classroom: a pedagogical approach and empirical test	2004	288
3	Measuring progress in entrepreneurship education	1997	229
4	The role of perceived university support in the formation of students' entrepreneurial intention	2015	137
5	Developing social entrepreneurs and social innovators: a social identity and self-efficacy approach	2012	108
Local citation count			
1	How does the entrepreneurship education influence the students' innovation? Testing on the multiple mediation model	2019	11
2	Opportunity identification and its role in the entrepreneurial classroom: a pedagogical approach and empirical test	2004	8
3	Measuring progress in entrepreneurship education	1997	8
4	Self-regulated learning, team learning and project performance in entrepreneurship education: learning in a lean startup environment	2015	7
5	The impact of entrepreneurship education on university students' entrepreneurial skills: a family embeddedness perspective	2020	7

When an article receives citations from documents other than directly related to its theme, it may be because of the methodology applied and that the findings are applicable to more disciplines and themes. The findings of the study reveal that 'The influence of personality traits and demographic factors on social entrepreneurship start up intentions' is the most cited article based on the GC count while 'How does the EE influence the students' innovation? Testing on the multiple mediation model' is the most locally cited article in the sample. The difference in citations occurs because articles from certain authors may be cited in multiple streams because of methodological novelty or collaboration pattern.

Table 5 Top articles based on prestige analysis

S. no.	*Article*	*PageRank*
1	The emergence of entrepreneurship education: development, trends, and challenges	0.007358
2	Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources	0.007334
3	Embedding entrepreneurship in doctoral students: the impact of a T-shaped educational approach	0.007203
4	The effect of youth entrepreneurship education programs: two large-scale experimental studies	0.00684
5	Entrepreneurship education enhances entrepreneurial creativity: the mediating role of entrepreneurial inspiration	0.006812

4.3 Prestige analysis

Several studies have criticised the use of both citation analysis and BC for being biased based on the age of the publication. Therefore, it is required to develop an estimate that reveals the worth of the articles considering the other criteria such as publication title, their importance in the theme and others. Prestige analysis is one of such analysis that ranks the manuscript based on their PageRank (PR). PR is an estimate calculated by the following equation:

$$PR(p_i) = \frac{1-d}{N} + d \sum_{p_j \in M(p_i)} \frac{PR(p_j)}{L(p_j)}$$

where p_i are the pages under consideration, $M(p_i)$ is the pages connected to p_i, $L(p_j)$ is the number of outbound links to the page p_j and N is the total number of pages (Brin and Page, 1998). In the study, the article becomes the page under consideration and its links with the other articles is considered as outbound linkage. The results of the PR analysis (Table 5) reveal that articles titled 'The emergence of EE: development, trends, and challenges' and 'Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources' are the most valuable articles in our sample. The results differ from citation analysis as the most valuable articles differ from those having higher citations. These articles although have a good citation count do not feature in our results of citation analysis. It means there exists more studies with higher citation count but do not represent centrality of theme

being researched in EE and innovation and creativity. Therefore, a sole criteria of citation analysis as a judge of articles worth is not sufficient.

4.4 Co-word analysis

Co-occurrence network reveal the most commonly used keywords in the articles. WoS has two types of keywords for its article:

1 the author keywords that are provided by the authors during the submission of article to journal

2 indexed keywords that are provided by the journals while indexing the article.

While indexed keywords are broader, author given keywords represent the critical aspects of the study. Figure 2 and Figure 3 represent the keyword co-occurrence networks for author given and indexed keywords, respectively. Both the co-occurrence networks highlight that there exist six major clusters of keywords in the researched topic. These clusters are: EE and experiential learning; EE, entrepreneurial intentions and human capital; EE, innovation and sustainable development; EE, intentions and theory of planned behaviour; EE, creativity, learning and entrepreneurial mindset; EE, innovation and entrepreneurial self-efficacy. The larger side of the nodes in Figure 2 and the darker shade in Figure 3 indicates a higher linking strength of the variable.

Figure 2 Author- keyword co-occurrence network

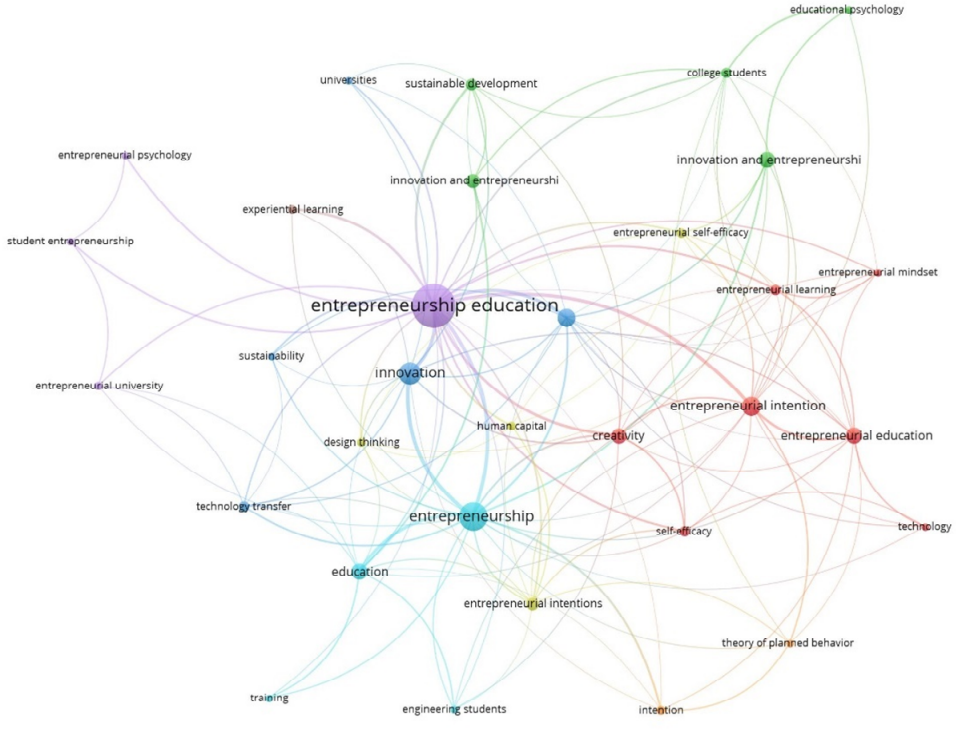
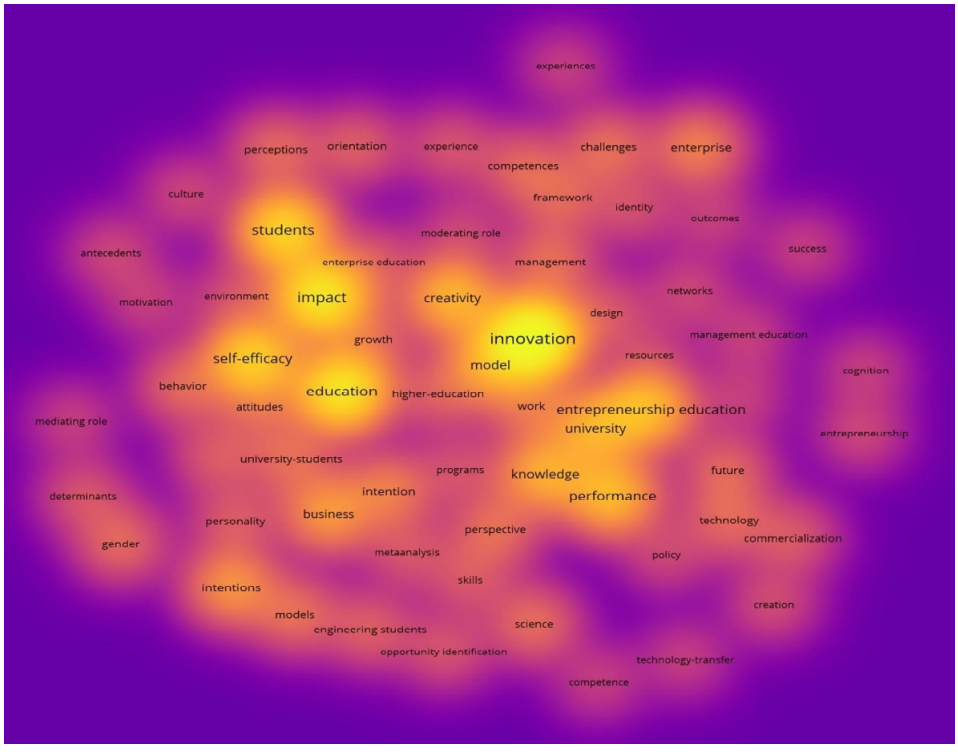


Figure 3 Density co-occurrence analysis of keywords plus (see online version for colours)



5 Network analysis

5.1 Co-authorship analysis

The author collaboration network, or co-author network, is one of the widely used network analysis techniques to identify the inherent collaboration structure among the researchers in a theme. Such a network offers two useful insights:

1 It assists researchers in locating potential collaborators for future projects.

2 It aids in determining whether research themes have crossed borders and how much developing and underdeveloped countries benefit from shared knowledge.

The findings (Figure 4) reveal that extensive collaboration is negligible among researchers. Fragmented clusters of three and four scholars exist that have very limited studies together. In addition, the engagement is geographically and institutionally concentrated, and researchers have very little motivation to engage in cross-border research. One of the benefits of cross-border research is the holistic development of the EE programme, which best prepares entrepreneurs for success. Thus, it is recommended that future scholars should engage more in cross-border research and develop good programmes. In our study, the only collaboration with a significant contribution is that of G. Secundo, G. Mele and P. Del Vecchio. These three authors also appear on the list of

top contributors based on bibliometric analysis. The co-authorship analysis of countries (Figure 5) reveals a similar story. There is limited research collaboration among researchers in developing and underdeveloped nations. Scholars from Asian nations such as China and Pakistan have collaborated with each other and with European counterparts. Scholars from the USA collaborate more with European scholars and have negligible research with Asian and African scholars.

Figure 4 Co-authorship network of authors (see online version for colours)

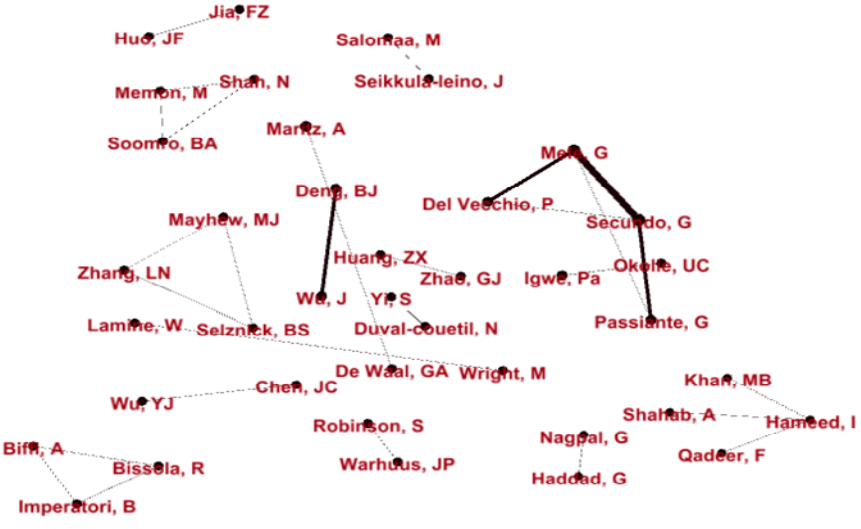
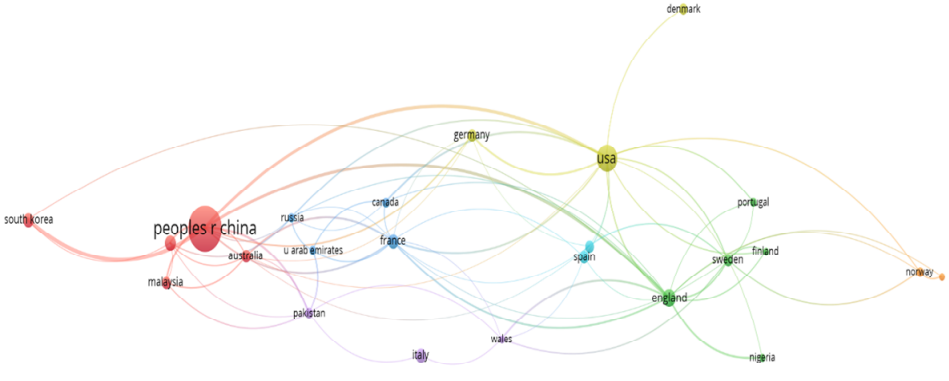


Figure 5 Co-authorship network of countries (see online version for colours)

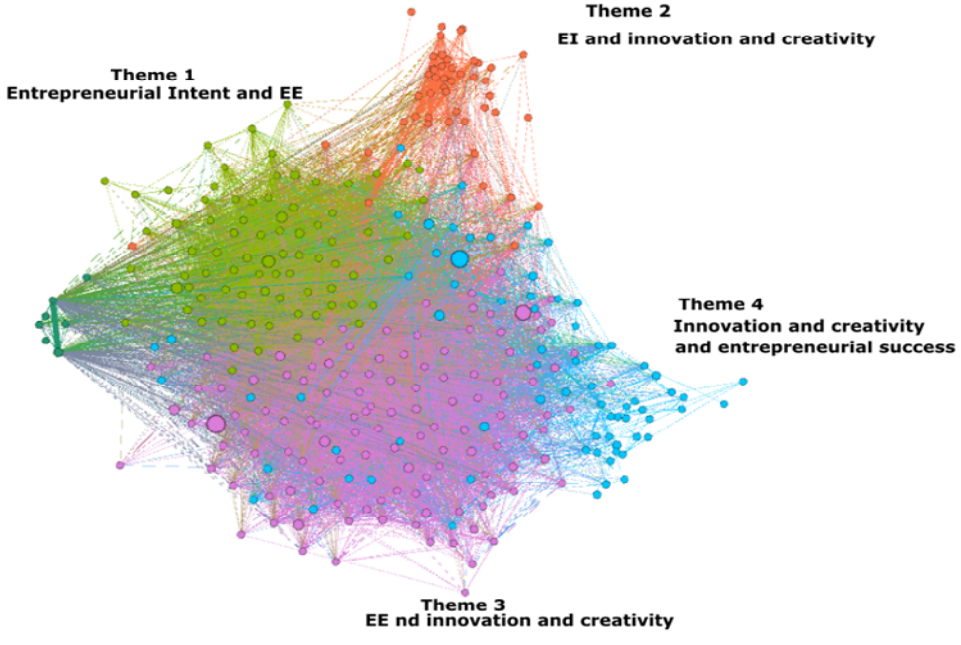


5.2 Co-citation analysis

Identifying research ideas and themes and clustering them using co-citation analysis is one of the techniques used in the bibliometric studies. The analysis is based on the assumption that when two or more articles are cited together in a publication, or co-cited, then the cited publications are related. On running the co-citation analysis on the sample, 328 documents were clustered into four groups, indicating four research themes. The

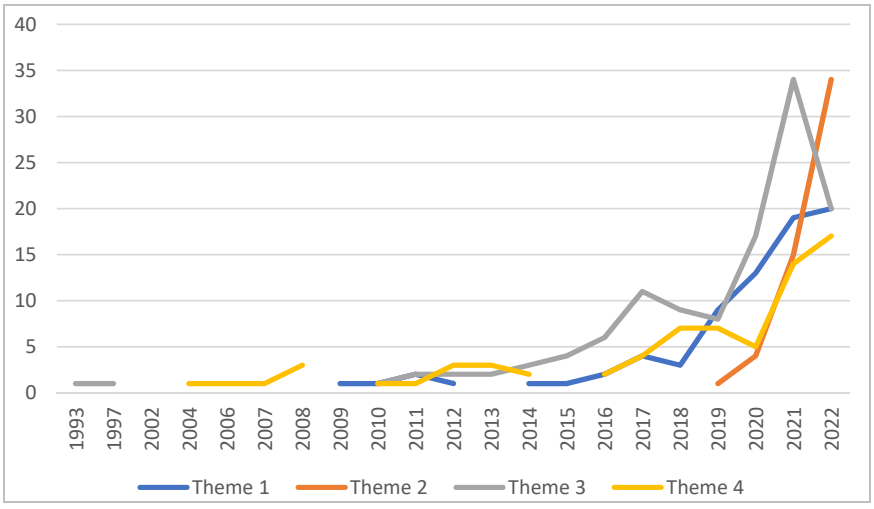
larger nodes in Figure 6 represent the articles with a higher GCC. The network was visualised as having 328 nodes with 1,518 connections and four clusters (Figure 6). The articles in each cluster were ranked based on the PR statistics. The theme of the cluster was identified after analysing the content of not fewer than ten articles under each theme. While in clusters 1 and 4, it was observed that themes reached maturity after analysing 20 articles, for clusters 2 and 3, 15 articles each were analysed to finalise the themes.

Figure 6 Visual representation of thematic clusters (see online version for colours)



The findings from dynamic co-citation analysis (Figure 7) reveal the evolution and timeline of the research themes. The annual accumulation of the articles is presented in Figure 7, and it is observed that none of the themes have reached exhaustive limits and are regularly studied by the researchers to date. However, one does observe several structural breaks in the annual publication count over the years. For instance, there was a long gap in theme 3 between 2002 and 2009. While research on theme 1 started in 2002, it has continued since then with breaks every few years. Research on topics in theme 2 has gained attention since 2017 and is the youngest theme to be discovered in the sample. Theme 3 is the oldest theme (1993–2022) in the sample and has been actively studied in the last few years. Theme 4 has had articles published since 2004, and articles are being published regularly. Since all the themes are still being researched, there are unresearched topics under each theme in terms of methodology adopted, research topics, designs followed and philosophies studied. The qualitative study of these clusters further reveals important research gaps that should be studied to improve the quality of EE and ensure the success of entrepreneurs.

Figure 7 Evolution of thematic clusters (see online version for colours)



6 Major thematic areas

6.1 EI and EE

EI is one of the key prerequisite for entrepreneurial success. It refers to a state that guides attention towards the achievement of specific goals. Since entrepreneurship is a journey, it is significant for the entrepreneurs to remain motivated. Having zeal and enthusiasm is a first step in successful venture development. Several studies have observed that EE shows a positive and significant influence on developing EI and motivation (Cui and Bell, 2022). However, educational institute support plays a crucial mediating role (Yordanova et al., 2020; Su et al., 2021). Teachers' by using successful entrepreneurs' stories as a case studies can help in generating entrepreneurial passion and alter EI (Liu et al., 2019). EE has shown to be improving the existing entrepreneurship knowledge and boosting the EI across disciplines such as in technology and psychology (Wang et al., 2021). EE creates awareness and makes entrepreneurship an attractive option for the students, thus, often helping in motivating students and developing their EI (Wu et al., 2020). Studies have also proved how EE engages with the entrepreneurial passion to generate EI among the university students (Uddin et al., 2022). EE further develops innovation capabilities, which act as a guiding tool for developing EI (Wang et al., 2019). The development of self-efficacy through EE further boosts the EI and motivation (Saeed et al., 2015). Few studies also observed that the relationship between EE and developing EI is very limited (Li et al., 2021). However, such a relationship is influenced by barriers and drivers to education and intent, and student background, which needs to be empirically investigated before making changes to the EE curriculum.

6.2 EI and innovation and creativity

This theme emerged in late 2017 and has gained rapid momentum in the last five years. The studies in this cluster focus more on how EI developed through EE helps in promoting innovation and creativity in the students. The focus of every EE programme is on developing self-efficacy in students by altering their EI and making them creative and innovative (Shi et al., 2020). A systematic EE helps in the development of educational and entrepreneurial ecosystems. Such ecosystems not only help in development of educational programme but are also a hub for systemic innovation and creativity (Zheng et al., 2022). The functional and connecting experiences provided by such ecosystems greatly influence the intent and motivation of the students (Bock et al., 2020). The EI thus developed has a significant positive impact on the innovation and creativity of students. Few studies have also highlighted the limitation of EI generated through EE in creating any significant alteration in the innovation and creativity of the students (Albattat et al., 2020; Chemli et al., 2020; Arcese et al., 2020). Such studies believe that personality traits of the students significantly mediate or moderate the relationship between EI and innovation and EE must be guided towards changing the mindset and developing passion before it could have any significant change in developing creativity.

6.3 EE and innovation and creativity

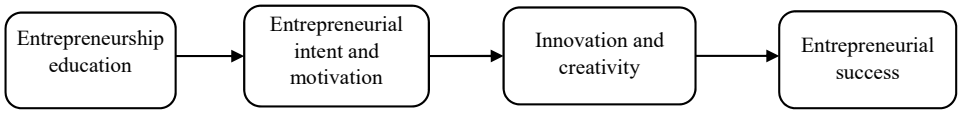
This is the largest cluster in our sample and includes the oldest studies from our sample. The studies cover the basic aspects of EE and highlight what must be provided in its curriculum so that students derive maximum benefits. Developing creative knowledge components such as skills, mentality, and behaviour that are essential for entrepreneurial success must be the target of every EE programme (Hood and Young, 1993). Therefore, the curriculum for entrepreneurship should be designed keeping in mind its objective. An EE programme offers useful insights to operational and strategic planning, human resource development, business process management, and leadership that enable an entrepreneur to develop innovative solutions to a holistic business problem (Vesper and Gartner, 1997). Provocations in EE are an important tool for developing creativity (Hjorth, 2011). Engaging students in real-world scenarios makes them understand the environment and also helps them apply the skills they have acquired. In addition, it makes them realise that their learnings is valuable, and they remain motivated. Engaging with other entrepreneurs often yield positive results for the existing entrepreneurs (Gordon et al., 2012). When such engagement occurs inside the classroom, it will result in positive peer learning that will promote growth for the entrepreneurs. The skills acquired during the programme help the entrepreneurs tackle various challenges. It helps them in adding to the social and economic value by apply creative solutions to the long standing issues and challenges (Kickul et al., 2012). The use of experiential learning in the EE programme is a must for innovation development in the entrepreneurial programme (Zappe et al., 2013). In addition, studies also recommend personalised learning based on the attitude and personality of the behaviour for better development of innovative skills (Middleton and Donnellon, 2014).

6.4 Innovation and creativity and entrepreneurial success

This is the most regular theme that has been studied in the sample of the study. Though not the largest in terms of publication count, the study has a higher count of prestigious articles than other themes and clusters. Corporate entrepreneurship has been widely studied as an innovation harbinger (De Waal and Maritz, 2019; Valeri and Katsoni, 2021). Systematic innovation through knowledge management ensures creative business development (Frolova et al., 2021). Innovation and creativity are visible in several aspects of entrepreneurship. One such area is the political connections and marketing skills that are needed for entrepreneurial success (Zhang et al., 2021). A formal and systematic education ensures that communication skills, along with marketing and networking skills, are sharpened among entrepreneurs for their success. Entrepreneurs are not produced in masses, i.e., they have a logical and critical thinking style that makes them different from others. EE has shown to impact these unique thinking styles which translate to success of the venture (Groves et al., 2011). In addition, EE has shown to effect creative mindset, which has been often associated with the entrepreneurial success (Yodchai et al., 2022). Similarly, literature suggests that innovation creed and innovation conviction are required for entrepreneurial success (Maziriri et al., 2022). Learnings from the EE in the form of skills and theoretical knowledge impact entrepreneurial acumen. Few studies also suggested that entrepreneurial orientation plays a moderating role in increasing the success chance of organisation through grassroot innovation (Singh et al., 2021). In the study, a cluster also establishes that EE can alter the orientation of students and make them more oriented towards entrepreneurship. Thus, EE will increase the chance of the venture's success through cultivating the entrepreneur's talent.

Based on the content analysis of the thematic clusters, the authors put forward a linear model where EE leads to entrepreneurial success through igniting EI and motivation, which further leads to innovation and creativity. The model is presented in Figure 8. Several factors, such as existing knowledge, entrepreneurial passion, and the backgrounds of the students, have been tested empirically to show a moderation or mediation effect on the dependent and independent variables.

Figure 8 Theoretical model for role of EE in entrepreneurial success



7 Research gaps

Because all of the research themes are still being investigated by researchers today, despite the topic being three decades old, it suggests that there are several unanswered questions that impact the performance of EE in developing innovation and creativity for ensuring entrepreneurial success. In theme 1, it is observed that limited research is conducted on exploring how EI is influenced by the environment, which influences the students' decision to pursue the EE. There has been little empirical research on the impact of drivers and barriers on the relationship between EE and EI. By combining

student background, the moderation or mediation effects of drivers, barriers, and student background on the relationship between EI, EE, and innovation and creativity, useful insights will be revealed. The role of peer learning in EE in promoting innovation and creativity is not well researched in theme 3. Furthermore, an effective curriculum combines theoretical and practical knowledge. However, using scientific principles, an optimal balance of theory and practise should be developed, as well as a curriculum. Future research could look into incorporating peer learning as a component in developing new EE theories and putting it to use in gaining practical experience. In EE, technology is frequently used to foster creativity and innovation. However, in countries where technological infusion is limited and technology is not readily available, EE struggles to achieve the desired success. Scholars in such countries could investigate how low-cost technologies could be used to ensure that the impact of EE is not diminished. According to studies in theme 4, students frequently found it difficult to apply the practical knowledge learned in the EE due to a lack of connection with the real world. In such cases, the concepts, theories, and principles learned in theory class appear to be useless. As a result, future scholars will be able to understand how innovative concepts and practises can be converted into case study materials or provided to students as simulated experiences to test their learnings in real-world scenarios.

The study also found a gap in research collaboration between researchers from developing countries and those from developed countries. It is one of the reasons for these developing countries' lack of advanced research techniques. The curriculum thus developed is based on the western curriculum without regard for the students' background or intent, and its success in improving creativity and innovation is limited as a result. The majority of the studies in our sample use a similar methodological approach in terms of research designs, data collection methods, statistical tests used (structural equation modelling) and findings. Scholars must work harder to produce significant novel results, which should be reflected in higher citation counts for the studies. Increasing the number of publications will also allow researchers to study the topic from multiple perspectives, including concepts from psychology and social studies. Incorporating such gaps in future studies will contribute to the literature on EE by demonstrating how EE can boost innovation and creativity, ensuring entrepreneurial success.

8 Study implications

The current study contributes significantly to the theory of EE by highlighting how academicians have demonstrated the role it plays in boosting innovation and creativity for entrepreneurial success. The study proposes a model for enhancing the effectiveness of the EE programme for ensuring entrepreneurial success (Figure 9). To assess the effectiveness of the EE programme, students' entrepreneurial acumen, EI and motivation, and level of innovation and creativity should be assessed before and after the programme. Furthermore, future research could investigate how to use students' EI to attract them to a formal and systematic EE. The researchers could also investigate the role of motivations and barriers to pursuing EE. Furthermore, rather than taking a 'one size fits all' approach, students should be segmented based on their entrepreneurial interests. Students with similar interests should be grouped together and educated together to improve peer learning. As a result, we make the following propositions:

P1 The relationship between EE and EI is influenced by the drivers to pursue education.

P2 The relationship between EE and EI is influenced by the barriers to pursue education.

P3 The relationship between EE and EI is influenced by the student background.

A curriculum must include both theoretical and practical components. An optimal balance of the two not only aids students in learning basic and advanced concepts, but industrial visits and projects under the practical component also assist students in applying their theoretical learning. As a result, when developing an EE curriculum, higher education institutions must consider both aspects in an optimal ratio. As a result, we make the following propositions:

P4 The relationship between EE and innovation and creativity is influenced by the practical component in the curriculum.

P5 The relationship between EE and innovation and creativity is influenced by the theoretical component in the curriculum.

P6 The relationship between EE and innovation and creativity is influenced by peer learning in the curriculum.

P7 The relationship between EE and innovation and creativity is influenced by use of technology in the teaching.

Innovation and creativity are needed for entrepreneurial success. The limited availability of practical opportunities during the EE hinders the chances of entrepreneurs tackling the challenges effectively. However, the innovative mindset of the student will itself be dependent on how seriously they pursue their education, and on their personality and behaviour. Thus, we make the following proposition:

P8 The chances of practical application influence the relationship between innovation and creativity and entrepreneurial success.

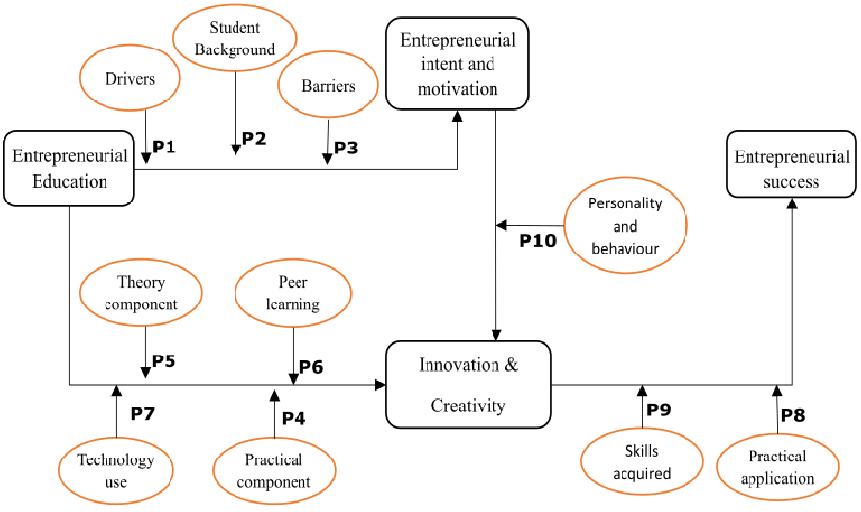
P9 The skills innovative and creative skills acquired during EE influences the relationship between Innovation and creativity and entrepreneurial success.

P10 The relationship between EI and innovation and creativity is influenced by student personality and behaviour.

The study also provides teachers and academic curriculum designers with useful information for improving their EE programme. Low intent or motivated students are observed to lack innovative acumen, which affects their learning and survival chances. As a result, a strong emphasis on motivating students in their journey is required. The curriculum should be balanced in theory and practise, and the use of technology in education will increase motivation even more. A revised education programme should be developed with stakeholder input and input from previous students about the difficulties and challenges they faced after completing their course in their entrepreneurial journey. The assistance required by students pursuing an EE degree should not be limited to the completion of the degree. Students who have completed the course should be invited to share their experiences with current students in order to advise them on how to benefit from the programme, as well as to share their course experience about how and when the

course helped them during their hardships. The EE programme should not be restricted to the classroom. Teachers who demonstrate transformative leadership can effectively motivate students. Furthermore, EE teachers must 'lead by example'. To ensure entrepreneurial success, they must be motivated, use innovative and creative teaching methods, and prioritise student well-being.

Figure 9 Boosting performance of EE programme to ensure entrepreneurial success (see online version for colours)



9 Conclusions and limitations

EE has been a focus of universities and education in the last decade and is finding emphasis in the academic curricula of programmes at different levels. However, a lack of expertise in designing the curriculum and limited research on how innovation and creativity can be improved through the EE programmes limit their success. Thus, the study was undertaken to study the literary trends in research on EE and its role in improving innovation and creativity. The findings reveal that research on the topic is clustered in four research themes: EE and innovation and creativity; EE and EI and motivation; EI and motivation and innovation and creativity; and innovation and creativity and entrepreneurial success. The study also identified top contributors and contributions in the studied topic to provide future scholars with useful insights. The findings from network analysis revealed a lack of research collaboration among scholars and limited exploration of the topic by the existing researchers. Prestigious contributions were also identified based on their PR. The qualitative analysis of the research themes revealed a plethora of topics that should be studied to enhance the effectiveness of EE programmes.

Based on the study findings and the gaps identified, the study proposed a framework for enhancing the effectiveness of EE programmes in improving the creativity and innovation of students. A carefully designed curriculum with a mix of theory and components designed on scientific principles, considering student background and

motivational drivers and barriers, may prove successful in improving creativity and ensuring entrepreneurial success. However, future scholars could empirically test the validity of the model developed by collecting data from students with diverse academic backgrounds. The study's findings could also be improved by incorporating literature from diverse data sources and expanding the sample size.

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