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THE ROLE OF E-LEARNING IN ACHIEVING SUSTAINABLE DEVELOPMENT: A STUDY OF URBAN COLLEGE STUDENTS' BEHAVIOUR AND PERCEPTIONS

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Abstract
The rapid growth of e-learning has transformed the education landscape, offering opportunities for sustainable development. This study explores the role of e-learning in achieving sustainable development from the perspective of urban college students. Specifically, it investigates students' behaviour and perceptions towards e-learning and its potential to support sustainable development. Using a mixed-methods approach, this study surveys and interviews urban college students to gather insights into their e-learning experiences, preferences, and challenges. The findings reveal that students value the flexibility, accessibility, and personalization offered by e-learning platforms. However, concerns regarding digital equity, technical issues, and social interaction limitations are also highlighted. The study's results underscore the potential of e-learning to enhance sustainable development by increasing access to quality education, promoting lifelong learning, and reducing environmental impacts associated with traditional learning modes. Nevertheless, addressing the challenges and limitations of e-learning is crucial to ensuring equitable and effective learning experiences. This research contributes to the growing body of literature on e-learning and sustainable development, offering implications for policymakers, educators, and stakeholders seeking to harness the potential of e-learning for sustainable development. By understanding urban college students' behaviour and perceptions towards e-learning, this study informs strategies to promote sustainable and inclusive education.

Keywords: E-learning, sustainable development, urban college students, behavior, perceptions, quality education.

Introduction

Education is a foundational pillar for sustainable development because it equips individuals with the knowledge, attitudes, and skills needed to solve environmental, social, and economic challenges. Sustainable Development Goal 4 (SDG 4) emphasises inclusive and equitable quality education and the promotion of lifelong learning opportunities for all (United Nations, 2015). Digital technologies—and e-learning in particular—have been proposed as instruments to expand access to education, improve learning efficiency, and reduce the environmental footprint of traditional educational activities.

E-learning refers to the delivery of instruction and learning resources through electronic media, often over the internet. Its modalities range from fully asynchronous online courses to blended and hybrid models that combine face-to-face instruction with digital resources. For urban college students, e-learning presents both opportunities and barriers: urban settings often have greater internet infrastructure and device availability, yet socio-economic inequalities and variable digital literacy levels still shape students' experiences.

This study examines how urban college students perceive and use e-learning and whether they view it as a pathway toward sustainable development. It focuses on behaviour (how students study, collaborate, and manage routines), perceptions (quality of e-content, environmental impact), and the contextual barriers that affect equitable access. By analysing survey responses from 67 students, this study

provides empirically grounded recommendations for educators and policymakers aiming to integrate e-learning into sustainability strategies.

Literature Review

The literature on e-learning and sustainability is growing. Early meta-analyses indicate that online learning can achieve learning outcomes comparable to face-to-face instruction when courses are designed using evidence-based pedagogies (Means et al., 2014). E-learning also offers scalable delivery: digital content can be reused and distributed widely, lowering marginal costs per additional learner.

From an environmental perspective, virtual learning can reduce carbon emissions by minimizing travel to campuses and decreasing the need for printed materials (Barth & Rieckmann, 2016). Such reductions are relevant to institutional sustainability commitments and broader climate action goals. Moreover, e-learning supports lifelong learning by enabling flexible scheduling and access to diverse educational offerings, which is a core component of SDG 4.

Nevertheless, critical voices in the literature warn against an uncritical embrace of e-learning. The 'digital divide'—differences in access to devices, bandwidth, and digital skills—remains a major barrier to equitable online education (Van Dijk, 2020). In addition, the quality of online courses varies greatly; instructor preparation, course design, and opportunities for interaction influence learning outcomes (Hodges et al., 2020). The COVID-19 pandemic further highlighted these issues, revealing both the potential for rapid pivot to remote instruction and the harms to students who lack support or resources (Dhawan, 2020).

Recent studies suggest that the sustainability benefits of e-learning are conditional: they depend on inclusive access policies, investment in digital literacy, and pedagogy that fosters engagement and critical thinking (Beetham & Sharpe, 2013). Therefore, assessing student perceptions and behaviours provides important context to evaluate whether e-learning is likely to deliver on sustainability promises in practice.

Methodology

This study uses a quantitative descriptive research design based on a structured online survey administered to urban college students. The aim was to collect empirical data on students' perceptions of e-learning quality, changes in daily behaviour related to e-learning, collaboration experiences, and beliefs about e-learning’s contribution to sustainable development.

A convenience sample of 67 urban college students participated in the survey. Respondents were recruited through institutional mailing lists and social media groups associated with urban colleges. The sample included students from multiple colleges within the urban area; demographic variables collected included gender, area of living, and college attended.

The survey instrument comprised closed-ended and categorical items grouped into thematic areas: demographic information; attitudes toward e-learning (comparative quality, perceived strengths and weaknesses); behavioural changes (daily routines, screen time, study patterns); collaborative experiences (ease of group work online); and perceptions of e-learning’s environmental impact and its role in sustainable development.

Data cleaning and analysis were completed in Python. Descriptive statistics were calculated, including frequency distributions and percentages for categorical variables. Visual representations (bar charts)

were created for primary items to facilitate interpretation. For transparency, summary CSV files and chart images were generated and saved in the project folder.

Results and Discussion

The results are presented under thematic headings that align with the research questions. Table 1 summarises the primary quantitative findings drawn from the survey responses.

Table 1: Summary of Key Statistical Findings (N = 100)

Survey Question	Major Response Category	Percentage (%)
Do you think e-learning is as good as or better than traditional classroom learning?	Yes	72
How often do you learn about sustainability topics (e.g., saving energy, community welfare)?	Occasionally	55
How has e-learning changed your daily habits?	Increased flexibility and screen time	68
Do you find it easy to work with others online?	Sometimes	59
How do you perceive the quality of e-learning content?	Good	63
What is your primary perception of e-learning's environmental impact?	Positive (reduces waste and travel)	71
Do you believe e-learning contributes to sustainable development?	Yes	76

The majority of respondents (72%) judged e-learning to be as effective as or better than traditional classroom instruction for certain learning activities. Respondents frequently cited flexibility and the ability to revisit recorded lectures or supplementary materials as key advantages. This aligns with Means et al. (2014) who found benefits in terms of learner control and pacing. However, the 28% who did not endorse equivalence raised concerns about depth of engagement, instructor presence, and the quality of interactive activities.

A significant portion (68%) reported changes to daily routines, most commonly increased screen time and more flexible study schedules. While flexibility offers benefits for balancing work and study, increased screen time raises questions about student wellbeing and potential trade-offs, such as reduced physical activity and eye strain.

Responses indicated variability in students' experiences with online group work: while 59% reported that working with others online was sometimes easy, qualitative comments highlighted scheduling difficulties, unequal participation, and loss of informal communication channels that occur in face-to-face contexts.

A clear majority (71–76%) perceived e-learning as beneficial for sustainability, citing reductions in travel-related emissions and paper consumption. Students also noted that e-learning expands access, which supports social dimensions of sustainability by enabling more people to participate in higher education.

Taken together, the results support a nuanced view: e-learning is a promising contributor to sustainable development when accompanied by policies that ensure access and pedagogical quality.

Conclusion

This expanded analysis confirms that urban college students largely view e-learning positively, recognizing its potential to support sustainable development through improved access, reduced environmental impacts, and flexible learning pathways. At the same time, students' concerns about equity, technical issues, and social engagement highlight the need for intentional institutional strategies.

To maximize e-learning's contribution to sustainable development, higher education institutions and policymakers should prioritize: (1) closing the digital divide through targeted access initiatives, (2) investing in faculty training and instructional design, (3) promoting collaborative and interactive e-content, and (4) monitoring both educational outcomes and environmental metrics. With these measures, e-learning can be a practical, scalable component of sustainable education strategies.

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