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A Systematic Literature Review: Exploring the Integration of Technology in Green Entrepreneurship Education

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ABSTRACT

This study provides an overview of the article's purpose: to conduct a comprehensive literature review on integrating technology in green entrepreneurship education. It explains the aim of the study, which is to identify key themes, theoretical frameworks, methodologies, and research gaps in this field. This part explains the approach taken to conduct the literature review. The researchers searched the Web of Science (WoS) and Scopus databases using keywords related to green entrepreneurship and technology. The criteria for selecting relevant articles are described, leading to the compilation of a list of the most frequently cited articles (37 in total). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines are highlighted, ensuring a systematic and rigorous approach to selecting and analysing relevant manuscripts. This result presents the outcomes of the literature review. It outlines the three main themes that emerged from the analysis of the selected articles: (1) the role of technology in entrepreneurship education, (2) the impacts of green entrepreneurship education, and (3) the challenges and opportunities in technology integration for green entrepreneurship. The key findings and trends within these themes are summarised, reflecting the content of the reviewed articles. The significance of the identified themes is discussed in more detail. The benefits of incorporating technology into entrepreneurship education are highlighted, including creating immersive learning experiences that simulate real-life entrepreneurial scenarios. Integrating technology helps students develop practical skills, fosters environmental consciousness, and prepares them for the evolving business landscape. The contribution of this integration to the growth of sustainable businesses and a greener economy is emphasised.

Keywords:

Green entrepreneurship education;
Integration technology

1. Introduction

Sustainable business practices and entrepreneurship have become increasingly relevant in recent years, promoting environmental consciousness and addressing global sustainability challenges. Universities can promote sustainability by partnering with environmentally conscious businesses and

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successful green startups utilising technology to address environmental challenges are taken from the previous studies [1]. On the other hand, case studies can highlight the benefits of Artificial Intelligence (AI)-powered resource optimisation, Virtual Reality/Augmented Reality (VR/AR)-based environmental education, and blockchain-enabled supply chain transparency in reducing carbon footprints, conserving resources, and promoting circular economy practices are taken from the previous studies [2,3]. Using technology in green entrepreneurship education has many benefits. It allows for interactive learning through simulations, access to many sustainability information and resources, collaboration with global green entrepreneurs and experts, practical skill development, environmental awareness, innovation, problem-solving, and cost-effectiveness through digital tools and real-time industry insights for a complete understanding of sustainable entrepreneurship are taken from the previous studies [3-6]. By considering the education principles for sustainable development and the goals outlined in the Agenda 2030, technology integration in green entrepreneurship education aligns with the broader objectives of promoting sustainability and addressing global challenges, as shown in Figure 1. Note that traditional entrepreneurship education approaches often rely on theoretical instruction and case studies, which may not fully capture the complexities and practicalities of sustainable entrepreneurship. However, with the rapid advancement of technology, new opportunities have emerged to enhance the learning experiences of aspiring green entrepreneurs are taken from the previous studies [7,8].



Fig. 1. Agenda 2030, SDG4: quality education

1.1 Green Entrepreneurship Education

Green entrepreneurship education is a specialised form of entrepreneurship education that emphasises the orientation of entrepreneurial activities as well as entrepreneurial decision-making

to the environment's sustainable development are taken from the previous studies [10]. Its goal is to instil entrepreneurs with economic as well as environmental values from traditional business education are taken from the previous studies [11]. Other than that, the goals of green entrepreneurship education include giving students a well-rounded mix of information and activities in the "green" and "entrepreneurial" domains. This enables students to engage with and become inspired by nature as a source of life and helps students establish the new skills as well as competencies demanded with regard to green entrepreneurship and jobs are taken from the previous studies [6]. College students tend to be involved in green entrepreneurship activities if they have a basic understanding of the field. Moreover, green entrepreneurship education may also accelerate the development of college students' cognition with respect to green entrepreneurship as well as motivate them to handle the challenges experienced in green entrepreneurship in the future, strengthening their desire to engage in green entrepreneurship are taken from the previous studies [11]. Green entrepreneurship education can also be enhanced by integrating technology into the curriculum, such as using online learning platforms, simulation software, social media, and data analytics are taken from the previous studies [12].

Technology has revolutionised the field of green entrepreneurship education by offering diverse tools and platforms for teaching and learning are taken from the previous studies [7]. These technologies include VR, which allows students to immerse themselves in realistic environmental scenarios; online learning platforms, providing flexible access to educational resources and collaborative opportunities; mobile applications, enabling learning on the go; simulation software, allowing students to practice entrepreneurial decision-making in a virtual environment; and online collaboration tools, facilitating teamwork and knowledge sharing are taken from the previous studies [12]. Nevertheless, the technology gap between Malaysia and other countries in the region, such as Indonesia, is one of the significant challenges. Indonesia and Malaysia have developed more flexible solutions for entrepreneurs, which puts Malaysia in direct competition with its neighbour are taken from the previous studies [13]. However, regarding technology, Indonesia seems behind compared to Malaysia and other countries. This technology gap poses a challenge to integrating technology in green entrepreneurship education in Malaysia. This challenge is further exacerbated by the decreasing entrepreneurial intention score among Malaysians, which decreased to 11.8% in 2013 and 11.63% in 2014 are taken from the previous studies [14,15]. Inadequate entrepreneurship education and training are among the challenges entrepreneurs face in Malaysia. These challenges highlight the need to reassess education and training to promote an entrepreneurial mindset among Malaysians.

There has been a significant emphasis on developing entrepreneurship in Malaysia in recent years, mainly through integrating entrepreneurship elements into tertiary education curricula. One institution that has contributed to the development of entrepreneurship in Malaysia is Universiti Kebangsaan Malaysia are taken from the previous studies [16]. This university has played a role in supporting small and medium enterprises in Malaysia. However, these enterprises face various obstacles in the international market. Some of the obstacles include the economic recession, problems related to global economic productivity, a lack of government support, a lack of cooperation between small and medium enterprises and multinational corporations, intellectual property, bankruptcy issues, a lack of legal knowledge, information, and communication technology issues, and insufficient consideration for product branding are taken from the previous studies [16]. These obstacles present significant challenges for integrating technology into green entrepreneurship education in Malaysia. This study addresses this gap by systematically examining existing research on integrating technology into green entrepreneurship education. Through a comprehensive review of relevant literature, the study seeks to identify and analyse critical themes,

theoretical frameworks, methodologies, and gaps in the field. By synthesising and evaluating the findings, valuable insights can be generated for educators, policymakers, and researchers to effectively incorporate technology into green entrepreneurship education.

2. Methodology

This section describes how articles on integrating AR in green entrepreneurship education are retrieved. The reviewers used PRISMA, comprising resources (such as Scopus as well as Web of Science (WoS)) for the systematic review, exclusion as well as eligibility criteria, review process phases (identification, screening, as well as eligibility), as well as data analysis and abstraction.

2.1 PRISMA

The review followed the PRISMA, which is frequently employed in the realm of environmental management. In order to define straightforward research questions that enable systematic study, identify exclusion as well as inclusion criteria, and attempt to review a sizable scientific literature database in a certain length of time, it offers three different advantages. The PRISMA statement offers an extensive search of terms to clarify the benefits and implications of incorporating AR technology into green entrepreneurship education and pinpoint areas that need more research. Other than that, the methodology can help us explore how AR can improve future green entrepreneurs' information acquisition, skill development, and sustainability mentality.

2.2 Resources

We conducted a comprehensive search of various databases, utilising specific keywords such as "green entrepreneurship", "ecological entrepreneurship", "ecopreneurship", "technology", as well as "environmental entrepreneurship" in the education context. Our primary focus was on the reliability of the results, which is why we filtered the database search engines to display outcomes only in the title, abstract, or keywords. This approach helped us exclude articles that only mentioned the terms without any substantial connection to the manuscript text. Due to the interchangeable usage of terminology within research areas, we focused especially on minimising the recurrence of articles when searching through the two databases: Scopus and WoS. Therefore, after combining research articles from all the databases and different periods, we obtained 37 research articles listed in Table 1.

Table 1

Integrating Technology in Green Entrepreneurship Education, 37 most cited articles in WoS and Scopus databases

No	Authors	Title	Method	Publication Year
1	Ismail <i>et al.</i> , [19]	The Importance of Digital Applications in Young Children's Learning Industry Era 4.0	The authors use descriptive design in this qualitative investigation. Analysing documents from books, journals, proceedings, book chapters, and other sources is how data is gathered. Thematic analysis was used to examine the data.	2024
2	Saleh <i>et al.</i> , [20]	Mathematics Anxiety among Architecture Students at Polytechnic Sultan Idris Shah: A Preliminary Study as An Attempt to Strengthen Mathematics Education in TVET Institution	The authors used a questionnaire and a problem-solving test and analysed data from 45 Diploma in Architecture students using descriptive and correlation analyses.	2024
3	Ramli <i>et al.</i> , [3]	Interactive AR Textbook Application For 3M Orang Asli Students in Primary School	This study employs design-based research (DBR) in four phases: analysis, development, evaluation, and documentation. Six experts validated the application, which was tested on 62 first-year Orang Asli students in Perak for usability and impact on student performance.	2024
4	Hishamuddin <i>et al.</i> , [21]	Empowering Leaders: A Work in Progress on Promoting Leadership Roles in Online Learning through Project-Based Learning (PBL)	The authors integrate project-based learning (PBL) to promote leadership in online education. Student teachers learn to facilitate active, inquiry-based learning experiences for their future students through projects.	2024
5	Sidhu <i>et al.</i> , [22]	Awareness and Readiness of Malaysian Generation Z Students towards the Fourth Industrial Revolution (IR4.0)	The authors determine if variables like Performance Expectancy, Effort Expectancy, Social Influence, Perceived Risks, and Trust are related to Generation Z students' Behavioural Intention to use IR4.0 Technologies. The research involved 920 Generation Z students aged 16-26 studying in public and private schools across Malaysia.	2024
6	Giuggioli & Pellegrini [17]	Artificial intelligence as an enabler for entrepreneurs: a systematic literature review and an agenda for future research	A comprehensive examination concerning relevant studies was conducted through a Systematic Literature Review (SLR) to establish links between entrepreneurship and AI. The findings were organised into the "AI-enabled entrepreneurial process."	2023

7	Shabeeb Ali <i>et al.</i> , [6]	Born to Be Green: Antecedents of Green Entrepreneurship Intentions among Higher Education Students	The study surveyed college seniors and recent graduates from four schools who took management and entrepreneurship courses. The questionnaire was designed to measure six factors that predict entrepreneurial intention. These factors include attitude, commitment to green consumption, university education support, self-efficacy, social norms as well as country support. The questionnaire was tested and found to be clear, consistent, and simple.	2023
8	Bjelobaba <i>et al.</i> , [18]	Collaborative Learning Supported by Blockchain Technology as a Model for Improving the Educational Process	A survey was chosen to gather data from educators in Serbia's higher education institutions. The researchers used random sampling to create a representative sample of teaching staff members from the Toplica Academy of Professional Studies database. Care was taken to ensure accuracy.	2023
9	Khelifi [19]	Informal university entrepreneurship: The missing link in transition higher education systems	The author used qualitative and quantitative research methods to study Tunisian higher education's entrepreneurial identity. According to PRISMA-ScR criteria, a scoping assessment was carried out to look at informal matters, such as teaching staff profiles and academic networks. Empirical data may have been used to support the findings.	2023
10	Weking <i>et al.</i> , [6]	Metaverse-enabled entrepreneurship	The author used a conceptual framework approach in this study, as indicated in the abstract. The main focus was on exploring metaverse-enabled entrepreneurship and understanding the factors enabling supply and demand, including technological and social aspects.	2023
11	Maydiantoro <i>et al.</i> , [20]	Development of Virtual Reality Technology in Entrepreneurial Learning Containing Ethnpreneurship	The author used the Borg and Gall model for their study: data collection, planning, product development, and field trials. They conducted a literature review, validity test, and questionnaire, analysing the data with descriptive analysis. They aimed to create an entrepreneurship learning module using VR-assisted Ethnpreneurship and assess its impact on entrepreneurial intentions. Field trial specifics and research implications were not mentioned in the abstract.	2023
12	Fischer <i>et al.</i> , [11]	A Brief Review of Our Agile Teaching Formats in Entrepreneurship Education	The author conducted a case study on agile teaching formats for entrepreneurship education at a Bavarian university. They created a limited company for practical experimentation and developed elective courses and a founders' night. The program resulted in the creation of six student-led startups, promoting entrepreneurial thinking among students.	2022

13	Alkaabi & Ramadani [21]	A framework for the university performance assessment: some insights on innovation, technology and entrepreneurship	Using a comparative and analytical approach, the author analysed university performance in entrepreneurship, technology, as well as innovation. Factors examined included commercialisation, economic influence, entrepreneurship culture, collaboration, intellectual property, as well as research capability. A fuzzy multi-criteria decision-making method was used to identify critical factors for promoting innovation and entrepreneurship education in universities.	2022
14	Petrenko <i>et al.</i> , [22]	A System for Training Innovative Entrepreneurs with the Use of an Aggregator Platform for the Digital Economy	This study developed a training system for innovative entrepreneurs that fosters flexible thinking and practical work in fast-changing environments. It developed algorithms for utilising educational resources and offered a model for the educational process. The system includes a scalable educational subsystem and a unified knowledge base accessible to all platform participants. It was evaluated throughout master classes as well as university courses and aims to train entrepreneurs-innovators across various fields.	2022
15	Secinaro <i>et al.</i> , [2]	Exploring agricultural entrepreneurship and new technologies: academic and practitioners' views	In this work, 683 patents from the European Patent Office (EPO) dataset and 325 academic sources obtained from the Scopus database were subjected to content as well as thematic analysis. The non-parametric Kruskal-Wallis test was also used in the study to evaluate any discrepancies between the key ideas covered in the two sources.	2022
16	Anghel & Anghel [10]	Green Entrepreneurship among Students—Social and Behavioural Motivation	A study examined the link between students' inclination to implement business ideas in the field and education on green entrepreneurship. Data was gathered from 123 students at Valahia University in Romania using a Likert-type scale and analysed with ANOVA and the Likelihood Ratio Chi-Square test. Here, findings indicated a rise in the interest in green entrepreneurship among students.	2022
17	Dahl & Grunwald [23]	How lower secondary pupils work with design in green entrepreneurship in STEM education competitions	The authors acted as referees for their university in a municipality competition on October 31, 2018. They chatted informally with two educators from Forest School Town (700 students) and Valley School Rural (200 students from grades 0-6).	2022
18	Nikitina <i>et al.</i> , [24]	Individual entrepreneurial orientation: comparison of business and STEM students	To study entrepreneurial orientation among student groups in Latvia and Poland, a survey was conducted using theoretical research methods, including linear regression analysis and non-parametric inferential statistical techniques.	2022

19	Rajchamaha & Prapojanasomboon [25]	Influence of role models on the entrepreneurial skills of Science and technology undergraduates	A qualitative research design was used to gain insight into how entrepreneurial skills are delivered among science and technology students. Note that this was part of a more extensive study to design an instrument for Mahidol University in Thailand. Qualitative methods are helpful in cases with incomplete research or needing further description.	2022
20	Oliver & Oliver [26]	Innovative online learning in entrepreneurship education: The impact of embedding real-life industry practice in the virtual learning environment	Researchers used Virtual Learning Environment (VLE) data to identify learning patterns during the pandemic. They overcame online learning challenges in entrepreneurship education by using structured approaches and scaffolding to connect theory and practice.	2022
21	Al-Gindy et al., [12]	Integrating Digital Technology in Enterprise and Entrepreneurship Education	The article discusses using modern tech, like VR, AI, AR, and robotics, as pedagogical tools in enterprise education, connecting science and business students for enhanced learning experiences. It is a descriptive and exploratory approach rather than a specific research methodology.	2022
22	Kim, Huruta & Lee [27]	Predictors of Entrepreneurial Intention among High School Students in South Korea	A cross-sectional study was conducted in South Korea, with the participants being students from the High School of Science and Technology. They completed a survey between August and September 2021. Purposive sampling was used to select participants based on specific criteria. The minimum sample size was determined using the number of pointing arrows and the statistical power rule.	2022
23	Setyani & Susilowati [28]	The Effect of E-Problem Based Learning on Students' Interest, Motivation and Achievement.	A quantitative method was used to analyse data in a study exploring the impact of the Entrepreneurship Learning Program during COVID-19. Close-ended questionnaires and a test were given to participants before their final class.	2022
24	Ala et al., [4]	Understanding the possibilities and conditions for instructor-AI collaboration in entrepreneurship education	In light of shifts in society, technology, culture, and pandemics, this chapter examines the effectiveness with respect to traditional entrepreneurship education and the need for novel approaches. It discusses AI usage in education, which includes virtual classrooms, AI tutors, and extensive data systems. The chapter emphasises investing in AI integration in entrepreneurship education for improved pedagogical practices and learner outcomes.	2022

25	Recke & Perna [29]	An emergent narrative system to design conducive educational experiences	The University of Naples Federico II uses the Challenge Based Learning (CBL) paradigm in one of its software development courses. CBL focuses on collaborative and self-guided learning through real-world projects. The aim is to provide an experiential and progressive learning experience that immerses learners in entrepreneurial realities. The program also uses emergent narrative concepts to enhance learning experiences and foster innovation in entrepreneurship teaching.	2021
26	Situmorang <i>et al.</i> , [5]	Entrepreneurship education through mobile augmented reality for introducing SMEs in higher education	A mixed-method study evaluated the effectiveness of AR on entrepreneurship education students with Android smartphones. Here, 20 students from the educational technology study program and 20 from the civic education study program at Jakarta State University were interviewed. Participants were chosen by purposive sampling. The study analysed students' responses concerning their understanding of learning design, AR, entrepreneurship education, SMEs, and learning needs.	2021
27	Bawakyillenuo & Agbelie [1]	Environmental Consciousness of Entrepreneurs in Ghana: How Do Entrepreneur Types, Demographic Characteristics and Product Competitiveness Count?	This section covers the study's methods and data, starting with the theoretical model's framework. The model's construction is detailed in subsequent subsections. The study uses the Consumer Green Purchase Framework (CGPF) to determine suppliers' environmental consciousness. According to CGPF, entrepreneurs should consider consumer feedback to sustain the business, avoid suboptimal production, and lower profit margins.	2021
28	Alvarez-Risco <i>et al.</i> , [30]	Factors Affecting Green Entrepreneurship Intentions in Business University Students in COVID-19 Pandemic Times: Case of Ecuador	The present study employed an observational methodology having an inferential as well as descriptive design. The research's goal was to pinpoint, list, and discuss the contributing elements to green entrepreneurship as well as to explain its motivation. Students from Ecuador's business universities who were 18 years of age or older made up the study's participants.	2021
29	Hussain <i>et al.</i> , [31]	Green and sustainable entrepreneurial intentions: A mediation-moderation perspective	Empirical data from 300 university students in Faisalabad and Lahore was gathered via a structured questionnaire. Convenience sampling was employed to collect information from participants quickly. This sample size allowed for an accurate estimation of the $C\alpha$ -coefficient. Structural equation modelling analysis is commonly recommended with a minimum sample size of 300.	2021

30	Amankwah & Sesen [32]	On the relation between green entrepreneurship intention and behaviour	A study was conducted on Ghana's tertiary students to determine the factors that affect their decision to adopt environmentally friendly entrepreneurial behaviour. The study focused on green entrepreneurial intentions, behaviours, university support, and consumption factors. Three universities were selected for the study, and two four-item scales were used for data collection.	2021
31	Soomro, Ghumro & Shah [11]	Green entrepreneurship inclination among the younger generation: An avenue towards a green economy	The study used quantitative research to forecast younger generations' interest in green entrepreneurship. Data was collected from bachelor's and master's degree students through a survey with 284 usable questionnaires. To examine the impact with respect to education, sustainability orientation, as well as self-efficacy on green entrepreneurship inclination, the data were assessed utilising Structural Equation Modelling (SEM).	2020
32	Gallagher & Stephens [33]	Multiple roles, multiple perspectives: graduates and manufacturing SMEs	The study investigated the workplace experiences of science, engineering, and technology graduates under the FUSION project in Ireland. It used qualitative research and analysed the graduates' experiences from three perspectives.	2020
33	Yatluk, L [34]	Strategies and Tactics of Academics in the Context of Transition toward the Entrepreneurial University	This study examined how conflicting logic affected university researchers in Russia amid the transition towards the entrepreneurial university. The author used qualitative research and conducted 30 in-depth interviews with virtual and AR researchers as well as five expert interviews with market representatives. Conflict situations included lab funding, research problem selection, and program launches. The study employed the mētis and anomie theory to analyse researchers' strategies and choices.	2020
34	Silva <i>et al.</i> , [40]	Technological Structure for Technology Integration in the Classroom, Inspired by the Maker Culture	A study from 2014 to 2018 trained 367 educators to use technology in their lessons. The VLE was used in 27 public schools, providing access to educational content for 6,766 students. Three thousand three hundred sixty students used twenty labs for practical activities in STEM subjects.	2020
35	Munoz, Guerra & Mosey [46]	The potential impact of entrepreneurship education on doctoral students within the non-commercial research environment in Chile	An analysis with respect to the impact of an entrepreneurship course on science and technology Ph.D. students in Chilean doctorate programs was conducted via a multiple case study research design. The research tracked the students' experiences before, during, and one year after the procedure, focusing on their impact on their research projects and personal development.	2020

36	Oparaocha & Daniil [36]	Theatricalization of enterprise education: A call for “action”	The authors suggest similarities between unconventional thinking and art education/theatrical skills. They use videography to showcase how digital technology can integrate surprising concepts into enterprise education.	2020
37	Adach-Pawelus <i>et al.</i> , [37]	Towards Sustainable mining in the didactic process—MEITIM project as an opportunity to increase the attractiveness of mining courses (a case study of Poland)	The article analyses the mining education in Poland at WUST and compares it to the experiences of UPM and LUT under the MEITIM initiative. However, the research methodology needs to be clearly explained in the abstract.	2020

2.3 Eligibility and Exclusion Criteria

The study followed specific criteria to select relevant literature for the review. Only journal articles were considered eligible for inclusion, while other sources such as review journals, book chapters, books, book series, and conference proceedings were excluded. The literature had to be written in English, excluding non-English articles. The timeline for inclusion was set from 2019 to 2023, covering five years, with articles published before 2019 being excluded. The context of the study was global. The eligible subjects included environmental sciences, ecology, social sciences, computer science, and technology. However, all other subject areas not falling within these categories were excluded from the review. This systematic approach ensured that the selected literature met specific criteria and aligned with the study’s focus on exploring the integration of technology in green entrepreneurship education, as demonstrated in Table 2.

Table 2
 Exclusion and inclusion criteria

Criterion	Eligibility	Exclusion
Literature type	Journal articles	Journals (review), chapters in a book, book, book series, conference proceeding
Language	English	non-English
Timeline	2019 till 2023 (5 years)	before 2019
Context	Global	
Subject area	Environmental sciences ecology social sciences computer science technology	All others except the mentioned

2.4 Systematic Review Process

During our systematic review process, we methodically carried out four key stages. Firstly, we carefully examined previous studies and thesauruses to identify relevant keywords for our search process, which included “green entrepreneurship”, “ecopreneurship”, “ecological entrepreneurship”, “environmental entrepreneurship”, and “technology”, as listed in Table 3. Following a thorough screening, we decided to discard one article. In the second stage, we continued to screen and remove 1 paper out of the 153 eligible ones. Consequently, the third stage involved accessing the full articles to determine their eligibility; after that, we excluded 115 articles as they did not focus on integrating AR in green entrepreneurship education or were not empirical articles.

Table 3
 The search string utilised with regard to the systematic review process

Databases	Keywords
Web of Science	(TS=(green entrepreneurship) OR TS=(ecopreneurship) OR TS=(environment entrepreneurship) OR TS=(ecological entrepreneurship) AND AB=(education) AND AB=(technology)) AND (PY==(“2019” OR “2020” OR “2021” OR “2022” OR “2023”) AND DT==(“ARTICLE”) AND LA==(“ENGLISH”) AND SJ==(“ENVIRONMENTAL SCIENCES ECOLOGY” OR “EDUCATION EDUCATIONAL RESEARCH” OR “SOCIAL SCIENCES OTHER TOPICS” OR “SCIENCE TECHNOLOGY OTHER TOPICS”) AND TASCA==(“EDUCATION EDUCATIONAL RESEARCH” OR “GREEN SUSTAINABLE SCIENCE TECHNOLOGY”))
Scopus	TITLE-ABS-KEY (“green entrepreneurship” OR “ecopreneurship” OR “ecological entrepreneurship” OR “environmental entrepreneurship”) AND (“technology”) AND (LIMIT-TO (PUBSTAGE, “final”)) AND (LIMIT-TO (PUBYEAR,2023) OR LIMIT-TO (PUBYEAR,2022) OR LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019)) AND (LIMIT-TO (LANGUAGE, “English”))

Finally, the last stage of our review process entailed a qualitative analysis of 37 articles, as demonstrated in Figure 2.

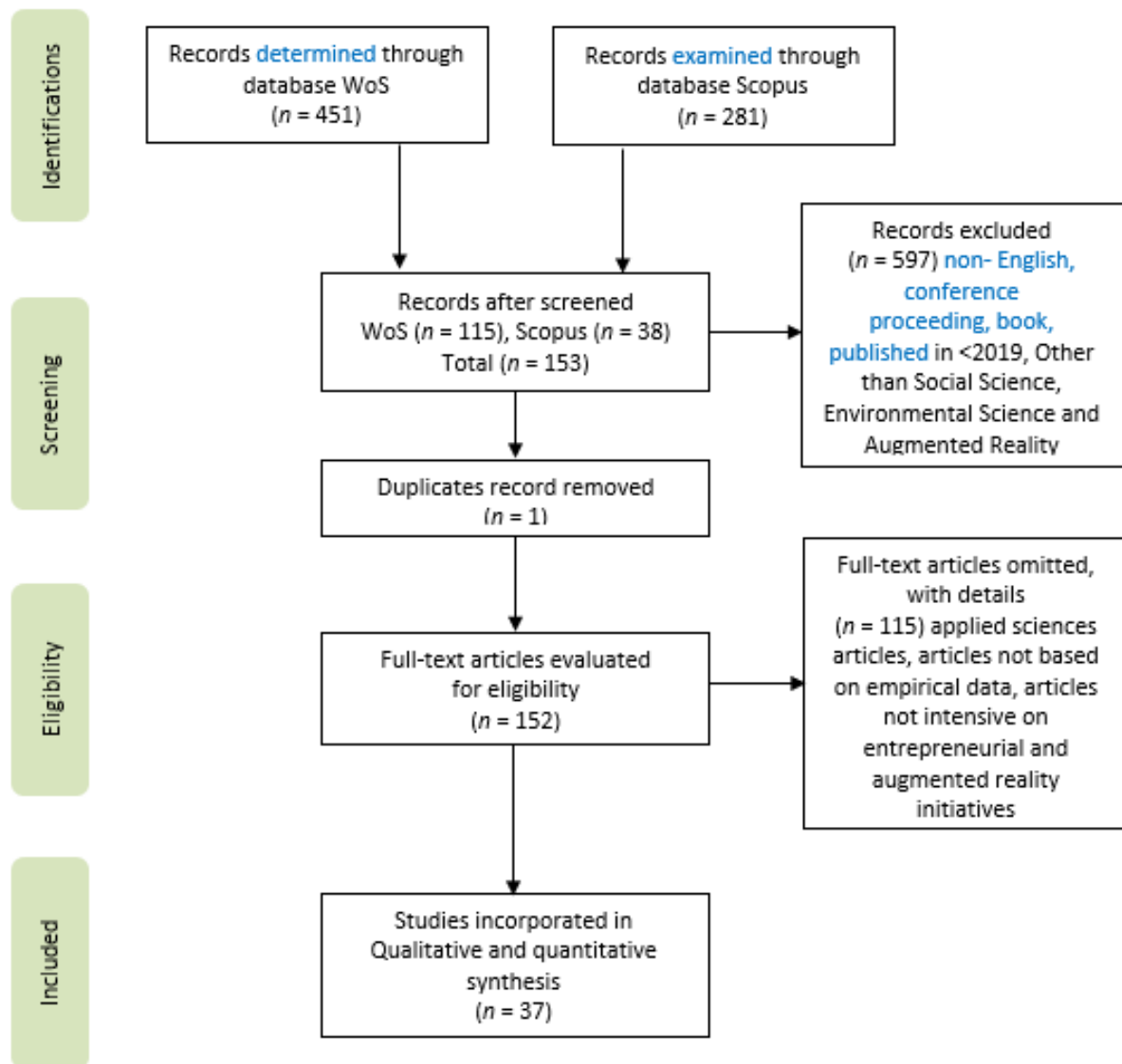


Fig. 2. Flow diagram for article selection (*Source: [41,43])

2.5 Data Abstraction and Analysis

Finding and developing the primary themes was the initial step in the review process. These themes were then developed further with subthemes drawn from the chosen studies. To ensure the accuracy and objective of the review, a thorough analysis of statements that captured the essence of the studies was conducted. Subsequently, data encoding was performed to establish meaningful and coherent themes. Three primary themes were identified through this review process. During the data analysis, careful attention was given to maintaining logical consistency among the themes and subthemes. Experts with qualitative and quantitative approaches examined the final articles to ensure their applicability and clarity of classification.

3. Discussions

3.1 Role of Technology in Green Entrepreneurship Education

The first theme explores the role of technology in green entrepreneurship education in Malaysia, which is essential in preparing students for the current and future demands of the job market. With the rapid advancement of technology, it has become increasingly necessary for educational institutions to incorporate technology into their curriculum to provide students with the skills and knowledge needed to succeed in the digital age, such as VR, AI, AR, as well as Robotics can empower entrepreneurs in various ways are taken from the previous studies [3,5,8,12,17,20,40]. AI, for example, provides opportunities for identifying and capitalising on business prospects, making informed decisions, enhancing overall performance, and supporting educational and research endeavours in entrepreneurship. By incorporating technology into green entrepreneurship education, students are exposed to various digital devices and platforms that enable them to explore different sustainable business models and solutions. For instance, the Ministry of Education Malaysia recognised the importance of digital entrepreneurship and included a module in the entrepreneurship course at higher learning institutions starting in 2016 taken from the previous studies [43]. Integrating technology into the curriculum allows students to understand how technology can foster sustainable development and promote green practices in entrepreneurship are taken from the previous studies [43]. Furthermore, they learn how to use technology for market research, digital marketing, and communication, enabling them to promote green products or services taken from previous studies [36].

3.2 Impacts of Integrate Technology in Green Entrepreneurship Education

The second theme focuses on the impact of technology on green entrepreneurship education. The findings emphasise the importance of integrating environmentally conscious practices into entrepreneurial endeavours taken from the previous studies [1,10,27,30,31]. Incorporating technology into green entrepreneurship education helps cultivate an innovative mindset among students by exposing them to various digital devices and platforms. The study highlights the impact of metaverse technology on entrepreneurship, offering insights into its potential applications and implications for future research in this domain. This allows them to explore and develop sustainable business models and solutions that can contribute to the overall green economy, especially in Malaysia, which are taken from previous studies [1,28,37,46]. Moreover, technology enables students to access a wealth of information, and resources related to green entrepreneurship. With the proliferation of websites and social media platforms, students have easy access to a wide range of resources, case studies, and success stories in green entrepreneurship taken from previous studies

[10,32]. This enhances their knowledge and understanding of green business practices and inspires them to pursue entrepreneurial ventures in the green sector. Furthermore, universities can create a greener and more sustainable entrepreneurial ecosystem by encouraging students to develop an interest in green entrepreneurship and providing them with the necessary knowledge and resources are taken from the previous studies [9,11,22,23,33,46].

3.3 Challenges and Opportunities in Technology Integration for Green Entrepreneurship Education

The third theme explores the challenges and opportunities in technology integration for green entrepreneurship education. While challenges exist in integrating technology into green entrepreneurship education, numerous opportunities can enhance the learning experience. Educational institutions, particularly those in underserved areas, face challenges in providing green entrepreneurship education due to limited access to technology are taken from the previous studies [42]. The lack of advanced technology necessary for effective teaching can hinder students' access to quality education. Moreover, implementing technology in education can be expensive, which puts a strain on educational budgets, especially for institutions with limited resources are taken from the previous studies [20,24,34]. Teacher training is also a challenge, as many educators lack the necessary skills and knowledge to use technology for green entrepreneurship education taken from the previous studies [2]. Developing high-quality digital content for green entrepreneurship education can also be challenging, requiring expertise in both environmental science and entrepreneurship are taken from the previous studies [21]. Finding qualified content creators is crucial. Additionally, technological obsolescence is a constant challenge as technology evolves rapidly, and educational institutions must continually update their equipment and curricula to keep pace with advancements in green technology and entrepreneurship taken from previous studies [45].

However, technology also provides many opportunities for green entrepreneurship education. Online learning platforms can create courses in green entrepreneurship accessible to a global audience, expanding access to education beyond traditional classroom settings [46]. Interactive simulations, virtual labs, and gamified lessons can make learning more engaging and help students better understand complex environmental and business concepts taken from the previous studies [39]. Data analytics tools can help educators track students' progress and customise learning experiences, improving educational outcomes and identifying areas for improvement. Technology also facilitates global collaboration among students and educators, allowing for diverse perspectives and international partnerships taken from the previous studies [33]. Online resources such as research papers, case studies, and video lectures are readily available, making it easier for educators to access and integrate relevant materials into their courses. Technology allows for the development of innovative teaching tools, such as Virtual Reality (VR) simulations of sustainable business practices or Artificial Intelligence (AI) tutors that provide personalised feedback to students are taken from the previous studies [12,17]. Entrepreneurship incubators provide students with hands-on experience in developing green startups, fostering innovation and real-world entrepreneurship skills are taken from the previous studies [40]. Finally, the Internet of Things (IoT) and sensors can be used to track and measure sustainability efforts within educational institutions, providing data for research and practical learning are taken from the previous studies [9].

4. Conclusions and Future Research

In a nutshell, the SLR focuses on the significance of technology in entrepreneurship education, highlighting its role in helping students identify business opportunities, make informed decisions, and

improve overall performance. Technologies such as AI, VR, AR, and Robotics empower entrepreneurs and support educational endeavours. Additionally, blockchain technology ensures secure data storage and sharing, facilitating job skill recognition in education. Using technology, educators may design engaging lessons that help students obtain real-world experience and gain a greater knowledge of entrepreneurship.

Furthermore, promoting green entrepreneurship and sustainability is crucial in entrepreneurship. The integration of technology, like Metaverse, can significantly impact driving environmentally friendly practices. It enables businesses to adopt eco-friendly approaches and adhere to environmental laws, especially in urban areas. Therefore, universities are pivotal in supporting green practices and environmental education, fostering students' interest in green entrepreneurship, and providing the necessary knowledge and resources.

Lastly, collaboration between academia and industries is essential in entrepreneurship education. Universities must work closely with industries to foster innovation, technology, and entrepreneurship ecosystems. This collaboration enables students to gain industry-specific knowledge, develop management skills, and cultivate attributes vital for success. Startup clubs and patents facilitate technology transformation into tangible products, with universities supporting this process. Moreover, initiatives like Tinkering Labs and integrating digital technology in education prepare students for real-world challenges by instilling practical skills, curiosity, creativity, and imagination.

Future research in entrepreneurship education can investigate the effectiveness of AI, VR, AR, and Robotics technologies in different learning environments and cultures. It can also explore how technology can be adapted for specific entrepreneurship domains, like social or sustainable ventures. Another area of study can be the impact of green entrepreneurship on society and the environment to identify ways to promote sustainability. Consequently, successful industry-academia partnerships can be studied to understand the key factors that lead to successful collaborations. Fostering an entrepreneurial mindset and skill set among students can also be explored to address real-world challenges. These research directions can contribute to sustainable entrepreneurship and address global environmental and social issues.

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