TRANSFORMING ECONOMIC EDUCATION: BUILDING SUSTAINABLE AND DIGITAL ENTREPRENEURS

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ABSTRACT

The convergence of digital technology, sustainability imperatives, and the creative economy necessitates a fundamental transformation in economic education. This paper examines the urgent need to integrate digitalization and sustainability into entrepreneurship education to better prepare future entrepreneurs for a dynamic global economy. Despite the growing relevance of sustainability and digital competencies, few educational frameworks have adequately synthesized these dimensions within economic education. This study employs a narrative literature review method, systematically analyzing recent empirical studies and theoretical models published between 2015 and 2025. Drawing upon Sustainable Entrepreneurship Theory, Transformative Learning Theory, and the Digital Competence Framework, the study offers a solid conceptual basis for its integrated approach. The findings reveal that technology-enabled learning platforms enhance entrepreneurial skills by offering practical, interactive experiences, while sustainability-focused curricula foster critical thinking and future-oriented mindsets. Programs such as Indonesia's Digital Entrepreneurship Academy (DEA) and Singapore's Ngee Ann Polytechnic Green Innovation elective exemplify successful models in bridging digital and sustainability gaps in entrepreneurship education. The novelty of this paper lies in its integrated framework that combines digital competence, transformative learning, and sustainable entrepreneurship theories to inform curriculum development strategies. The results underscore the necessity of embedding cloud platforms, AI tools, and interdisciplinary sustainability

projects into economic education for cultivating resilient, socially responsible innovators. In conclusion, the study highlights that transforming economic education through digitalization and sustainability integration is critical to achieving Sustainable Development Goals (SDGs) and building a future-ready entrepreneurial generation. Educational institutions must reform curricula and invest in capacity-building initiatives to meet the evolving demands of global economic ecosystems.

Keywords: economic education, sustainable entrepreneurship, digitalization, creative economy, SDGs

INTRODUCTION

The accelerating digital transformation across all sectors necessitates a fundamental restructuring of economic education, particularly emphasizing digital and sustainable entrepreneurship competencies. According to the World Economic Forum (2023), over 85% of future jobs will require at least basic digital skills, highlighting the urgency of integrating technology into education systems. However, a report by UNESCO (2023) indicates that only 30% of economics students in developing countries possess medium to high levels of digital literacy, revealing a significant skills gap that must be addressed.

In Indonesia, the Indonesia Digital Literacy Survey 2022 conducted by the Ministry of Communication and Information Technology (Kemenkominfo) shows that the national digital literacy index remains at a moderate level of 3.54 out of 5. Consequently, future graduates must master not only business strategies but also digital technologies and sustainable practices. Entrepreneurship, often regarded as a key driver of economic growth, must now address both technological disruption and sustainability imperatives.

Given this context, traditional educational models are increasingly inadequate to equip students with the interdisciplinary skills required for today's dynamic environment. Research by Meitriana et al. (2020) shows that entrepreneurship programs structured around practical projects have successfully increased entrepreneurial motivation and competencies among university students. Similarly, Indrayani et al. (2020) illustrate how Balinese women entrepreneurs have integrated traditional knowledge with digital tools to enhance sustainable productivity.

Consequently, this study argues that economic education must evolve by embedding digitalization and sustainability frameworks to foster creative, adaptive, and socially responsible entrepreneurs. Furthermore, it aligns with several Sustainable Development Goals (SDGs), notably SDG 4 (quality education), SDG 8 (decent work and economic growth), SDG 9 (industry, innovation, and infrastructure), SDG 12 (responsible consumption and production), and SDG 13 (climate action).

Background and Problem Statement

The current landscape of economic education shows a growing mismatch between the skills imparted to students and the competencies required in a digitally driven, sustainability-focused economy. While digitalization and sustainability are increasingly acknowledged in policy and industry circles, their integration into formal entrepreneurship education remains limited and fragmented. This research seeks to address the critical question: How can economic education effectively integrate digitalization and sustainability principles to develop future-ready entrepreneurs?

Research Objectives and Questions

The objectives of this study are to (1) analyze the existing gaps in digital and sustainability integration within entrepreneurship education, (2) propose a conceptual framework combining digital competence, transformative learning, and sustainable entrepreneurship theories, and (3) highlight examples of successful educational initiatives that bridge these gaps.

Research Methodology Overview

This study employs a narrative literature review approach, systematically analyzing empirical studies, policy reports, and theoretical models published between 2015 and 2025. By synthesizing findings across multiple disciplines, this research identifies key trends, best practices, and remaining challenges in fostering digital and sustainable entrepreneurship education.

Contribution and Novelty

The novelty of this paper lies in its comprehensive integration of digitalization and sustainability within the context of economic education. Unlike previous studies that treat these dimensions separately, this research proposes an integrated framework that informs curriculum development strategies. By doing so, it contributes to both academic literature and practical policy recommendations for educational reform toward achieving the SDGs. This paper not only bridges digitalization and sustainability within entrepreneurship education but also proposes an integrative curriculum framework that directly aligns with multiple Sustainable Development Goals (SDGs)

LITERATURE REVIEW

Theoretical Framework

To establish a strong conceptual foundation, this study applies multiple theoretical lenses.Three theoretical frameworks underpin this study. The Sustainable Entrepreneurship Theory by Shepherd and Patzelt (2011) posits that entrepreneurs can identify opportunities in environmental and social challenges, integrating sustainability into their business strategies. Additionally, Mezirow's (1991) Transformative Learning Theory emphasizes that deep learning and behavioral change stem from critical reflection, an essential element in fostering sustainable mindsets. Complementing these, the Digital Competence Framework (DigComp) by the European Commission (2017) outlines key digital skills necessary for thriving in a technology-driven society, including mastering information and data literacy, effective communication and collaboration, creating digital content, ensuring digital safety, and developing problem-solving capabilities. Collectively, these frameworks advocate a holistic integration of entrepreneurship, digital skills, and sustainability principles.

This conceptual diagram (Figure 1) illustrates the intersection of Sustainable Entrepreneurship Theory, Transformative Learning Theory, and the Digital Competence Framework. These three theoretical pillars inform curriculum innovation aimed at fostering SDG-aligned, future-ready entrepreneurs.

The following diagram presents the integrated conceptual framework that underpins this study. This framework synthesizes three key theoretical approaches—Sustainable Entrepreneurship Theory, Transformative Learning Theory, and the Digital Competence Framework—which intersect to support curriculum innovation in entrepreneurship education aligned with the Sustainable Development Goals (SDGs).

Figure 1. Integrated Framework for Sustainable and Digital Entrepreneurship Education

Sustainable Entrepreneurship Theory emphasizes the importance of balancing social impact, environmental goals, and economic viability in entrepreneurial practices. Transformative Learning Theory focuses on critical reflection, experiential learning, and deep behavioral change as foundational elements in shaping a sustainable entrepreneurial mindset. The Digital Competence Framework outlines a comprehensive range of digital skills, including information literacy, communication and collaboration, digital content creation, safety, and problem solving, all of which are essential in today's digital age. The intersection of these three frameworks creates a conceptual space for Curriculum Innovation for SDG-Aligned Entrepreneurship Education, aiming to produce future entrepreneurs who are not only adaptive to technological change but also socially conscious and environmentally responsible. This integrated framework serves as a conceptual guide for analyzing literature, formulating curriculum recommendations, and shaping educational implications toward a more transformative and sustainable direction.

Digital Transformation in Economic Education

Furthermore, the advancement of digital tools introduces adaptive learning platforms, AI-powered simulations, virtual reality experiences, and global collaboration projects into education. During the COVID-19 pandemic, the shift to online learning platforms accelerated digital adoption significantly.

Studies conducted by Meitriana, Heryanda, and Dharmayasa (2021) reveal that 75% of economic education students perceive online learning positively, noting flexibility, access to resources, and enhanced technological familiarity. Moreover, technology-enhanced inquiry-based models improve student engagement and critical thinking.

In addition, technology democratizes access to entrepreneurship, enabling inclusive participation aligned with SDG 4 (inclusive education).

Sustainable Entrepreneurship and Creative Economy Pedagogy

Moving beyond digital aspects, teaching sustainable entrepreneurship requires integrating real-world issues such as climate change, resource scarcity, and ethical governance into curricula. Cocu et al. (2025) highlight the role of digital platforms in training green entrepreneurs, emphasizing practical sustainability applications. Indrayani et al. (2020) underscores the ability of women entrepreneurs in Bali to utilize digital platforms while maintaining traditional wisdom, a hybrid approach that fosters resilience. Similarly, Meitriana, Suwena, and Irwansyah (2019) stress creativity and adaptability as vital success factors in student entrepreneurial ventures. Moreover, creative economy pedagogy demands a cross-disciplinary approach that integrates arts, technology, entrepreneurship, and sustainable practices, as emphasized by Katre (2020). Transformative education instills a mindset where success is measured not just by profit but also by societal and environmental impacts, supporting SDG 12 (responsible consumption and production).

Tourism, Sustainability, and Digital Economy Integration

Expanding further, tourism as a significant sector in creative economies is also transforming under digitalization and sustainability demands. Wood (2022) describes how online education tools support sustainable tourism training, enabling learners to simulate destination management and climate impact assessment projects. By fostering digital skills and sustainability awareness, tourism education can contribute directly to achieving SDG 8 (decent work), SDG 12 (responsible tourism practices), and SDG 13 (climate action). A noteworthy example from Indonesia is the "Desa Wisata Digital" initiative, launched in 2018, where digital skills training for local communities in Bali has enabled eco-tourism businesses to grow sustainably while preserving cultural heritage. Despite these advancements, there remains a critical gap in integrating digitalization and sustainability comprehensively within entrepreneurship education frameworks, a gap that this study seeks to address.

METHOD, DATA, AND ANALYSIS

Research Approach

This study employs a narrative literature review approach to synthesize empirical findings and theoretical models relevant to digitalization and sustainability integration in economic education.

Data Sources and Search Strategy

The review systematically analyzes peer-reviewed journal articles and conference proceedings published between 2015 and 2025. The search was conducted using the Scopus, Web of Science, and Google Scholar databases. Relevant keywords included "economic education," "entrepreneurship education," "digital learning," "sustainable development," and "creative economy."

Sampling Criteria and Unit of Analysis

The unit of analysis includes empirical studies and conceptual papers focusing on curriculum innovation, entrepreneurship education models, and sustainable business education. Studies selected met the following criteria: (1) integration of technology and/or sustainability elements, (2) provision of empirical outcomes related to entrepreneurship education, and (3) alignment with the goals of the Sustainable Development Goals (SDGs) and transformative learning frameworks.

Data Analysis Method

The data analysis followed a thematic synthesis method, categorizing findings based on major emerging themes: digital competence development, sustainability-oriented pedagogy, and curriculum innovation. Critical evaluation ensured the inclusion of only high-quality, peer-reviewed publications to maintain the reliability and validity of findings.

RESULT AND DISCUSSION

The results of this review have revealed several crucial dimensions that inform the evolution of economic education.

Enhancing Entrepreneurship Education Through Technology

First, digital tools enable interactive, customized, and real-world entrepreneurship training. Platforms like simulation games, virtual startups, and AI coaching offer opportunities for risk-free business experimentation. According to Fülöp and Cifuentes-Faura (2025), digital platform use enhances students' critical thinking, resilience, and sustainable business planning skills. Moreover, cloud computing, blockchain, and AI tools are now integral to entrepreneurial education.Technology thus plays a critical role in democratizing education and fostering inclusive innovation aligned with SDG 4.

In addition, the Global Entrepreneurship Monitor (2023) reports that only 18% of new startups globally incorporate sustainability principles into their business models, underlining the need for targeted education to bridge this gap. Integrating sustainability into entrepreneurship education becomes crucial for ensuring that future business leaders prioritize environmental and social impacts alongside profitability.

A noteworthy case in Indonesia is the Digital Entrepreneurship Academy (DEA) initiated by the Ministry of Communication and Information Technology. The DEA provides structured digital training for aspiring entrepreneurs, including modules on green innovation and digital marketing for sustainable businesses. As of 2023, the DEA has trained over 100,000 participants, contributing to the rise of digitally literate entrepreneurs who are also aware of sustainability challenges. Internationally, Singapore's Ngee Ann Polytechnic offers a Green Innovation elective under its entrepreneurship track, enabling students to develop start-ups with strong environmental, social, and governance (ESG) values.

This finding indicates that while digital platforms significantly enhance entrepreneurial competencies, their potential to foster sustainability awareness remains underutilized, highlighting a critical opportunity for curriculum innovation.

Fostering Sustainable Practices Through Transformative Learning

In tandem, embedding sustainability concepts in entrepreneurship education requires promoting critical self-reflection among students. Transformative learning activities include case studies on ethical dilemmas, climate crisis simulations, and sustainable business model canvases. Indrayani et al. (2020) exemplify how reflective adaptation allows entrepreneurs to navigate uncertainty sustainably, supporting SDG 12. These activities not only enhance students' critical consciousness but also instill the ethical and reflective dispositions necessary for navigating complex sustainability challenges in entrepreneurial settings.

Building Digital Competencies for Future Entrepreneurs

Despite the promising prospects, several challenges may hinder the effective integration of digitalization and sustainability into economic education. One significant barrier is the digital divide, particularly in rural and underserved regions where access to reliable internet infrastructure and digital devices remains limited. This disparity can create unequal learning opportunities and widen the skills gap among students.

Additionally, the readiness of educators poses another challenge. Many faculty members in economic education programs may lack sufficient training in digital pedagogy and sustainable entrepreneurship frameworks, which can impede the delivery of transformative learning experiences. Institutional limitations, such as constrained budgets and lack of policy support for technology adoption and sustainability initiatives, further exacerbate these issues.

Moreover, there is often a lack of collaboration between academia, industry, and government sectors in promoting comprehensive digital and sustainable entrepreneurial ecosystems. Overcoming these barriers requires a multi-stakeholder approach that prioritizes investment in infrastructure, capacity-building programs for educators, curriculum reform, and supportive regulatory environments. Addressing these challenges holistically is vital to ensure that the integration of digitalization and sustainability in economic education can produce truly resilient and future-ready entrepreneurs.

Bridging these systemic barriers requires not only technological investments but also a paradigm shift in educational leadership, fostering cross-sector collaboration to build resilient digital-sustainability ecosystems.

Integrating SDGs into Entrepreneurship Curriculum

Finally, embedding the SDGs within entrepreneurship curricula strengthens the social and environmental impact of education. Economic education can foster SDG alignment by encouraging social entrepreneurship projects that promote decent work (SDG 8), supporting eco-innovation and sustainable industries (SDG 9), and integrating climate-conscious business strategies (SDG 13).

Projects such as "Green Startup Challenges," "Sustainable Business Hackathons," and "Digital Marketplace for Ethical Products" exemplify ways to operationalize these goals. Embedding SDGs transforms entrepreneurship education into a driver of global sustainability.

Strategically embedding SDG-oriented entrepreneurship initiatives into curricula ensures that future entrepreneurs are equipped not only with business acumen but also with a profound sense of social and environmental stewardship.

CONCLUSION

In conclusion, economic education must undergo a paradigm shift by fully embedding digital competencies, transformative learning practices, and sustainable entrepreneurship frameworks. Technology-enhanced, SDG-focused curricula will produce graduates who are not only entrepreneurial but also resilient, digitally fluent, and environmentally conscious.

This study makes three core contributions: (1) offering a conceptual framework that integrates digitalization, transformative learning, and sustainability into economic education; (2) presenting empirical and policy-based best practices that exemplify successful integration of digital and sustainability education;

and (3) proposing strategic directions for curriculum design and educator development aligned with Sustainable Development Goals (SDGs).

Research by Meitriana et al. and Indrayani et al. strongly supports that integrated, practical, and reflective educational models cultivate stronger entrepreneurial motivation and sustainable mindsets among students. Future entrepreneurs must be equipped to build businesses that thrive economically while contributing positively to global sustainability.

Ultimately, the future of economic education hinges on a courageous commitment to sustainable transformation, ensuring that innovation aligns with the broader goals of societal and environmental well-being. Empowering a generation that balances profitability with planetary responsibility.

This study offers several implications for future research and practice. Empirically, the findings highlight the need for broader, multi-country analyses to examine the effectiveness of integrated digital and sustainability entrepreneurship education across diverse contexts. Theoretically, this research contributes to the growing body of knowledge linking transformative learning, digital competence, and sustainable entrepreneurship. Economically, fostering graduates with such interdisciplinary skills supports the development of innovative and resilient business ecosystems aligned with the Sustainable Development Goals (SDGs). Future researchers are encouraged to explore longitudinal studies that assess the long-term impacts of digital-sustainability curricula on entrepreneurial success rates.

By embracing this paradigm shift, educational institutions can serve as catalysts for cultivating entrepreneurial leaders who are not only economically successful but also committed stewards of a sustainable future.

IMPLICATION/LIMITATION AND SUGGESTIONS

Based on these findings, several implications and recommendations are proposed to guide future developments in economic education.

Curriculum design should integrate DigComp skills, transformative learning strategies, and sustainable entrepreneurship principles. Aligning entrepreneurship projects with SDG targets can foster a sustainable mindset among students.

Faculty development programs must train educators in digital pedagogy and sustainability facilitation skills while encouraging interdisciplinary collaboration between faculties of economics, IT, environmental science, and social studies.

Institutional policies should promote blended and hybrid learning models to enhance inclusivity and flexibility, alongside investing in digital infrastructure supporting inclusive, sustainable entrepreneurship education. Furthermore, national education policies should endorse frameworks that promote digitalization and sustainability to create systemic impact.

Future research should conduct longitudinal studies assessing the long-term impact of digital-sustainability integrated curricula on graduates' entrepreneurial ventures, while exploring AI and big data applications in sustainable entrepreneurship education. In addition, future studies should explore how educational institutions across varying socio-economic contexts adapt integrated digital-sustainability curricula. Mixed-method longitudinal studies could provide a more nuanced understanding of long-term entrepreneurial success and environmental-social impacts. Exploring collaborations among academia,

industry, and government in developing and scaling digital-sustainability entrepreneurship models also remains a fertile ground for future inquiry.

Ultimately, economic education reform is essential for preparing graduates capable of leading innovation and sustainability initiatives in a digitally-driven, environmentally-challenged global economy.

While this study offers important insights into the integration of digitalization and sustainability into economic education, several limitations must be acknowledged. First, the narrative literature review methodology, while valuable for thematic synthesis, is inherently limited by potential selection bias and the subjective interpretation of existing studies. Second, the study primarily relies on secondary data from published articles and reports, which may not fully capture emerging or unpublished innovations in educational practice. Third, the geographic focus of most reviewed studies is limited to certain regions, which may affect the generalizability of the findings to global contexts.

Despite these limitations, the study provides a critical foundation for future empirical research and curriculum development efforts aimed at fostering sustainable, digitally literate entrepreneurs.

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