E-learning in Entrepreneurship Education: A Systematic Literature Review

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***Abstract*—In this systematic literature review we take the first scientific attempt towards examining state-of-the-art knowledge regarding e-learning and entrepreneurship education. We review 41 journal articles that were published over a 19-year period in 29 main-stream journals from both e-learning and entrepreneurship/management domains. Combining the bibliometric analysis method and the semantic analysis method, we report the temporal and spatial distribution of these studies, their academic impact, and thematic dimensions/sub-dimensions of contents. Results show that existing studies have limited impact and this topic yields a grand research gap to be filled by future researchers. Students are the most studied research sample. Four aspects of e-learning are central in the screened research: education, learning issues, students, and usability. European scholars are the most active and a majority of studies adopt the quantitative approach. In the end we address limitations of this work.**

Keywords—entrepreneurship education, e-learning, systematic literature review, 5W1H model, semantic analysis

I. INTRODUCTION

Implementing e-learning in the education sector becomes inevitable in the long run considering the significant influence and challenge placed on the face-to-face educational activities by the potentially repetitive global pandemics such as the COVID-19. The class of the future requires a harmonious combination of technology, pedagogy, space, and most recent technological solutions to equip classrooms [1]. The implementation of e-learning in classrooms is not uncommon in our digital society and has particularly attracted considerable attention over the last two decades [2], [3]; however, using educational technologies in entrepreneurship courses appears to be relatively new [4] [5]. For instance, the first MBA entrepreneurship course (Management of New Enterprises) started at Harvard in 1947 [6], [7] while the first distance learning program of entrepreneurship was founded half-century later in 1998 [8]. After nearly four decades' expansion since the 1980s, entrepreneurship education programs are no longer solely within business schools [9] but are available in the vast majority of universities globally as compulsory or elective offerings [10]. They have grown as one of the most important components in the entrepreneurship ecosystem for stabilizing business creation [11]. Thus to explore the opportunities and challenges of teaching entrepreneurship education with e-learning is not only significant but also urgent.

Although there exists a systematic literature review (SLR) of online education in business education [12], our attempt to find an SLR article on e-learning in entrepreneurship education was not successful. Therefore, we initiated a literature review project to respond to this research gap, charter the territory, and reveal the current research development of e-learning in entrepreneurship education. The following research question was our primary focus during the study: What is the research status quo regarding the integration of e-learning in entrepreneurship education?

As far as we know, this study is the first scientific attempt that follows a clearly defined SLR protocol to examine the existing literature on the cross-domain topic: e-learning in entrepreneurship education. The result is mainly beneficial to academicians by revealing the topic's current development and helps to identify the future direction.

II. PRIOR REVIEWS OF THE TOPIC

A. Definition of Entrepreneurship Education

The entrepreneurship education can be narrowly or broadly defined. In the narrow definition the output of entrepreneurship education is entrepreneurs who eventually create business ventures. In the broad definition the output is entrepreneurial individuals who will engage in innovative activities in different types of organizations. As stated by Fayolle [13], "entrepreneurship education should rather be more a 'factory' designed to produce (future) entrepreneurs capable of thinking, acting, and making decisions in a wide range of situations and contexts." (p.698) More and more educators agree with the broad definition and entrepreneurship education is gradually expanding to an interdisciplinary environment [14] with the purpose to reach a wider audience [7]. For education to penetrate a large population e-learning has been proved an efficient and widely used tool [15].

B. Research Themes in Entrepreneurship Education

Our preliminary search identified 16 systematic literature review studies of entrepreneurship education, which are available at https://doi.org/10.13140/RG.2.2.12539.13606. We would like to highlight some primary research themes out of these review studies. For instance, the thematic analysis from [16] revealed the following themes on the macro-, meso-, and micro-level.

- Macro-level (societal environment): general policy climate for entrepreneurship education, and general enterprise infrastructure.
- Meso-level (institutional environment): university enterprise context, university-business interaction context, and education program context.
- Micro-level (activity-based outputs): outputs of entrepreneurship education including graduate enterprise and graduate employability.

The narrative review of Fayolle [13] reported a great variation in entrepreneurship education programs/courses regarding audiences, objectives, contents, methods, and evaluation. Regarding methods used in entrepreneurship education research some scholars noted two clusters [17]:

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"quantitative studies of the extent and effect of entrepreneurship education, and qualitative case studies of different courses and programs" (p.697).

C. Education Delivery Modality: Face-to-Face or E-Learning

Various pieces of evidence in the literature indicate that the face-to-face modality prevails in the current entrepreneurship teaching. According to a survey of 114 lecturers teaching entrepreneurship in 82 HEIs in the UK, a majority of respondents (57%) used traditional teaching approaches (e.g., lectures and seminars) and few had received dedicated staff training before teaching the subject to students [18], [19]. A total of 568 entrepreneurship educators from 270 community colleges in the USA reported the face-to-face classroom mode as the most significant modality (44.1%) to deliver entrepreneurship courses in their institutions, which was followed by the blended structure (16.79%) and purely online offering (11.81%) [20].

D. Historical View of E-Learning

The European Commission [21] defines e-learning as "the use of new multimedia technologies and the internet to increase learning quality by easing access to facilities and services as well as distant exchanges and collaboration" (p.2). Before the term e-learning (electronic learning) was used for the first time in 1999, much attention was paid to distance education distributed via post, radio, and television [22]. After years' development, as described below, e-learning nowadays is highly dependent on the internet.

1) Web-based e-learning: With the advancement of the internet since the 1990s numerous web-based learning opportunities have emerged to empower life-long learners [7]. The business began adopting e-learning in 2000. Initially e-learning was perceived as a cost-effective method that provides training electronically to employees and clients, which reduces delivery cycle time and information overload, but increases convenience for learners and improves the tracking of learning progress [23].

2) Open e-learning: By the end of the 1990s the OpenCourseWare (OCW) movement started. Moodle as the first open-source learning management system rose up. A culture of open source and open knowledge came to shape.

3) Open and social e-learning: The birth and prosperity of social media sites have created a society of networked individualism [24]. This concept captures the way how people have integrated social networks, the internet, and mobile devices into their lives for the socialization purpose [25]. Enabled by both the open-source culture and the online social networking culture, tremendous education phenomena took place during this open and social distance education period [22], including the Open Educational Resources (OER), iTune University, Khan Academy, Massive Open Online Courses (MOOCs), and OCW Consortium.

E. Research Themes in E-Learning

A systematic review of 99 e-learning related academic articles between 2010 and 2018 identified four dimensions of research in the literature [26]:

1) Education: Educational technology trends (e.g., gamification, mobile learning, cloud computing, augmented reality, and technology clustering), online tools (e.g., dashboard applications, microblogging platforms, and Google), and social media (e.g., social networking).

2) Learning issues: Learning innovation in educational fields (e.g., health education, engineering education), online platforms (e.g., MOOCs), and learning (e.g., learning styles).

3) Students: Behavioral issues (e.g., engagement, satisfaction, awareness, and motivation).

4) Usability: Distance learning (e.g., online learning environments), e-learning systems (e.g., usability testing, personalized learning, defining a conceptual framework, implementation & adoption, challenges, usability intentions), and learning analytics (e.g., learning management system's use).

F. Cross-Field Review: E-Learning in Entrepreneurship Education

The only literature review study we found was a short narrative review of entrepreneurship education and experiential e-learning [27]. It was a subjective narration of relevant work and was not based on a systematic searching protocol.

III. Methodology

A. Sample

We followed a five-step process to collect and select relevant literature. The whole literature search and screening process is shown in Table I. The article retention rate shows the percentage of articles remained after each step of the procedure. The detail of journals is available as a dataset on https://doi.org/10.13140/RG.2.2.34722.66240/1.

- We compiled a list of 266 journals including (a) 195 entrepreneurship and management journals based on experience, Scopus CiteScore 2018 metrics [28], Jerome Katz entrepreneurship journal list (version 9) [29], and two previous studies [30], [31]; (b) 71 e-learning related journals based on the Scimago's Scientific Journal Rankings (SJR) [32].
- We searched on Scopus for articles published in 266 journals by May 2020. Scopus is used in various review articles on the entrepreneurship field and considered the largest abstract and citation database of peer-reviewed literature [33]. Only articles and review articles written in English were included. We dropped the 83 entrepreneurship and management journals uncovered by Scopus.
- We ran advanced search queries combining "SRCTITLE()" (to limit the search to pre-selected journals) and "TITLE-ABS-KEY()" (to limit the search to preselected keywords that appear in titles, abstracts, and keywords). Selected keywords for searching in entrepreneurship and management journals were (a) "elearn*" or "e-learn*", or (b) "online" or "virtual" or "distan*" cross-referenced (AND search) with "learn*" or "course*" or "class*" or "educat*", or (c) "MOOC*" or "massive* open online course*". Keywords for searching in e-learning related journals were (a) "entrepreneur*" cross-referenced with "educat*", or (b) "entrepreneur*", or (c) "business educat*", or (d) "entrepreneurship", or (e) "enterprise education". All records were exported and organized in one .csv file for data cleaning. During

this process, some journals were missing. Therefore, the third step was repeated to search relevant articles in the missing journals until it reached saturation and no further article was generated. All data were integrated into one data file for analysis.

- We searched in the generated data file within titles, abstracts, author keywords, and index keywords, using the keywords in the third step.
- We conducted an eye screening procedure to manually read through titles, abstracts, author keywords, and index keywords to further exclude irrelevant articles. We considered one article relevant when both aspects of entrepreneurship education and e-learning are present in titles or abstracts. We considered one article irrelevant when at least one of the two aspects are missing. When an article is about e-learning and business education at large, we also excluded it. The final sample included 41 articles from 29 journals.

TABLE I. FIVE-STEP LITERATURE SEARCH AND SCREENING

Step	E-Learning Journals (Articles)	Entre-Manage Journals (Articles)	Total Journals (Articles)	Article Retention Rate
1	71(-)	195(-)	266(-)	-
2	71(45,053)	112(60,026)	183(105,079)	-
3	65(2,050)	93(2,611)	158(4,661)	4.4%
4	58(571)	77(1,333)	135(1,904)	40.8%
5	12(15)	17(26)	29(41)	2.2%

B. Analysis

We first analyzed the articles' temporal and spatial distribution and their impact on the academic community. We then imported the bibliographic data of 41 articles in VOSviewer and ran co-authorship analysis and citation analysis by source (parameters: a minimum of one document and a minimum of ten citations per source). The 5W1H model was used to extract semantic elements of each article. The model consists of five elements: who, what, why, when, where, and how. According to Ikeda, Okumura, and Muraki [34], "5W1H information, extracted from text data, has an access platform with three functions: episodic retrieval, multi-dimensional classification, and overall classification" (p.571). Another reason for using 5W1H was that for the education of entrepreneurs, the discourse of how, what, why, and when is ongoing, dynamic, and insightful according to several scholars [35]. This report, however, only reports 3W1H (who, what, where, and how) due to the page limit.

IV. RESULTS AND DISCUSSION

A. Distribution and Impact of Research

a) Temporal distribution: Despite receiving extensive attention in business disciplines [12], e-learning in entrepreneurship education is surprisingly and disappointedly under-researched. There is an upward growth trend but even the peak year in 2019 only produced 11 articles (Fig. 1). Considering the low retention rate (41 out of 4,661 articles, Table I) the underdevelopment of this topic yields a grand research gap to fill.

b) Spatial distribution: The publication outlets of this topic's research are dispersed but also balanced regarding distribution between business-focused journals and e-learning-focused journals. As many as 29 journals published a relatively small number of 41 articles (Table I) with the one-article-per-journal scenario applying to 24 articles. The most active journals were the *Journal of Entrepreneurship Education* (7 articles), *Interactive Learning Environments* (3), *Journal of Small Business and Enterprise Development* (3), *Knowledge Management and E-Learning* (2), and *Simulation and Gaming* (2). Entrepreneurship and management journals published nearly 63.4% of all articles, and the e-learning journals published the rest. The rather balanced distribution between two domains' journals as a result is inconsistent with the study by Arbaugh et al. [12]. Their findings suggested the avoidance of business school scholars to publish in online education journals and inform the broader online learning research community. The contradicting findings may be explained by (a) actual improvement after one decade's development since the review work of Arbaugh et al. (2000–2008), or (b) the topic's novelty attracted pioneer researchers from both communities simultaneously.

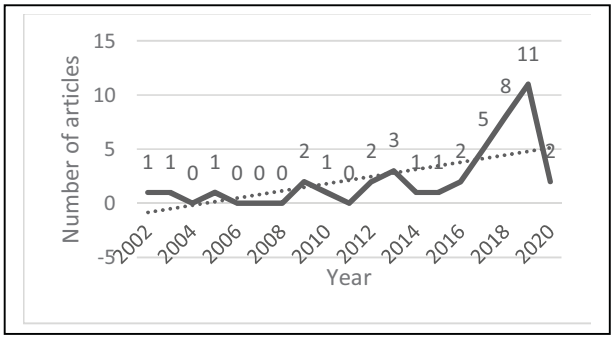

Fig. 1. Number of articles by year.

Out of 103 authors only eight ones published at least two articles, while others appeared to drop the topic. Navío-Marco J. and Solórzano-García M. co-authored two articles [36], [37]. Cirulli F., Solazzo G., and Elia G. co-authored two articles [38], [39]. Fellnhofer K. [5], [40], Kurilova A. [7], [41], and Lee C.Y. [42], [43] published two articles, respectively. Very few being serial authors indicates temporary research interests, early-stage research field, or stressing continuity problem of the topic.

Our results also showed that European scholars are most active. The observation partially confirmed the statement by Haase and Lautenschläger [44] that over the past twenty years Western Europe (especially the Scandinavian and German-speaking countries) has progressed considerably in offering entrepreneurship education. The systematic literature review of Blenker et al. [17] also discovered that entrepreneurship education research is a European discussion. Surprisingly the USA and the UK as the market leaders of entrepreneurship education development [19] were not found representative on the topic.

c) Impact of research: Although the primary home to publish on the topic of e-learning on entrepreneurship was *the Journal of Entrepreneurship Education,* the number of citations it received (41 times with seven articles) fell far behind journals such as *Technovation* (119 with one article),

International Small Business Journal (108 with one article), and *Simulation and Gaming* (136 with two articles).

We combined the journal ranking data (by journals' quartile in the SJR rankings) and article citation data from Google Scholar (by June 12, 2020), and found that most articles were published in Quartile 1, 2, or 3 journals (Fig. 2). The most active Quartile 2 covered 19 articles, followed by Quartile 1 (10) and Quartile 3 (10). Of 41 articles. Only 15 articles received at least 10 citations with the highest citation number as 119. There was no peer citation to each other among the 41 articles. Overall, these articles' influence remained quite limited and received poor attention and recognition from both communities of e-learning and business.

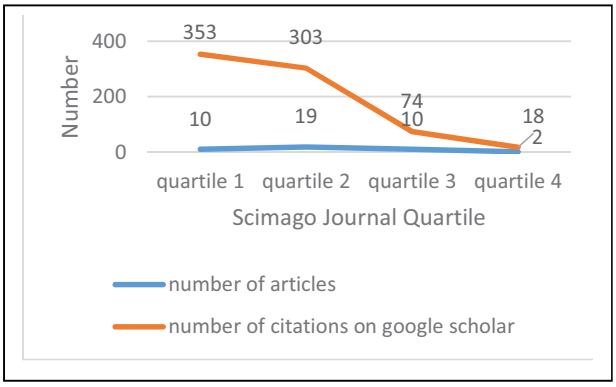

Fig. 2. Counting articles by journal quartile and citation number.

B. Thematic Dimensions/Sub-Dimensions of Contents

We cross analyzed 3W1H of 41 articles by SJR's journal quartile (1–4) with detailed results available in Table II.

1) Who

Among 41 studies students were the most common sample under study (18 out of 41). They were from different education levels including secondary education, undergraduate, and postgraduate education. The disciplinary backgrounds were also mixed including both business-related and non-business-related disciplines. Nine studies used entrepreneurs in the research sample. Five studies used MOOC learners as the sample. Four studies sampled entrepreneurship educators in HEIs. Other samples included schools, education programs, experts, web users, advisors, and online discussants but were minorities in the pool.

2) What

Two groups of keywords were listed under "What" to label e-learning elements that were central to studies, and key topical concepts generated from studies. These e-learning elements and topical contents fully reflected the four popular dimensions identified from a previous study [26], which include education, learning issues, students, and usability. The following sub-dimensions are frequent in our sample.

a) Education: Gamification/simulation, social networking, e-mentoring, and online assessment.

b) Learning issues: MOOCs, entrepreneurial traits/characteristics, and social enterprise/entrepreneurship.

c) Students: Learning performance, attitude, and perception of e-learning.

d) Usability: Web-based learning, online course, and learning analytics.

3) Where

European scholars were comparatively active in researching the topic of e-learning in entrepreneurship education, followed by their peers in the USA and some Asian areas such as Taiwan and Malaysia.

4) How

Nearly 68.3% of 41 studies were quantitative research: 24 studies used surveying (questionnaire or/and interview), two used experiment design [3], [42], and two used web analytics [35], [36] to obtain data. Less than 31% of studies were qualitative research: 11 studies were case studies that reported specific e-learning related practices and two studies were conceptual/commentary articles. The result is contradicting with a previous study reporting methods used in entrepreneurship education research [17], which concluded that qualitative research was more dominant than quantitative research. It is recommended that a mixed-methods approach should be more applied in future research with case studies as a research strategy to include various levels of analysis, different types of data, and both insiders (educators) and outsiders (researchers) [17].

V. Conclusion

The topic of e-learning in entrepreneurship education is facing urgency in practice and scarcity in research. Responding to the research gap of having no systematic literature review study on this interdisciplinary topic, this paper reports the first attempt to systematically examine the status quo of research development in this field by following a clearly defined review protocol. By running the bibliometric analysis using VOSviewer and the semantic analysis using a shortened 5W1H model, we produced a detailed narration of 41 journal articles published in 29 journals between 2002 and 2020. The study offers insights for other scholars to conduct further research.

Here are some limitations. This study used broad terms in the two domains to conduct the literature search. In the future, more refined keywords that reflect dimensions or sub-dimensions from the two domains (e.g., terms listed in Table II in the "What" column) should be used. For instance, in the e-learning domain the child-level labels such as MOOCs, OER, mobile learning, online discussions can be used as keywords. In the entrepreneurship education domain the child-level topics such as opportunity recognition, business plan writing can be used as keywords. Such attempts can further the investigation to a deeper level. We would like to also bring your attention to the concerning relevance level of the data directly exported from the academic database engines (i.e., Web of Science or Scopus) when an eye screening procedure was not followed. Our experience showed that the data output had a high risk of being skewed by irrelevant data. The extremely low retention rate of relevant articles in our research also demonstrated the flaw of solely relying on automatically generated results of academic databases. Future researchers when using a bibliometric analysis method can contribute further observations on the matter. Besides, we used VOSviewer to analyze the bibliometric data but our sample was rather small; therefore, the power of bibliometric analysis was not fully revealed. Finally, the result of using the 5W1H model was not fully reported in this paper due to the page limit. A more elaborated version of this research is expected to publish in a journal as the next step.

TABLE II. 3W1H ANALYSIS OF 41 ARTICLES BY SCIMAGO JOURNAL QUARTILE

Citations	Who	What	Where	How
Quartile 1 [23], [37], [43], [45]–[51]	**Students:** undergraduate students; postgraduate students; students (unspecified) **Companies:** owner-manager of SMEs; SMEs employees; high-tech startup entrepreneurs and managers **Others:** experts; MOOC learners	**e-learning elements:** online course; e-learning in SMEs; web-based learning; Facebook; social networking websites; gamification or games; digital reputation; simulation-based learning systems; MOOCs; digital mind mapping; learning analytics **Topics:** characteristics of learners; learning outcomes; attitudes to e-learning; learner performance; personality traits; learning facilitators; business plan writing; effectiveness; course evaluation; entrepreneurial learning; intellectual capital; entrepreneurship instructor; cultural norms; attitudes to entrepreneurship education; game-based learning; competition preference; simulation-based learning; flow experience; entrepreneurial self-efficacy	**Europe:** France; UK; Spain; Germany; Austria; Italy; Netherlands; Poland; Sweden **Asia:** Taiwan; Malaysia **America:** USA	**Quantitative:** questionnaire; Delphi survey; web analytics; interview; semantic analysis **Qualitative:** participant action research
Quartile 2 [4], [5], [7], [8], [20], [35], [36], [41], [52]–[62]	**Students:** students (unspecified); university students; postgraduate students **Companies:** women entrepreneurs; entrepreneurs **Educators:** lecturer; entrepreneurship educators in college universities; business schools' heads **Others:** faculty as a unit; education program as a unit; MOOC learners; website users	**e-learning elements:** game simulation; online self-assessment instruments; e-mentoring; online assessment; multimedia; online platform; use of e-learning and alternative techniques; information systems; digitalization of entrepreneurship education; MOOCs; learning analytics **Topics:** entrepreneurial characteristics/traits; entrepreneurship course; program development and evaluation; entrepreneurship toolkit; skill development; university education program; entrepreneurship curriculum success; entrepreneurial mindset profile; pedagogical approach; comparison of online and face to face entrepreneurship education; experiential learning; social entrepreneurship; entrepreneurial intention; perception/attitude to distance learning; TPB theory; learning community; interactivity; commitment; demographic profiles of entrepreneurship educators; developing countries; outsourcing educational activities; social learning theory	**Europe:** France; UK; Greece; Germany; Denmark; Russia; Spain **Asia:** Indonesia; Azerbaijan **America:** USA; Mexico; Canada	**Quantitative:** questionnaire; experiment; interview; web analytics; expert panel survey **Qualitative:** case study; grounded theory; participant action research; conceptual/commentary approach **Mixed methods:** mixed methods
Quartile 3 [1], [3], [38]–[40], [63]–[67]	**Students:** undergraduate students; high school students **Companies:** entrepreneurs **Educators:** teachers; researchers **Others:** education program; school; MOOC learners; advisors	**e-learning elements:** Web 2.0; blended learning; web-based software model; web application; gamification; e-mentoring; MOOCs **Topics:** education-business link; practice enterprise; experimental education; learning outcomes; entrepreneurial attitudes and intention; entrepreneurial traits; psychometric test; entrepreneurial aptitude; social enterprise education; evaluation model	**Europe:** UK; Italy; Germany **Asia:** Malaysia; Dubai; India	**Quantitative:** survey; web analytics; interviews **Qualitative:** participant action research; design science method; action-based research; case study; conceptual/commentary approach
Quartile 4 [10], [42]	**Students: u**ndergraduate students **Others:** online discussants	**e-learning elements:** online peer assessment; online informal discussions **Topics:** family entrepreneurial experience; learning performance	**Europe:** Greece **Asia:** Taiwan	**Quantitative:** experiment **Qualitative:** case study

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