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Barta-Boncz Nóra
Between enthusiasm and anxiety: technophilia vs technophobia in digital entrepreneurship education

Barta-Boncz Nóra

Eszterházy Károly Catholic University, Eger, Hungary

nora.bartab@szilagyi-eger.hu

Abstract: Digital entrepreneurship education is increasingly shaped by the dual forces of technophilia and technophobia—contrasting attitudes that significantly influence the learning experience. The acceleration of distant and technology-enhanced education, especially during by recent crises, has amplified both the benefits and the anxieties associated with digital transformation in entrepreneurial learning environments.

On one hand, technophilic attitudes embrace the potential of digital tools to enrich entrepreneurial education. Business Simulation Games (BSGs) and flipped classroom models have been shown to enhance critical thinking, creativity, and problem-solving, while also promoting soft skills like teamwork and resilience in realistic and engaging contexts. Artificial Intelligence (AI) tools, particularly AI chatbots such as ChatGPT, support business idea generation, market analysis, and ethical decision-making, thereby strengthening digital entrepreneurial self-efficacy and boosting participation. Immersive technologies like AR and VR further expand student engagement by fostering global awareness and cultural competence through experiential learning.

Online learning environments (OLEs) also support self-directed learning and professional networking, making entrepreneurship education more accessible and inclusive. Digital platforms create flexible and interactive spaces that facilitate communication, build community, and encourage open reflection on failure—essential elements in entrepreneurial growth.

Conversely, technophobic attitudes expose the limitations and risks of digital integration. Many students experience digital fatigue, loss of motivation, and a lack of meaningful interpersonal interaction in remote settings. Over-reliance on AI may hinder the development of independent thinking and core academic competencies. Concerns about academic integrity, data privacy, misinformation, and the perceived lack of creativity in AI-generated outputs further complicate acceptance. Additionally, resistance among educators—due to inadequate training or skepticism toward new methodologies—hampers innovation. Despite their digital upbringing, students may still lack professional e-skills, while overly complex simulations can deter rather than inspire entrepreneurial intention.

Ultimately, the success of digital entrepreneurship education depends on finding a balance between embracing technological innovation and addressing the legitimate concerns of learners and educators. By designing inclusive, ethically sound, and pedagogically thoughtful learning environments, institutions can harness the advantages of digital tools while ensuring the development of resilient, reflective, and future-ready entrepreneurs.

Keywords: technophilia, technophobia, digital entrepreneurship education (DEE), GenAI, social media, online learning environments

1 Introduction

This paper explores the psychological consequences of modern technologies, which simultaneously generate positive and negative feelings and thus give rise to psychological ambivalence. This ambivalence manifests in two opposing attitudes: technophilia**,** the attraction to technology, and technophobia**,** the rejection of technology (Osiceanu, 2015).

The rapid development and pervasive integration of new technologies—including computers, the Internet, social networks, mobile devices, generative AI, and even immersive technologies such as virtual and augmented reality—have profoundly reshaped daily life. These innovations alter customs, habits, attitudes, and behaviours in ways that significantly affect both physical and emotional well-being (King et al., 2017). This influence can also be felt in the field of education, also in our main area of concern: digital entrepreneurship education (DEE).

In this study, we focus on digital entrepreneurship education (DEE) and how the two seemingly opposing views - technophilia and technophobia - manifest in this educational domain. These attitudes can either foster and stimulate innovation or hinder and discourage technological adoption among aspiring and would-be entrepreneurs (Richards, 1993), those who have entered and do online or blended courses related to entrepreneurship. The perception of technological innovativeness, along with its often hypothetical nature, influences university students' opportunity beliefs, which are essential for engagement in digital ventures (Andrade-Valbuena et al., 2024).

According to one definition, technophilia is openness, enthusiasm and attraction toward activities involving advanced technologies, accompanied by an ease of adaptation to the social changes they bring (Osiceanu, 2015). It often evokes futuristic, positive emotions, driving individuals—termed "technophiles"—to take the most or all technological tools and devices in a very positive manner, to adopt and integrate new technologies openly, easily and enthusiastically. Such individuals view technology as a means to improve living conditions and address societal challenges, combat social problems (Amichai-Hamburger, 2009). However, this admiring attitude may prevent a critical assessment of environmental and social consequences. At its extreme, technophilia can even resemble addiction, where technology use becomes compulsive, obsessive and egocentric. Technophilia can also refer to "technological determinism". This theory emphasizes that human society lacks the power to resist towards the influences of technology. A number of technologies are used as an expression of personal narcissism. (Osiceanu, 2015).

By contrast, technophobia refers to fear, dislike, or discomfort with modern technologies and complex devices (Pfaffinger et al., 2020). It may hinder acceptance and utilization, thereby limiting opportunities for learning and innovation (Richards, 1993). In educational contexts, technophobia can discourage experimentation with new tools, curbing both creativity and entrepreneurial initiative (Osiceanu, 2015).

The interplay between technophilia and technophobia is relevant in entrepreneurship education, where digital tools are increasingly central to pedagogy. Understanding these opposing views is critical and vital for designing effective learning environments that balance enthusiasm for innovation with critical reflection (AL-Takhayneh et al., 2022). New technologies such as the Internet of Things, artificial intelligence, and augmented reality create and involve both opportunities and challenges in this context (Zhang, 2021).

On the positive side, integrating digital technologies into entrepreneurial curricula enhances collaboration, communication, and data visualization, while also fostering risk tolerance and critical digital skills. This integration supports the development of an entrepreneurial mindset, equipping students for success in a technology-driven business landscape (Bandera et al., 2018). However, uncritical or excessive reliance on technology may fuel resistance among students and educators, leading to technophobia that undermines creativity and critical thinking.

The coexistence of technophilia and technophobia shapes how students experience DEE. Recognizing these dynamics is essential for promoting innovation while ensuring that technological adoption remains critical, balanced, and pedagogically meaningful.

The discussion of the theme proceeds in five sections in which particularly prominent examples of digital methods and tools are shown that are employed in our field of study, in entrepreneurship education. Examples include social media, generative artificial intelligence, flipped classroom pedagogy, business simulation games and. Examples derive from relevant articles and research papers on DEE in which each of these illustrates different ways showing how digital technologies reshape entrepreneurial learning environments and outcomes and in their employment and each of these show technophilic and technophobic attitudes.

Technophilic and Technophobic Attitudes to Emerging Technologies in Digital Entrepreneurship Education (DEE)

2 Social Media in DEE

In DEE using social media represents a key arena where both technophilic and technophobic attitudes shape entrepreneurial learning and outcomes.

On the technophilic side, social media provides inexpensive marketing opportunities, particularly valuable for start-ups. Beyond marketing, it functions as a platform for self-directed learning, knowledge sharing, and entrepreneurial networking, supporting business trend analysis, opportunity identification, and the search for team members or investors (Scarmozzino et al., 2017). Online networks also help overcome barriers of time and space, connecting entrepreneurs across borders and enabling collaborative learning (Elenurm, 2022). Social networking sites encourage informal learning, both inside and outside classrooms and can provide essential entrepreneurial resources such as investment contacts, mentorship, and market knowledge (Vidal et al., 2021).

Blended learning models that integrate social media into instruction enhance students' ability to critically evaluate online networking opportunities. Tools such as weblogs, digital reflections, and flipped classroom approaches can help students develop awareness of how online communication aligns with their entrepreneurial goals (Manwaring et al., 2017; Thompson, 2017). Previous researches also show that goal-oriented use of platforms like Facebook strengthens collaborative learning, peer support, and resilience in academic contexts. Importantly, students' evolving networking priorities—from maintaining friendships, to consumer-driven use, to participation in specialized groups—highlight the need for educators to adapt course design to reflect shifting online trends (Elenurm, 2022).

Technophilic attitudes are most clearly expressed in students who embrace social media as a tool for entrepreneurial self-development. They may adopt imitative orientations, transferring successful models from one context to another, or co-creative orientations, using networks and open innovation to generate new business ideas (Chesbrough, 2017). Higher education institutions thus have an important role in helping students align their networking behaviours with entrepreneurial growth, while also preparing them to act as responsible digital citizens in professional and intercultural contexts (Halbusi et al., 2022).

Many learners, however, display technophobic attitudes toward social media. Feedback from students actively engaging in DEE include some negative ideas. In classroom contexts, multitasking on social platforms can distract learners, reduce cognitive processing, and lower academic performance (Demirbilek & Talan, 2018). According to students privacy concerns are another major barrier: while disclosure of personal information can foster communities, it also disrupts personal boundaries and creates risks of misuse (Millham & Atkin, 2018). Personal data have been already proved to be extremely vulnerable in digital environments making students and would-be entrepreneurs highly sceptical and they obviously practice caution.

Technophobic students may show reluctance to create or share online content, citing concerns about privacy, intellectual property, or their own lack of digital skills. Such hesitation can limit their engagement in collaborative knowledge creation and reinforce reliance on traditional, offline methods of networking—thus restricting access to global entrepreneurial ecosystems increasingly shaped by digital tools (Elenurm, 2022). Trust building is therefore a crucial issue, as even information shared among peers can be misused.

To overcome technophobic tendencies, entrepreneurship education must emphasize critical thinking and trust-building skills through experiential learning. By engaging students in team-based problem solving and exposing them to real entrepreneurial challenges, educators can help them develop the confidence to navigate unreliable information, contribute responsibly to online communities, and use social media as a strategic tool for entrepreneurial growth (DeSimone & Buzza, 2013).

It is the challenge that tutors, instructors and educators must take to recognize both technophilic and technophobic attitudes and perspectives and guide students in critically reflecting on their networking practices so they can align them with their entrepreneurial self-development paths. Social media has great potentials as a driver of entrepreneurial learning, innovation and international networking although concerns over distraction, privacy, lack of necessary digital skills and trust cannot be neglected.

3 Generative Artificial Intelligence (GenAI) in DEE

Artificial intelligence (AI) technologies have been continuously transforming education, yet research on their role in business education is still limited (Desai, 2023), with even fewer studies focusing specifically on entrepreneurship courses (Ratten & Jones, 2021; Vecchiarini & Somià, 2023). Within this emerging field, Generative AI (GenAI), particularly the most popular tool among students, ChatGPT, has drawn attention for its capacity to support entrepreneurial learning. GenAI refers to AI systems that learn from large datasets to generate new content, including text, images, and simulations (Lv, et al., 2024; Gupta & Yang, 2024).

From a technophilic attitude and perspective, when GenAI is embraced for DEE, it offers substantial opportunities to enhance the learning process. Students can use AI chatbots to refine their Business Model Canvas (BMC), develop business plans, and receive feedback on pitch presentations (Vecchiarini & Somià, 2023). AI systems facilitate brainstorming, market analysis, and opportunity identification, enabling more informed decision-making about venture creation (Mavlutova et al., 2020). Similarly, AI-driven simulations and serious games allow students to test entrepreneurial ideas, views and initiations in safe environments, fostering skill development through experiential learning (Fox et al., 2018).

Educators and practitioners also highlight GenAI's role in customer discovery and validation. For example, Blank (2013) and TeachingEntrepreneurship.org (a website presenting date from entrepreneurship classes) suggest that AI can train students to design interview protocols and practice customer interactions, aligning with lean startup methodologies. Furthermore, GenAI can improve entrepreneurial competencies such as spotting opportunities, creativity, vision, valuing ideas, and ethical or sustainable thinking (Somià & Vecchiarini, 2024). Students who exploit this tool and show technophilic attitude, stand a better chance of advancing in their DEE studies, as GenAI increases motivation, sustains engagement and enables more experiential and competence-oriented approaches which is vital in the process of becoming an entrepreneur.

Positive feedback is often received in research papers using online questionnaires. When students themselves recognize its potential they often emphasize that ChatGPT can "spark a creative outlook," while others describe it as offering useful explanations for BMC tasks (Wang, 2024). Researches confirm that adopting ChatGPT enhances AI competencies, self-efficacy, and entrepreneurial intention, indirectly fostering digital entrepreneurial skills and mindsets (Duong et al., 2024; Aboobaker et al., 2023). Consistent engagement with GenAI builds confidence,

adaptability, and agility in navigating the digital business environment (Giuggioli & Pellegrini, 2022; Ayinde et al., 2023).

In this sense, technophilic attitudes toward GenAI frame it as a catalyst for innovation and self-development, preparing students for technology-driven entrepreneurial ecosystems (Ratten & Jones, 2021; Shore et al., 2024).

In contrast, technophobic attitudes toward GenAI highlight scepticism, risks, limitations, and ethical concerns. In relevant research papers, this kind of view also appears. A common critique is that AI lacks genuine creativity: while it can refine existing ideas or highlight competitor strategies, it cannot think, feel like human, cannot imagine entirely new opportunities or predict customer reactions to novel concepts (Agrawal et al., 2017; Somià & Vecchiarini, 2024). Some students voiced doubts, noting that ChatGPT "doesn't provide originality or creativity" despite being helpful in generating ideas (Wang, 2024).

Concerns mainly from tutors or educators also extend to students' overdependence on AI tools, which may encourage superficial learning and reduce motivation for independent research (Aithal & Aithal, 2023; Pradana et al., 2023). Educators warn that reliance on ChatGPT could undermine critical thinking, self-reflection, and communication skills (Dempere et al., 2023; Meckler & Verma, 2022). Technophobic attitude is justifiable because of its lack of accuracy, and it may undermine students' independent thinking and hinder their language development. Ethical and practical risks have been reported in the surveys. In the context of DEE, there are also concerns such as privacy violations, the spread of misinformation, inherent bias and the risk of academic dishonesty, misuse (Parker et al., 2024; Alafnan et al., 2023; Gulati et al., 2024). For instance students have been reported to have copied business plans, report or case studies, case analyses from online sources or AI tools instead of generating their own ideas. Also, students in DEE have been seen and reported to use automated tools (e.g. AI writing assistants, generative softwares) to produce essays, presentations, business reports that seem realistic but do not relate to real facts and figures (Alafnan et al., 2023; Gulati et al., 2024). In online or blended DEE courses boundaries in teamwork have been reported to seem unclear and that leads to copying or submitting team members' work or project as their own. In digital entrepreneurship educational projects market research have been seen falsified, surveys, statistics, financial projections and business plans show inaccurate and unreal data to meet assignment requirements (Gulati et al., 2024). The development of critical entrepreneurial skills such as problem-solving skills, creativity and ethical decision-making skills are often reduced due to too much reliance on external solutions.

These concerns breed fears align with broader definitions of technophobia, which emphasize discomfort with advanced technologies due to social, ethical, and usability concerns (Mokyr et al., 2015; Osiceanu, 2015).

Psychological risks are also relevant. Communication Addiction Disorder (CAD), linked to compulsive online interactions, raises concerns about GenAI fostering dependency and intrapsychic conflict among students (Bucy & Newhagen, 2004). These anxieties reinforce technophobic resistance to integrating AI deeply into entrepreneurship education.

Despite these contrasting perspectives, evidence from surveys suggests that balanced integration of GenAI can strengthen entrepreneurship education when paired with non-AI methods (Baidoo-Anu & Owusu Ansah, 2023). While technophilic attitudes emphasize its role in enhancing experiential learning, opportunity recognition, and entrepreneurial competencies, technophobic attitudes highlight the need for critical safeguards around ethics, creativity, and independent thinking.

Practical implications include integrating AI literacy into curricula (Luan et al., 2023), developing clear AI policies, and providing training for educators to guide responsible use (Mogavi et al., 2024). Such approaches can reduce technophobic anxieties while ensuring that students make good use of the potential of AI without losing essential human creativity and judgment.

4 Flipped Classroom Pedagogy in DEE

The flipped classroom has emerged as a promising approach in business and entrepreneurship education, enhancing learning effectiveness and fostering deeper engagement in the learning process (Senali et al., 2022). Those showing technophilic attitudes can enjoy courses on new product development (NPD) in which students often combine asynchronous e-learning with synchronous classroom sessions. For instance, Coursera's NPD modules provide a holistic overview of product development, while hands-on training with the PTB simulator allows practice in project management tasks such as scheduling, resource allocation, cost control, and risk monitoring (Förster et al., 2022) all useful and necessary knowledge for future career in the field. Prior to synchronous sessions, students are required to complete e-learning modules that align with classroom discussions, ensuring that online learning, experiential activities, and classroom interaction complement one another (Solan & Shtub, 2023). All those module participants harness the possibilities enabled by flipped classroom pedagogy clearly demonstrating a technophile attitude.

The integration of simulation-based training, teamwork, and collaboration with startups reflects an experiential learning model that resonates strongly with entrepreneurial practice. However, while the advantages of this approach has been widely recognised, fear and anxiety might grow in some students because some of them perceived the workload as challenging, particularly when combined with coordination across global time zones (Akçayır & Akçayır, 2018; Senali et al., 2022). These findings underline the importance of thoughtful course design to balance experiential learning opportunities with realistic expectations.

Flipped classrooms are particularly effective in promoting higher-order thinking skills (HOTS), which are critical for entrepreneurial decision-making in the knowledge economy (Di et al., 2019). Technology-enhanced learning (TEL) interventions—ranging from simulations to business strategy games (BSGs)—have been shown to improve creativity, introspection, teamwork, and global awareness, all of which are relevant entrepreneurial competencies (Kirkwood & Price, 2014; Ray et al., 2013; Alsowat, 2016; Lee & Choi, 2017; Huang et al., 2022).

Despite these advantages, several challenges persist that strengthen technophobia in would-be entrepreneurs that study the field at higher educational institutions. Flipped learning requires students to exercise strong self-regulation, as insufficient preparation before class can hinder in-class activities and overall learning outcomes (Akçayır & Akçayır, 2018; Lai & Hwang, 2016). Students with some developed negative attitude to utilising digital tools may struggle with maintaining discipline, especially when distracted by extracurricular commitments (Alkaabi, 2022). To address this, instructors must design interactive and engaging pre-class activities and provide scaffolding to support self-regulated learning (Sun et al., 2017).

Within digital entrepreneurship education, these issues raised by the flipped classroom pedagogy intersect with student attitudes toward technology. Learners with technophilia—a positive, enthusiastic attitude toward technology—tend to embrace flipped classroom models, benefitting from simulations, digital games, and interactive online tools. By contrast, students experiencing technophobia may find the reliance on technology stressful, potentially lowering engagement and amplifying the challenges of self-regulation. This polarity underscores the need for educators to balance digital tools with adequate guidance, offering both technical and motivational support to ensure inclusivity and equal learning opportunities.

In sum, the flipped classroom in digital entrepreneurship education offers strong potential to enhance learning through experiential, technology-enhanced, and student-centred methods. Yet its success depends on careful curriculum design that considers workload, self-regulation, and diverse learner attitudes toward technology—ranging from technophilia to technophobia—so that all students can benefit from its innovative structure.

5 Business Simulation Games in DEE

Business simulation games (BSGs) are increasingly recognized as powerful pedagogical tools in digital entrepreneurship education (DEE). Defined as dynamic, streamlined, and practical representations of business scenarios (Ranchhod et al., 2014), simulations allow learners who welcome the new to "look into the future" by exploring how decisions influence key performance metrics. Their integration reflects a global pedagogical shift from teacher-centred to learner-centred approaches, emphasizing experiential learning as the most effective method for acquiring 21st-century skills (Bennett et al., 2021).

Students who have confidence in and place trust in modern technology tend to fare better. Technophilic perspectives view BSGs as valuable platforms for fostering entrepreneurial competencies, employability skills, and higher-order thinking skills (HOTS). That mean it gives great opportunities for users not only to remember information but also to analyse, evaluate and create new information. Relevant research consistently links simulations to enhanced problem-solving, critical thinking, creativity, teamwork, and decision-making (Pirker & Gütl, 2015; Costin et al., 2018; Levant et al., 2016). Participation in BSGs has also been shown to strengthen non-cognitive competencies such as coping with ambiguity, risk management, and perseverance (Dong & Tu, 2021; Pérez-Pérez et al., 2021). Acquiring and instilling all these skills and qualities are vital in the process of becoming an entrepreneur, however, a closer examination might reveal that the skills and competencies outlined above are equally relevant and needed for individuals that may never engage in establishing their own business enterprise.

In flipped classroom settings, BSGs increase behavioural and cognitive engagement, improve learning achievement (Huang et al., 2022). Studies also demonstrate their ability to boost motivation (Koh et al., 2010), build emotional connections to outcomes (Olfat et al., 2013), and strengthen collaboration (Shah et al., 2019). Programs like *MonsoonSim* and *Innovation Farm* illustrate how gamified approaches can combine simulations with prototype development to create interactive, enjoyable, and socially meaningful entrepreneurial learning experiences (Chen et al., 2021; Alkaabi, 2022).

For those who adapt easily and welcome the new, from a competency-based framework perspective, BSGs are among the most effective educational technologies for developing financial literacy, initiative, and entrepreneurial awareness (Secundo et al., 2021; Hammoda 2024). They also contribute to employability by reinforcing transversal skills, including communication, analytical reasoning, teamwork, and adaptability to complex environments (AACSB International, 2013; Sheikh et al., 2023). Technophilic attitudes thus frame BSGs as essential for preparing students to navigate uncertainty, experiment with business models, and develop sustainable entrepreneurial mindsets (Gatti et al., 2019; Wiek et al., 2011).

In contrast,technophobic attitudes underscore the risks, limitations, and unintended consequences of BSGs. One concern some research papers that deal with the field is that the authenticity and complexity of simulations may overwhelm students, potentially decreasing entrepreneurial intention (Newbery et al., 2016). If students perform poorly in the game, the experience may evoke negative emotions and reinforce fear of failure, which in some cultural contexts, such as Spain, can deter future entrepreneurial attempts (Shepherd, 2004; Pérez-Pérez et al., 2021; Bosma et al., 2020).

Another challenge lies in self-regulation. Flipped classrooms incorporating BSGs demand strong student discipline and preparation. Lack of pre-class learning or overcommitment to extracurricular activities can diminish the benefits of simulations (Alkaabi, 2022). Curriculum designers must also "think outside the box" to ensure effective alignment of BSGs with learning outcomes; otherwise, the pedagogical potential of simulations may not be fully realized (Sheikh et al., 2023).

Moreover, while simulations support many entrepreneurial skills, they appear less effective in developing sustainability-oriented competencies, limiting their role in addressing broader goals of responsible

entrepreneurship (Sheikh et al., 2023). This shortfall fuels skepticism about whether BSGs adequately prepare learners for the multidimensional challenges of modern entrepreneurship.

The opposing attitudes toward BSGs highlight the tension between their promise as engaging, competency-building tools and the risks of overreliance, emotional setbacks, or misalignment with learning goals. Technophilic views welcome and celebrate BSGs as transformative experiential platforms for entrepreneurial learning, while technophobic perspectives caution that complexity, failure experiences, and weak self-regulation can undermine their effectiveness.

For educators, the challenge may lie in designing balanced pedagogical strategies. These might include embedding BSGs within blended or flipped learning models, supporting students with guidance and reflection opportunities, and complementing simulations with non-digital methods. This approach can mitigate technophobic concerns while ensuring that BSGs realize their potential to develop entrepreneurial skills that will be useful in later careers.

6 Immersive technologies, including virtual and augmented reality (VR and AR) in DEE

Immersive technologies, including virtual and augmented reality (VR and AR) are reshaping digital entrepreneurship education by creating sensory-rich environments that allow learners to engage in authentic, experiential contexts (Duwan et al., 2019). Most recent advances in mobile communication and AR have expanded the temporal and spatial boundaries of learning, enabling students to collaborate internationally, develop cultural competence, and foster global mindfulness (Wang et al., 2024; Whewell et al., 2022). Such experiences promote the development of changemaker identities, equipping students with the confidence and creativity needed to drive entrepreneurial innovation.

Platforms like ZEPETO illustrate the entrepreneurial potential of immersive digital spaces. With millions of users and creators, ZEPETO enables students to design avatars, create virtual products, and engage in digital marketplaces (Qiu et al., 2023). By translating conceptual ideas into virtual goods, learners enhance creativity and design skills, supporting experiential learning and entrepreneurial practice (Barráez-Herrera, 2022; Onu et al., 2023). More broadly, the ‘metaverse’ integrates VR, AR, and online interaction into shared spaces, offering opportunities for entrepreneurial projects that blend creativity, teamwork, and global collaboration (Mystakidis, 2022).

In higher education, immersive projects such as TalkTech and Digital Learning Across Boundaries (DLAB) have demonstrated how VR and AR can nurture changemaker attributes—including digital literacy, innovation, critical thinking, empathy, and cross-cultural communication—by connecting students across continents in entrepreneurial and educational collaborations (Whewell et al., 2022; Garrett, 2020). Simulation games similarly provide engaging platforms for problem-solving and decision-making, helping students acquire entrepreneurial competencies through realistic, interactive experiences (Matute & Melero, 2016; Pérez-Pérez et al., 2021).

Despite these advantages, ongoing challenges foster technophobia toward these emerging immersive technologies. Many students have limited prior experience with 3D platforms, and access to design software can be costly, creating barriers to widespread adoption (Alkaabi, 2022). As these technologies are becoming more and more complex, they may also provoke technophobia. Studies indicate that students may exhibit anxiety, hesitation or a sense of intimidation when engaging with VR and AR technologies. This contrasts with technophilia, where students enthusiastically embrace immersive environments, often demonstrating higher engagement, motivation, and creativity (Radu, 2014). These differing orientations significantly shape student experiences. Technophiles may thrive in simulation-based learning, while technophobes risk disengagement or underperformance if adequate support is lacking.

Addressing this polarity requires intentional pedagogical design. Instructors must scaffold immersive learning to ensure accessibility, provide technical and emotional support to reduce anxiety, and encourage gradual

familiarization with immersive platforms. At the same time, cultivating curiosity and offering open-ended creative opportunities can harness technophilic tendencies, and students will be allowed to maximize the entrepreneurial benefits of VR and AR.

In conclusion, immersive technologies hold substantial promise for digital entrepreneurship education by fostering experiential learning, creativity, and global collaboration. However, their effectiveness depends on balancing the enthusiasm of technophilic learners with strategies to mitigate technophobia, ensuring that immersive environments serve as inclusive and empowering platforms for developing entrepreneurial mindsets.

7 Conclusion

Digital entrepreneurship education (DEE) is increasingly shaped by diverse pedagogical and technological innovations. Social media platforms and generative AI (GenAI) provide opportunities for creativity, communication, and co-creation where students are able to test ideas, expand networks, and develop entrepreneurial identities in real-world digital ecosystems (Ratten & Jones, 2021; Dwivedi et al., 2023). Business simulation games (BSGs) and flipped classroom pedagogy further strengthen experiential and student-centred learning, cultivating higher-order thinking skills (HOTS), problem-solving, and teamwork through interactive and reflective practices (Solan & Shtub, 2023; Huang et al., 2022). Complementing these approaches, immersive technologies such as VR and AR extend learning into sensory-rich and globally connected environments, supporting creativity, cultural competence, and changemaker identities (Whewell et al., 2022; Wang et al., 2024).

Despite these advantages, the integration of advanced technologies into DEE also highlights the polarity between technophilia and technophobia. While technophilic learners enthusiastically engage with social media, simulations, AI tools, and immersive environments, technophobic learners may experience anxiety, resistance, or disengagement (Akçayır & Akçayır, 2018; Radu, 2014). This divide directly influences the effectiveness of digital pedagogies, as highly motivated technophiles often leverage tools for innovation and collaboration, whereas technophobes may struggle with self-regulation, workload, or technical barriers (Sun et al., 2017; Alkaabi, 2022).

Consequently, the successful adoption of novel methods in DEE requires balanced pedagogical design. Instructors must scaffold technological use, provide training and motivational support, and create inclusive learning pathways that address both enthusiasm and apprehension. By aligning social media, GenAI, BSGs, flipped learning, and immersive technologies within a coherent pedagogical framework, educators can foster not only entrepreneurial knowledge and skills but also resilience, adaptability, and digital confidence. In this way, DEE can empower all learners—regardless of technophilic or technophobic orientations—to participate meaningfully in innovation-driven environments.

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