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Application of Metaverse Technology in Entrepreneurship Education: A Systematic Review

Tang Haibin[1,2], Melor Md Yunus[1]

[1]Faculty of Education, Universiti Kebangsaan Malaysia, Bangi 43600, Malaysia, [2]Guangzhou Xinhua University, 19 Huamei Road, Tianhe District, Guangzhou, Guangdong, China, 510520

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Abstract

A systematic review of the application of metaverse technology in entrepreneurship education can help relevant teaching and research personnel better grasp the current development trends, and better utilize cutting-edge technologies to support the development of entrepreneurship education in teaching and practice. Therefore, this review aims to review the latest trends and research with the question "What issues can metaverse technology be applied in entrepreneurship education?". This system review adopts Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) , and collects data based on two core journal databases, Scopus and Web of Science, while using Note Express and Mendeley as supporting databases. A total of 27 articles were identified through a systematic search of ("metaverse*" OR "cyberspace*" OR "metaverse technology*") AND ("entrepreneurship education*" OR "enterprise education*" OR "entrepreneurial education*"). The results shown that metaverse related technologies are changing entrepreneurial intentions, make it easier for entrepreneurs to access entrepreneurial resources, and improving the efficiency of entrepreneurship education. The exploration of these issues also lays the foundation for subsequent researchers to study how to apply cutting-edge technologies to entrepreneurship education.

Keywords: Systematic Review, Metaverse, Metaverse Technology, Entrepreneurship Education, Application

Introduction

Entrepreneurship education is widely carried out in various countries, The academic community has conducted extensive research on entrepreneurship education, and the related research results has shown exponential growth (Tiberius & Weyland, 2023). Although schools can provide various forms of courses to help students master all the knowledge and skills necessary for entrepreneurship, an inexperienced entrepreneur is still difficult to succeed. Entrepreneurship experience is very important for entrepreneurs. Many successful entrepreneurs achieve success after experiencing multiple entrepreneurial experiences. For example, Jack Ma, the founder of the famous Alibaba company, after several failed startups experience, founded Alibaba and achieved success. However, the reality is that many people may only have one entrepreneurial opportunity. Because once entrepreneurs start a business, they always investing all of their time, energy, and money. However, once the

startup fails, it means that the entrepreneur will not have enough funds to start another new business for a long time. The metaverse expands the physical world by utilizing augmented reality Lim et al (2024) and virtual reality Benvegnù et al (2023) technologies. Virtual environments and immersive games (such as VRChat, Roblox, Fortnite, and Second Life) are described as the predecessors of the metaverse (Dwivedi et al., 2022). All these immersive games will bring participants a real experience, enhancing and changing their cognition in the real physical world. And these experiences can also be entrepreneurial experiences that entrepreneurs must possess. Therefore, this systematic review aims to review the latest trend and research with the question as follow:
What problems in entrepreneurship education can applying metaverse technology?

Metaverse Technology
In 1982, science fiction writer William Gibson pioneered the concept of cyberspace in his short story "Holographic Rose Fragments". In 1992, Neil Stephenson proposed the concept of the "metaverse" in his science fiction novel "Avalanche". Whether it's the Metaverse in the novel "Avalanche" or the Oasis in the movie "Number One Player", these virtual spaces used to carry the main plot of the story all have a common name, which is Cyberspace. When Roblox was listed on the New York Stock Exchange, the metaverse was included in the prospectus. So now Metaverse has become synonymous with Cyberspace. Most of the time, these two words have the same meaning. Because the term metaverse does not specifically refer to specific technologies, but rather to the widespread transformation of the way humans interact with technology (Whitehouse, 2008). Metaverse is a virtual environment where users have strong connections with the physical world through their avatars(Aung et al., 2024). Boston Consulting Group (BCG) defines the metaverse as the following three types of technologies in its "Metaverse Enterprise Hitchhiking Guide"

First category is metaverse worlds (M-worlds)(Hayashi et al., 2023);
Second category is augmented reality (AR) Koumpouros (2024), virtual reality (VR)(van der Meer et al., 2023) and mixed reality (MR) (Campbell et al., 2016);
Third category is Web3 (Seddon et al., 2023) and virtual assets (Zhang et al., 2022).
These technologies are widely applied in various industries, especially in the education sector. Emerging technologies such as Immersive Virtual Reality (IVR) and Metaverse have pointed out new directions for the future of education (Wei & Yuan, 2023). For example, the combination of virtual reality and interactive technology can play an important role in promoting campus culture by providing campus cultural information in the metaverse, allowing users and various social media platforms to interact (Listyaningsih et al., 2023).

Entrepreneurship Education
Entrepreneurship education can be narrowly defined as supporting students to become entrepreneurs themselves. But broad definition of entrepreneurship education is to help students acquire entrepreneurial abilities, so that in their future work and life, they can create value for the companies or organizations, as well as engage in entrepreneurial activities and achieve success on their own (Kikas, 2019). Entrepreneurship education aims to cultivate talents with basic entrepreneurial qualities and innovative personalities (Jia et al., 2022). It not only aims to cultivate the entrepreneurial awareness, spirit, and ability of students in school, but also targets those who plan to start businesses and have already started businesses throughout society. Entrepreneurship education is a phased and hierarchical

education that cultivates innovative thinking and enhances entrepreneurial abilities. Entrepreneurship education is essentially a practical education. Entrepreneurship ability is one of the key factors in enhancing a country's competitiveness (Chou et al., 2023). Entrepreneurship education is crucial for cultivating students' ability to start up and successfully operate a new businesses (Amani et al., 2024). It is precisely because entrepreneurship education is so important, and at the same time, the updates and iterations of metaverse technology are also rapidly changing. Therefore, a systematic review of the application of metaverse technology in entrepreneurship education can help relevant teaching and research personnel better grasp the current development trends, and better utilize cutting-edge technologies to support the development of entrepreneurship education in teaching and practice.

Methods

According to the method of Preferred Reporting Items for Systematic Reviews and Meta-Analyses(PRISMA), following the four basic steps of identification, screening, qualification, and inclusion , as shown in Figure 1. The specific content of the entire operation processes are as follows.

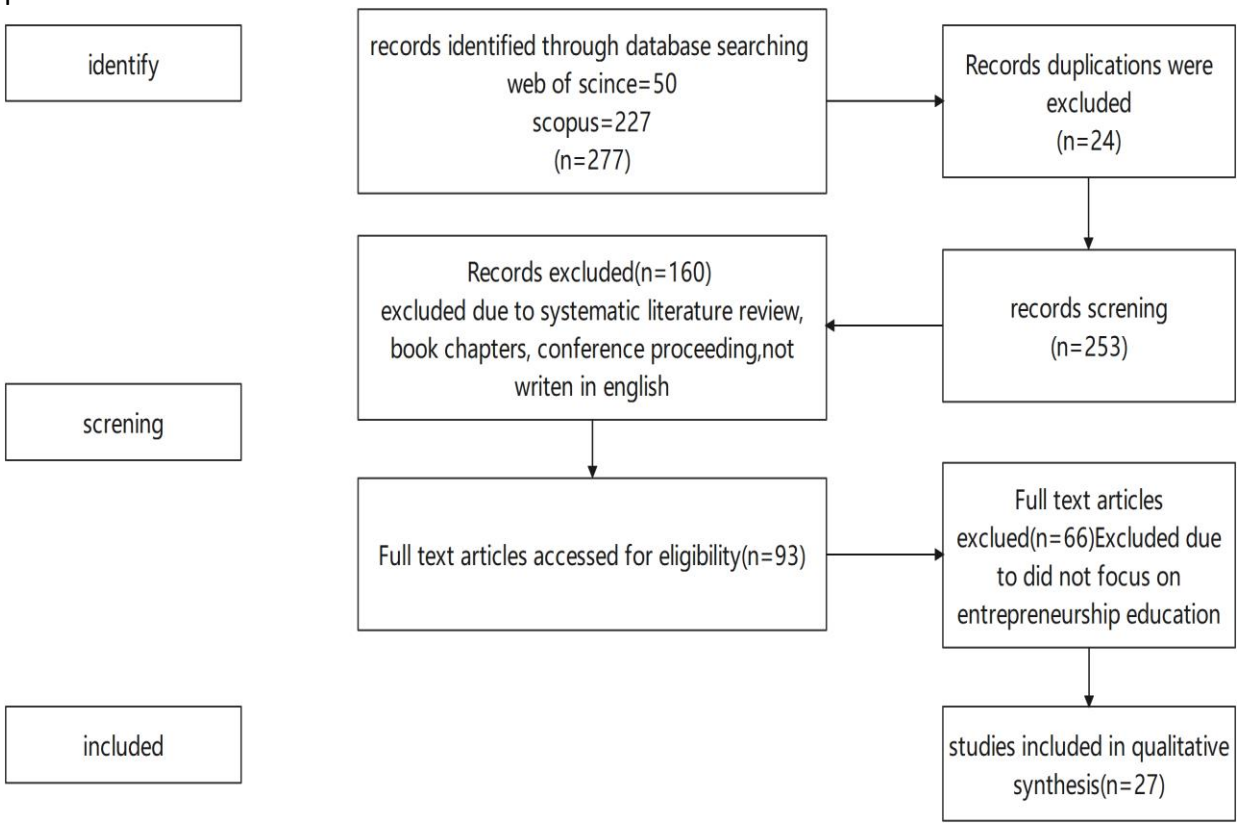

Figure 1. PRISMA systematic review adapted from(Tan & Md Yunus, 2023)

Identification

The first step in the systematic review covers the Identification process as reported in the PRISMA guidelines (John & Yunus, 2021). All retrieved literature comes from the Web of Science (WoS) and Scopus databases. The key terms included in this system review have been carefully constructed to reflect the structure under review. Words related to Metaverse and Entrepreneurship Education(EE) were included. During the search process, due to the limited

number of literature retrieved from the WoS database, the scope of the search was increased. The search strings used for each database in this study are shown in Table 1.

Table 1
Search string used in this study.

Database	Search String
Web of Science(WoS)	TS=(("metaverse*" OR "cyberspace*" OR "metaverse technology*" OR "augmented reality*" OR "virtual reality*" OR "mixed reality*") AND ("entrepreneurship education*" OR "enterprise education*" OR "entrepreneurial education*" OR “EE”))
Scopus	ALL(("metaverse*" OR "cyberspace*" OR "metaverse technology*") AND ("entrepreneurship education*" OR "enterprise education*" OR "entrepreneurial education*"))

Screening
After searching, a total of 277 articles were found from two databases. First, remove the duplicate 24 articles. Then, after excluding review articles, book chapters, conference proceedings, articles not written in English, and articles where the full text cannot be found, there are still 93 articles left. T Table 2 shows the inclusion and exclusion criteria.

Table 2
Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Articles from journals	Excluded due to systematic literature review, book chapters, conference proceeding
Articles written in English	Articles not written in English
Full text articles accessed	Not related to entrepreneurship education and Metaverse technology

After a quick reading of these articles, 66 articles that were clearly unrelated to entrepreneurship education and the metaverse were excluded, leaving 27 articles on the application of metaverse technology in entrepreneurship education. Conference proceedings and book chapters are excluded because they were not complete enough(Santhanasamy C, 2022).

Included
After careful selection and organization, there are a total of 27 articles related to metaverse and entrepreneurship education. Table 3 present in details about the research objectives and results of these articles.

Table 3
Summary of the selected studies

Study	Database	Aim	Samples	Findings
(Alkashami et al., 2023)	Scopus	Address the employability issue in Middle Eastern nations by utilizing an Adaptive Neuro-Fuzzy Inference System (ANFIS) data mining technology.	3 Jordanian universities, consisting of 22 parameters.	Achieving an accuracy of 94% for the graduate dataset, ANFIS exhibited high complexity.
(AlMalki & Durugbo, 2023)	Scopus	The range of determinants and priorities that influence institutional innovation for delivering society value.	485 peer-reviewed scientific publications.	The review identified key determining factors and management priorities.
(Bernardino et al., 2023)	Scopus	Whether the social entrepreneur's network reliance on social media increases the amount of resources available for the social organization.	313 social organizations in Portugal.	The social entrepreneur's network linkages have a direct and an indirect effect.
(Burgess et al., 2018)	Scopus	This article examines the design, development and delivery of a pilot blended learning program for entrepreneurial learning that targets the use of ICT by tradespeople.	11 weeks.	Project participants rated the face-to-face sessions, student mentor visits and practical exercises as very effective.
(Calandra et al., 2023)	Wos, Scopus	By collecting professional evidence, explain how metaverse technology affects digital entrepreneurship.	533 practitioner sources from the Nexis Uni database.	Discovered three macro themes and eight concepts related to metaverse and digital entrepreneurship.
(Chen & Yang, 2023)	Wos, Scopus	A new game based augmented reality navigation system	24 high school students in	Learners can use GARNS, online navigation systems,

		has been developed based on the Octalysis gamification framework and scaffolding theory.	grade 11 from Keelung City.	or traditional narrative guides with librarians to achieve significant learning outcomes for maker space user education.
(Dana et al., 2023)	Wos, Scopus	The paper presents a quantitative mapping of Digital Entrepreneurship through a bibliometric analysis of its publications.	201 samples.	The field of Digital Entrepreneurship to be rather lively and in rapid development, with several publication outlets, affiliations, and countries contributing to it.
(El-Gohary et al., 2023)	Wos, Scopus	The relationship between entrepreneurial education (EE), attitudes toward sustainable entrepreneurship (ATSE), and sustainable entrepreneurial intentions (SEIs).	314 business graduates from Pakistani universities.	The attitude of students towards sustainable entrepreneurship plays a mediating role between EE and sustainable entrepreneurial intention.
(George & Wooden, 2023)	Wos, Scopus	Critically evaluate the strategic adoption of artificial intelligence within the framework of "smart universities".	Qualitative research.	Provide a balanced assessment to help stakeholders make informed strategic decisions in supporting and promoting the smart university model.
(Gutiérrez-Esteban et al., 2021)	Scopus	The impact of family structure on the use of social networks by entrepreneurial women and female businessmen.	477 entrepreneurs and 126 businesswomen.	It is necessary to establish formal digital training to increase the digital influence and participation of entrepreneurial women and female businessmen, in order to achieve

				equality in the field of digital inclusion
(Kuschel et al., 2020)	Wos, Scopus	In innovation driven startups, female representation is insufficient, highlighting a dual masculinity that exists at the intersection of Science, technology, engineering, and mathematics (STEM) fields and entrepreneurship.	Qualitative research.	Emphasized the institutional, organizational, and personal factors that influence women's entrepreneurship in the STEM field.
(Liu, 2023)	Wos, Scopus	Create an educational tool for entrepreneurship incubation from students' implicit knowledge and evaluate its performance.	15 university teacher and student users.	This product can alleviate the inherent contradiction between personalization (an inherent characteristic of innovation and entrepreneurship) and large-scale development (carried out in a sustainable manner).
(Ng et al., 2023)	Wos, Scopus	Exploring how to address the challenges faced by teachers using artificial intelligence systems.	Qualitative research.	Adjustments and revisions have been made to the DigCompEdu framework and P21's 21st century learning framework to adapt to artificial intelligence technology.
(Patrício & Ferreira, 2023)	Wos, Scopus	The relationship between the total amount of early entrepreneurial activities of graduates and their entrepreneurial	174128 observations randomly collected from an adult population aged 18 to 64	As long as students believe they have mastered the knowledge and skills required for entrepreneurship, their likelihood of

		attitudes and social values.		starting a company will increase.
(Park & Kim, 2023)	Wos, Scopus	Through gamification of entrepreneurship education to understand information control issues, a game called "Avaritia" was developed.	1773 students.	Avaritia has a positive impact on learners' cognitive changes and helps us understand the social issues of information control.
(Pan, 2022)	Wos, Scopus	Realizing virtual interactive learning between college students and teachers, inspiring students to explore entrepreneurship, and improving the limitations of traditional entrepreneurship education	104 valid Questionnaire Survey were recovered	The intelligent space based on VR ILM has increased entrepreneurship teaching courses, entrepreneurship coaching activities, and entrepreneurship practice activities by 4%, 6%, and 24%, respectively.
(Pugalia & Cetindamar, 2022)	Wos, Scopus	The challenges and strategies faced by immigrant female entrepreneurs in the field of technology.	49 research articles are included.	Immigration status exacerbates the human resource, financial, and network disadvantages faced by women in start up technology-based businesses.
(Pérez Fernández et al., 2021)	Wos, Scopus	The impact of social capital on entrepreneurial intention.	587 individuals in Spain.	Online social capital has a greater impact on entrepreneurial willingness than offline social capital.
(Pérez-Fernández et al., 2020)	Scopus	Assess the roles of social and psychological factors in the development of entrepreneurial intentions.	589 higher education students in Spain.	Negative biased emotions do not affect entrepreneurial intentions.

(Qiu et al., 2023)	Scopus	Teacher's views on the use of metaverse technology in educational practice.	20 teachers from China and Spain.	The application of the metaverse in entrepreneurship education is not limited to the attitude of teachers towards teaching, but also includes how to use metaverse enables students to acquire true skills.
(Ratten & Jones, 2023)	Wos, Scopus	ChatGPT, as a form of artificial intelligence generation, poses challenges and coping strategies for educational managers.	Qualitative research	How to incorporate technological innovation into curriculum design and management learning practices has contributed.
(Ratten, 2023)(Ratten, 2023)	Wos, Scopus	Discusses the role of new technological innovations such as the metaverse and virtual classrooms in management education.	Qualitative research	Emerging technologies related to Metaverse are shaping a new era for educational administrators
(Shwedeh et al., 2023)	Scopus	Between the external and internal factors of entrepreneurship,the role of entrepreneurship education as independent variable and moderating variable.	Predesigned questionnaires were distributed to the targeted respondents.	Entrepreneurship education significantly regulates the relationship between external environment and entrepreneurship, but its moderating effect on the relationship between internal environment and entrepreneurship is not significant.
(Su & Li, 2021)	Scopus	Based on Davis's Technology Acceptance Model (TAM), explore the application of TAM in online	150 questionnaire survey data	Online entrepreneurship education affects users' usability and credibility

		entrepreneurship education.		
(Tseng et al., 2022)	Wos, Scopus	This study examines the determinants of online entrepreneurial intention from the perspectives of planned behavior theory, control points, and online entrepreneurship education.	242 valid respondents.	Internal control sources promote perceived behavioral control, subjective norms, and attitudes, which in turn increase the willingness to engage in online entrepreneurship.
(Teng et al., 2022)	Wos, Scopus	The factors affecting learners' adoption of an educational metaverse platform.	495 respondents from China	Performance expectations, effort expectations, social influence, and convenience conditions have a significant positive impact on learners' satisfaction with Eduvese;The satisfaction of learners has a positive impact on their intention to continue using it; Learners' willingness to use Eduvese decreases after perceiving risks.
(Yan & Li, 2023)	Wos, Scopus	Based on ecosystem theory and applying the fsQCA method, analyze the effectiveness development path of digital learning power in intelligent education environment.	A total of 279 valid questionnaires were collected.	Developing students' digital learning abilities in an intelligent education environment is not just about applying technology alone, but requires coordination between students and technology.

Results

Through the search string, 277 articles were retrieved, and it was found that although there was no time limit set for the search, there were very few literature related to the metaverse and entrepreneurship education before 2019. However, starting from 2021, there has been a rapid growth trend in literature related to the metaverse and entrepreneurship education.

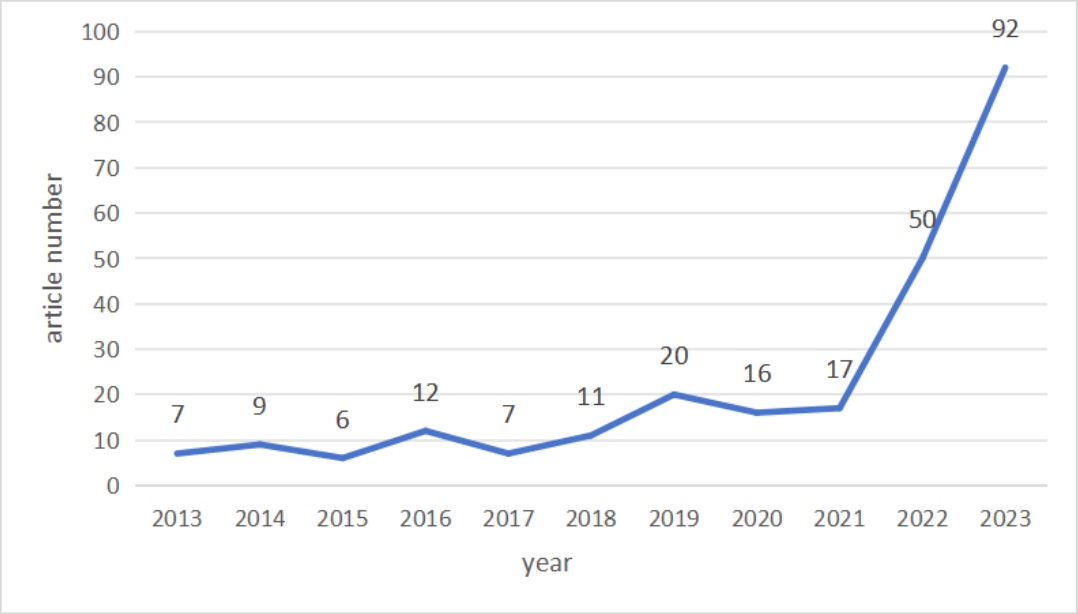

Figure 2. literature by year

Among the 27 selected articles, over 60% were published in 2023. This indicates that the application of the metaverse in the field of education, especially in entrepreneurship education, is just beginning to take off. How to apply metaverse related technologies in entrepreneurship education is becoming a hot topic in current research.

The impact on entrepreneurs: Changing entrepreneurial intentions

Metaverse technology has a significant impact on early entrepreneurship education and is of great help in successfully incubating entrepreneurial projects. Schools can use games for entrepreneurship education (Park & Kim, 2023). It can solve the contradiction between the personalized needs of each entrepreneur and the high cost of entrepreneurship education (Liu, 2023). Metaverse technology will affect the entrepreneurial willingness of entrepreneurs (El-Gohary et al., 2023). Virtual social platforms make it easier for entrepreneurs to find like-minded individuals and be influenced by others. This can not only help entrepreneurs obtain more resources, but also change their entrepreneurial intentions (Bernardino et al., 2023). The development of metaverse technology helps to eliminate gender differences in the field of entrepreneurship (Kuschel et al., 2020). More women can be involved in entrepreneurship (Gutiérrez-Esteban et al., 2021).

The impact on entrepreneurial resources: Easier access to entrepreneurial resources

Research on social entrepreneurship emphasizes the importance of resources. Establishing a new social platform through virtual networks can attract more entrepreneurial resources for entrepreneurs (Bernardino et al., 2023). More entrepreneurial resources will greatly improve the success rate of entrepreneurship. The metaverse has also influenced digital entrepreneurship (Calandra et al., 2023). Digital learning ability refers to the ability to use and

learn information technology(Yan & Li, 2023). Improving students' knowledge of information technology and enhancing their digital capabilities is an important factor in enhancing their trend towards building digital enterprises (Mir et al., 2023). As the threshold for using digital technology in innovative services decreases (Neff et al., 2024) , more and more entrepreneurs will find it easier to access entrepreneurial resources through data technology.

The impact on educators: Improving the efficiency of entrepreneurship education

New technologies have brought challenges to educators (Ratten & Jones, 2023). Digital technology has become a part of the learning experience, and these technologies are shaping a new era for educators (Ratten, 2023). Although the metaverse promotes interaction between individuals (such as learners), there is a scale of knowledge on what influences its acceptance and use in higher educational institutions (HEIs), specifically in developing countries (Alkhwaldi, 2023). Virtual technology has enabled large-scale popularization of entrepreneurship education, significantly increasing entrepreneurial activity(Pan, 2022). Universities can achieve personalized learning trajectories, improve accessibility, economic efficiency, and overall operational performance (George & Wooden, 2023). The use of the metaverse can enable students to acquire true skills (Qiu et al., 2023). At the same time, teachers are increasingly in need of sufficient digital abilities to use and teach artificial intelligence in teaching environments (Ng et al., 2023).

Discussion

In the past five years, research literature on innovation and entrepreneurship has exploded worldwide. Starting from 2022, papers on the metaverse and its related technologies have grown rapidly, becoming a new hot topic in the field of entrepreneurship education research. The metaverse has great potential for development, augmented reality and virtual reality technologies can be used to expand the existing physical world. Through avatars and holograms, enable seamless interaction between users in both real and simulated environment (Dwivedi et al., 2022). This greatly expands people's activity space and reorganizes social resources in a new way. Compared to offline social capital, online social capital has a greater impact on entrepreneurial attitudes, and online social capital has a greater impact on entrepreneurial willingness than offline social capital (Fernández et al., 2021). The accumulation of social capital requires time and experience. The virtual world constructed by the metaverse can break the influence of geographical factors in the real world, reduce the cost of interpersonal communication, and make it easier to establish connections with different types of people, thereby accumulating the social capital of entrepreneurs. At the same time, it can also effectively compensate for the problem of insufficient social capital of young entrepreneurs. This is very helpful for governments around the world to promote entrepreneurship in a more effective way (Tsaknis et al., 2024).

The development of new technologies related to the metaverse has also put forward new requirements for entrepreneurship educators. The way educators view their role relative to students is crucial (Wraae et al., 2022), and the widespread application of metaverse related technologies is constantly reshaping the role of educators (Iipinge & Shimpanda, 2022). The popularity of the metaverse is not only a challenge for entrepreneurs, but also a huge challenge for entrepreneurship educators.

Conclusions

In conclusion, this systematic review has reviewed papers related to Application of Metaverse Technology in Entrepreneurship Education. The entire article revolves around the question " What problems in entrepreneurship education can applying metaverse technology?" and ultimately answers this question. The main findings highlight three aspects of the trends in entrepreneurship education, as follows

First, Metaverse technology is an important factor affecting the entrepreneurial willingness of entrepreneurs. Most studies have shown that metaverse related technologies can enhance the entrepreneurial willingness of entrepreneurs, thereby benefiting the policy goals of encouraging entrepreneurship in various countries.

Second, Metaverse related technologies have broken many resource limitations in the original physical world, making it easier for entrepreneurs to access various resources. Meanwhile, metaverse related technologies are beneficial for improving entrepreneurial efficiency, reducing entrepreneurial costs, and helping entrepreneurs achieve higher success rates.

Third, The popularity of the metaverse has also posed new challenges to entrepreneurship educators. Mastering more advanced technologies and applying them to the teaching process is a major challenge currently faced by entrepreneurship educators and a key issue that must be addressed.

Based on the results, This review explores the application of metaverse related technologies to solve the problems faced by entrepreneurs, the problem of entrepreneurial resources, and the problems faced by entrepreneurial educators. This also lays the foundation for subsequent researchers to study how to apply cutting-edge technologies in entrepreneurship education.

References

Alkashami, M., Taamneh, A. M., Khadragy, S., Shwedeh, F., Aburayya, A., & Salloum, S. A. (2023). AI different approaches and ANFIS data mining: A novel approach to predicting early employment readiness in middle eastern nations. *International Journal of Data and Network Science*, 7(3), 1267-1282. http://doi.org/10.5267/j.ijdns.2023.4.011

Alkhwaldi, A. F. (2023). Understanding learners' intention toward Metaverse in higher education institutions from a developing country perspective: UTAUT and ISS integrated model. *Kybernetes* http://doi.org/10.1108/K-03-2023-0459

AlMalki, H. A., & Durugbo, C. M. (2023). Systematic review of institutional innovation literature: towards a multi-level management model. *Management Review Quarterly*, 73(2), 731-785. http://doi.org/10.1007/s11301-022-00259-8

Amani, D., Ismail, I. J., Makona, A., Changalima, I. A., & Kazungu, I. (2024). Extending the mediation role of entrepreneurial self-efficacy on enhancing students' entrepreneurial intentions: A moderated mediation model. *International Journal of Management Education*, 22(1) http://doi.org/10.1016/j.ijme.2023.100915

Aung, N., Dhelim, S., Chen, L., Ning, H., Atzori, L., & Kechadi, T. (2024). Edge-Enabled Metaverse: The Convergence of Metaverse and Mobile Edge Computing. *Tsinghua Science and Technology*, 29(3), 795-805. http://doi.org/10.26599/TST.2023.9010052

Benvegnù, G., Piva, A., Cadorin, C., Mannari, V., Girondini, M., Federico, A., Tamburin, S., & Chiamulera, C. (2023). The effects of virtual reality environmental enrichments on craving to food in healthy volunteers. *Psychopharmacology* http://doi.org/10.1007/s00213-023-06462-z

Bernardino, S., Santos, J. F., & Silva, P. (2023). Social entrepreneur management of personal network linkages: Does the use of social media increase resources? *Revista Galega De Economia*, 32(2) http://doi.org/10.15304/rge.32.2.8590

Burgess, S., Bingley, S., Paguio, R., & Woodley, C. (2018). Interventions in entrepreneurial learning: Blended learning and ICT capacity. *Australasian Journal of Information Systems*, 22 http://doi.org/10.3127/ajis.v22i0.1226

Calandra, D., Oppioli, M., Sadraei, R., Jafari-Sadeghi, V., & Biancone, P. P. (2023). Metaverse meets digital entrepreneurship: a practitioner-based qualitative synthesis. *International Journal of Entrepreneurial Behaviour and Research* http://doi.org/10.1108/IJEBR-01-2023-0041

Campbell, A. G., Santiago, K., Hoo, D., Mangina, E., & IEEE. (2016). Future Mixed Reality Educational Spaces *PROCEEDINGS OF 2016 FUTURE TECHNOLOGIES CONFERENCE (FTC)* (1088-1093). Future Technologies Conference (FTC).

Chen, C. M., & Yang, Y. C. (2023). A game-based augmented reality navigation system to support makerspace user education in a university library. *Electronic Library* http://doi.org/10.1108/EL-05-2023-0107

Chou, C. M., Shen, T. C., Shen, T. C., & Shen, C. H. (2023). The impact of CIE education integrated with the BIG 6 teaching strategy on students? innovative motivation, creativity, metacognition, and self-perceived employability. *Thinking Skills and Creativity*, 48 http://doi.org/10.1016/j.tsc.2023.101287

Dana, L. P., Crocco, E., Culasso, F., & Giacosa, E. (2023). Mapping the field of digital entrepreneurship: a topic modeling approach. *International Entrepreneurship and Management Journal* http://doi.org/10.1007/s11365-023-00926-6

Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., Janssen, M., Kim, Y. G., Kim, J., Koos, S., Kreps, D., Kshetri, N., Kumar, V., Ooi, K. B., Papagiannidis, S., Pappas, I. O., Polyviou, A., Park, S. M., Pandey, N., Queiroz, M. M., Raman, R., Rauschnabel, P. A., Shirish, A., Sigala, M., Spanaki, K., Tan, G., Tiwari, M. K., Viglia, G., & Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 66 http://doi.org/10.1016/j.ijinfomgt.2022.102542

El-Gohary, H., Sultan, F., Alam, S., Abbas, M., & Muhammad, S. (2023). Shaping Sustainable Entrepreneurial Intentions among Business Graduates in Developing Countries through Social Media Adoption: A Moderating-Mediated Mechanism in Pakistan. *Sustainability (Switzerland)*, 15(3) http://doi.org/10.3390/su15032489

George, B., & Wooden, O. (2023). Managing the Strategic Transformation of Higher Education through Artificial Intelligence. *Administrative Sciences*, 13(9) http://doi.org/10.3390/admsci13090196

Gutiérrez-Esteban, P., De Rodríguez-Miranda, P. F., Cubo-Delgado, S., & Hernández-Rincón, M. L. (2021). Digital Inclusion of Businesswomen and Women Entrepreneurs through Social Networks in the Informal Environment. *Generos*, 10(3), 201-232. http://doi.org/10.17583/GENEROS.7146

Hayashi, M., Suzuki, T., Kawata, Y., Goto, K., Shih, J. L., Kashihara, A., Chen, W., Chen, W., Ogata, H., Baker, R., Chang, B., Dianati, S., Madathil, J., Yousef, A. M. F., Yang, Y., & Zarzour, H. (2023, 2023-1-1). *The Impact of Metaverse Worlds on International*

Collaborative Learning for Cross-Cultural Understanding. Paper presented at the 31st International Conference on Computers in Education, ICCE 2023 - Proceedings.

Iipinge, S. M., & Shimpanda, A. M. (2022). Entrepreneurship education in Namibia: A study of tertiary education classroom practices. *Industry and Higher Education*, 36(1), 94-103. http://doi.org/10.1177/09504222211007744

Jia, F. Z., Wang, R., & Huo, J. F. (2022). Optimizing the Effectiveness of "Internet plus " Contest to Deepen the Reform Path of Innovation and Entrepreneurship Education in Colleges and Universities. *Wireless Communications & Mobile Computing*, 2022 http://doi.org/10.1155/2022/4757271

John, E., & Yunus, M. M. (2021). A systematic review of social media integration to teach speaking. *Sustainability (Switzerland)*, 13(16) http://doi.org/10.3390/su13169047

Kikas, M. (2019). ENTREPRENEURSHIP EDUCATION IN EUROPE NEEDS TO CHANGE. In L. G. Chova, A. L. Martinez, & I. C. Torres (Eds.), *13TH INTERNATIONAL TECHNOLOGY, EDUCATION AND DEVELOPMENT CONFERENCE (INTED2019)* (604-613). 13th International Technology, Education and Development Conference (INTED).

Koumpouros, Y. (2024). Revealing the true potential and prospects of augmented reality in education. *Smart Learning Environments*, 11(1) http://doi.org/10.1186/s40561-023-00288-0

Kuschel, K., Ettl, K., Díaz-García, C., & Alsos, G. A. (2020). Stemming the gender gap in STEM entrepreneurship – insights into women's entrepreneurship in science, technology, engineering and mathematics. *International Entrepreneurship and Management Journal*, 16(1), 1-15. http://doi.org/10.1007/s11365-020-00642-5

Lim, W. M., Mohamed Jasim, K., & Das, M. (2024). Augmented and virtual reality in hotels: Impact on tourist satisfaction and intention to stay and return. *International Journal of Hospitality Management*, 116 http://doi.org/10.1016/j.ijhm.2023.103631

Listyaningsih, E., Mufahamah, E., Mukminin, A., Ibarra, F. P., Delos Santos, M., & Quicho, R. F. (2023). Entrepreneurship education, entrepreneurship intentions, and entrepreneurship motivation on students' entrepreneurship interest in entrepreneurship among higher education students. *Power and Education* http://doi.org/10.1177/17577438231217035

Liu, P. (2023). An Entrepreneurship Incubation Process Model and Gamified Educational Software Designed for Sustainable Education. *Sustainability (Switzerland)*, 15(19) http://doi.org/10.3390/su151914646

Mir, A. A., Hassan, S., & Khan, S. J. (2023). Understanding digital entrepreneurial intentions: A capital theory perspective. *International Journal of Emerging Markets*, 18(12), 6165-6191. http://doi.org/10.1108/IJOEM-05-2021-0687

Neff, A., Weber, P., & Werth, D. (2024). Digital entrepreneurship in wholesale: identification of implementation strategies for data spaces. *International Journal of Entrepreneurial Behaviour and Research* http://doi.org/10.1108/IJEBR-10-2022-0943

Ng, D. T. K., Leung, J. K. L., Su, J., Ng, R. C. W., & Chu, S. K. W. (2023). Teachers' AI digital competencies and twenty-first century skills in the post-pandemic world. *Educational Technology Research and Development*, 71(1), 137-161. http://doi.org/10.1007/s11423-023-10203-6

Pan, Y. Y. (2022). Designing Smart Space Services by Virtual Reality-Interactive Learning Model on College Entrepreneurship Education. *Frontiers in Psychology*, 13 http://doi.org/10.3389/fpsyg.2022.913277

Park, S., & Kim, S. (2023). The Avaritia: Entrepreneurship Practice to Understand the Problem of Information Control through Gamification. *Sustainability (Switzerland)*, 15(8) http://doi.org/10.3390/su15086738

Patrício, L. D., & Ferreira, J. J. (2023). Unlocking the connection between education, entrepreneurial mindset, and social values in entrepreneurial activity development. *Review of Managerial Science* http://doi.org/10.1007/s11846-023-00629-w

Pérez Fernández, H., Rodríguez Escudero, A. I., Martín Cruz, N., & Delgado García, J. B. (2021). The impact of social capital on entrepreneurial intention and its antecedents: Differences between social capital online and offline. *Brq Business Research Quarterly* http://doi.org/10.1177/23409444211062228

Pérez-Fernández, H., Martín-Cruz, N., Delgado-García, J. B., & Rodríguez-Escudero, A. I. (2020). Online and Face-to-Face Social Networks and Dispositional Affectivity. How to Promote Entrepreneurial Intention in Higher Education Environments to Achieve Disruptive Innovations? *Frontiers in Psychology*, 11
http://doi.org/10.3389/fpsyg.2020.588634

Pugalia, S., & Cetindamar, D. (2022). Insights on the glass ceiling for immigrant women entrepreneurs in the technology sector. *International Journal of Gender and Entrepreneurship*, 14(1), 44-68. http://doi.org/10.1108/IJGE-10-2020-0169

Qiu, Y., Isusi-Fagoaga, R., & García-Aracil, A. (2023). Perceptions and use of metaverse in higher education: A descriptive study in China and Spain. *Computers and Education: Artificial Intelligence*, 5 http://doi.org/10.1016/j.caeai.2023.100185

Ratten, V. (2023). The post COVID-19 pandemic era: Changes in teaching and learning methods for management educators. *International Journal of Management Education*, 21(2) http://doi.org/10.1016/j.ijme.2023.100777

Ratten, V., & Jones, P. (2023). Generative artificial intelligence (ChatGPT): Implications for management educators. *International Journal of Management Education*, 21(3) http://doi.org/10.1016/j.ijme.2023.100857

Santhanasamy C, Y. M. (2022). A Systematic Review of Flipped Learning Approach in Improving Speaking Skills AU - Santhanasamy, Cassandra AU - Md, Melor. *European Journal of Educational Research*, 11(1), 127-139. http://doi.org/10.12973/eu-jer.11.1.127

Seddon, I., Rosenberg, E., & Houston, S. K. (2023). Future of virtual education and telementoring. *Current Opinion in Ophthalmology*, 34(3), 255-260. http://doi.org/10.1097/ICU.0000000000000945

Shwedeh, F., Adelaja, A. A., Ogbolu, G., Kitana, A., Taamneh, A., Aburayya, A., & Salloum, S. A. (2023). Entrepreneurial innovation among international students in the UAE: Differential role of entrepreneurial education using SEM analysis. *International Journal of Innovative Research and Scientific Studies*, 6(2), 266-280. http://doi.org/10.53894/ijirss.v6i2.1328

Su, Y., & Li, M. (2021). Applying Technology Acceptance Model in Online Entrepreneurship Education for New Entrepreneurs. *Frontiers in Psychology*, 12 http://doi.org/10.3389/fpsyg.2021.713239

Tan, S. Y., & Md Yunus, M. (2023). Sustaining English Language Education with Social Networking Sites (SNSs): A Systematic Review. *Sustainability (Switzerland)*, 15(7) http://doi.org/10.3390/su15075710

Teng, Z., Cai, Y., Gao, Y., Zhang, X., & Li, X. (2022). Factors Affecting Learners' Adoption of an Educational Metaverse Platform: An Empirical Study Based on an Extended UTAUT Model. *Mobile Information Systems*, 2022 http://doi.org/10.1155/2022/5479215

Tiberius, V., & Weyland, M. (2023). Entrepreneurship education or entrepreneurship education. *Journal of Further and Higher Education*, 47(1), 134-149. http://doi.org/10.1080/0309877X.2022.2100692

Tsaknis, P. A., Sahinidis, A. G., & Kavagia, C. A. (2024). Entrepreneurship education reveals antecedents of intention: what really matters? *Development and Learning in Organizations*, 38(1), 27-30. http://doi.org/10.1108/DLO-02-2023-0035

Tseng, T. H., Wang, Y. M., Lin, H. H., Lin, S. J., Wang, Y. S., & Tsai, T. H. (2022). Relationships between locus of control, theory of planned behavior, and cyber entrepreneurial intention: The moderating role of cyber entrepreneurship education. *International Journal of Management Education*, 20(3) http://doi.org/10.1016/j.ijme.2022.100682

van der Meer, N., van der Werf, V., Brinkman, W. P., & Specht, M. (2023). Virtual reality and collaborative learning: a systematic literature review. *Frontiers in Virtual Reality*, 4 http://doi.org/10.3389/frvir.2023.1159905

Wei, Z. W., & Yuan, M. (2023). Research on the Current Situation and Future Development Trend of Immersive Virtual Reality in the Field of Education. *Sustainability*, 15(9) http://doi.org/10.3390/su15097531

Whitehouse, H. (2008). "EE in Cyberspace, Why Not?" Teaching, Learning and Researching Tertiary Pre-Service and In-Service Teacher Environmental Education Online. *Australian Journal of Environmental Education*, 24, 11-21. http://doi.org/10.1017/S0814062600000549

Wraae, B., Brush, C., & Nikou, S. (2022). The Entrepreneurship Educator: Understanding Role Identity. *Entrepreneurship Education and Pedagogy*, 5(1), 3-35. http://doi.org/10.1177/2515127420979662

Yan, D., & Li, G. (2023). Students' internal driving force or environment external driving force? Configuring digital learning power heterogeneity in a smart education environment. *Interactive Learning Environments* http://doi.org/10.1080/10494820.2023.2266496

Zhang, H. X., Cui, W. P., Sun, Y. X., Liu, L. Y., & Zhou, K. (2022). Distributed Management of Virtual Reality Digital Assets for Online Experimental Education. In L. Xiao & D. Xu (Eds.), *THIRTEENTH INTERNATIONAL CONFERENCE ON GRAPHICS AND IMAGE PROCESSING (ICGIP 2021)* (12083, pp.). 13th International Conference on Graphics and Image Processing (ICGIP).