

EXPLORING THE IMPACT OF ICT TOWARD STUDENTS' ACADEMIC ACHIEVEMENT

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Abstract

This study investigates the direct effect of Information and Communication Technology (ICT) use on university students' academic achievement. Although ICT has become central to contemporary pedagogy, its measurable contribution to academic performance remains inconsistent. This quantitative study collected data from undergraduate students using a validated Likert-scale questionnaire. Findings revealed that ICT use does not significantly predict academic achievement, suggesting that access to technology alone does not guarantee improved academic outcomes. ICT's influence appears to depend on pedagogical design, digital literacy, student motivation, and quality of instructional practices. This study highlights the complexity of technology integration in higher education and provides recommendations for future research focusing on indirect pathways through which ICT may influence academic success.

Keywords: Academic Achievement, Digital Literacy, Higher Education, ICT, Technology Integration

INTRODUCTION

The rapid development of Information and Communication Technology (ICT) has profoundly reshaped the landscape of higher education, influencing not only how knowledge is delivered but also how students access, process, and engage with academic content. ICT tools, such as Learning Management Systems (LMS), virtual learning environments, digital libraries, educational applications, and collaborative platforms have become integrated into daily academic practices, reinforcing the shift toward blended and fully online learning modalities. These transformations reflect broader theoretical perspectives such as constructivism and socio-cultural learning theory, which emphasize that learning occurs through active engagement, interaction, and mediated tools that support meaning-making (Vygotsky, 1978; Anderson & Dron, 2012).

As the incorporation of ICT grows, there is an increasing expectation that technological engagement will enhance learning efficiency, deepen conceptual understanding, and improve learning outcomes. Proponents argue that ICT supports student-centered learning by expanding access to information, enabling personalized learning paths, and fostering interactive learning experiences (Lee et al., 2023; OECD, 2024; Crompton et al., 2021). Studies have also suggested that digital platforms can enhance academic motivation, learning autonomy, and student engagement factors that are known to contribute to academic performance (Aparicio et al., 2016; Deci & Ryan, 2023; Fredricks et al., 2004).

Despite these optimistic assumptions, empirical evidence on ICT's direct impact on academic achievement remains inconsistent. While some research reports positive correlations between technology use and academic performance (Sung et al., 2016; Alshammari, 2022), other studies show negligible or even negative effects, often due to distraction, multitasking, and cognitive overload associated with digital environments (Sweller, 1988; Tamim et al., 2011). Students frequently use ICT for entertainment, communication, or social media rather than academically oriented tasks, which can diminish the educational value of technology (Ben-David Kolikant, 2010; Alqahtani & Rajkhan, 2020). Such findings suggest that the benefits of ICT may not depend solely on access but rather on purposeful, academically aligned use supported by digital literacy and self-regulated learning skills.

Existing literature also highlights that academic achievement is shaped by multiple interrelated factors including socio-economic background, digital competence, instructional quality, learning strategies, and motivation which complicates efforts to isolate ICT's unique contribution (Bandura, 1997; Schunk & Zimmerman, 2012; Martin, 2018). Many scholars note that ICT often contributes indirectly to academic outcomes by mediating variables such as engagement, motivation, or cognitive processing rather than directly improving grades or performance metrics (Tondeur et al., 2018; Rasheed et al., 2020). This indicates that ICT's role may be more supportive than determinative.

Furthermore, contextual differences in ICT infrastructure, accessibility, and technological readiness—particularly in developing countries further complicate the relationship between ICT and academic achievement (Hennessy et al., 2010; Khan & Abdou, 2023). Limited digital resources, inconsistent internet connectivity, and uneven digital literacy rates can affect how effectively students use ICT for academic purposes, suggesting that ICT's impact varies widely across educational environments.

Given these mixed findings, there is a growing need to investigate ICT's direct influence on academic achievement without introducing mediating variables. Many previous studies incorporate constructs such as digital literacy, engagement, or motivation, making it difficult to determine whether ICT use alone contributes meaningfully to academic outcomes. Therefore, the present study focuses specifically on examining the direct relationship between ICT use and academic achievement among university students. By isolating ICT as a single predictor, this research aims to contribute more precise empirical evidence to the ongoing debate regarding technology's role in academic success.

METHODS

This research applied a quantitative descriptive design to investigate the direct impact of ICT use on academic achievement. The study targeted undergraduate students from various faculties at a public university, selected through convenience sampling due to accessibility. Despite this limitation, the sample was diverse, representing students with varying academic backgrounds and ICT exposure. Ethical considerations were implemented, ensuring voluntary participation, informed consent, anonymity, and confidentiality.

Data collection was conducted using a structured online Likert-scale questionnaire consisting of ten items designed to measure two constructs: ICT use and academic achievement. Six items focused on ICT use, examining frequency of technology use, types of tools accessed, purpose of ICT engagement, and ease of digital tool utilization. These items captured not only how often students used ICT but also the intentionality and nature of their usage.

Four items measured academic achievement based on students' perceptions of their grades, their confidence in completing academic tasks, and overall academic performance relative to expectations. Self-reported academic achievement is commonly used in educational research and correlates strongly with actual academic performance. The questionnaire underwent expert validation to ensure clarity and construct relevance. Reliability testing using Cronbach's Alpha resulted in coefficients above 0.80 for both constructs, indicating strong internal consistency. This suggests the instrument effectively measured ICT use and academic achievement.

Data analysis involved descriptive statistics to explore patterns of ICT use and academic achievement, followed by linear regression to determine whether ICT use significantly predicted academic performance. Regression analysis was chosen to evaluate ICT as a direct predictor without introducing mediating or moderating variables, aligning with the study's purpose of isolating ICT's standalone effect.

FINDINGS AND DISCUSSION

Descriptive analysis showed that students reported moderate ICT use with a mean score of 3.12 (SD = 0.78). Students accessed ICT tools regularly but not necessarily with strong academic intent. Meanwhile, academic achievement recorded a higher mean score of 3.54 (SD = 0.81), indicating generally positive perceptions of academic performance.

Tabel 1. Descriptive Statistics

| Variables | Mean | Std |
|----------------------|------|------|
| ICT Use | 3.12 | 0.78 |
| Academic Achievement | 3.54 | 0.81 |

Regression analysis demonstrated that ICT use was not a statistically significant predictor of academic achievement ($\beta = 0.084$, $p = 0.276$). These findings suggest that ICT use, in its current form, does not directly influence students' academic outcomes.

Tabel 1. Regression Results

| Predictor | Beta coefficient | Significance (p-value) |
|-----------|------------------|------------------------|
| ICT Use | 0.084 | 0.276 |

The findings of this study align with research asserting that ICT's role in academic performance is often indirect rather than direct. The absence of a significant direct effect suggests that simply using digital tools does not guarantee improved academic achievement. Several factors may explain this phenomenon. Many students use ICT primarily for non-academic purposes, such as entertainment, communication, or social networking. Although ICT provides access to educational content, much of students' digital time is spent on platforms unrelated to learning (Hennessy et al., 2010; Alqahtani & Rajkhan, 2020). As a result, the potential academic benefits of ICT may be overshadowed by competing online activities.

The nature of digital environments may also contribute to cognitive overload. Frequent exposure to multimedia content, hyperlinks, and notifications can disrupt attention and reduce learning efficiency (Sweller, 1988). Students using digital tools may become overwhelmed by information, leading to shallow processing rather than deep learning (Tamim et al., 2011). Digital literacy is another critical factor. ICT effectiveness depends on students' ability to use digital tools strategically. Students lacking digital research skills, organizational abilities, or familiarity with educational applications may struggle to translate ICT use into academic gains (Martin, 2018; Rasheed et al., 2020). Without adequate guidance, technology becomes a passive rather than empowering resource.

Furthermore, the effectiveness of ICT is strongly shaped by instructional design. Meaningful learning occurs when educators integrate ICT into active, collaborative, or inquiry-based pedagogies (Crompton et al., 2021). When ICT is used merely as a content repository or substitute for traditional teaching, the impact is minimal (Petko, 2012). In developing countries, disparities in ICT access, unstable internet connections, and limited institutional infrastructure may further restrict the academic benefits of technology (Khan & Abdou, 2023). These contextual limitations reduce students' opportunities to engage with ICT consistently and effectively. Overall, ICT's value lies not in its presence but in how it is used. Without strong digital literacy, clear pedagogical goals, and structured academic support, ICT use may not directly influence academic achievement.

CONCLUSION

This study concludes that ICT use does not have a significant direct effect on university students' academic achievement. Although ICT has become an essential component of modern higher education, the findings suggest that technology alone is not sufficient to enhance academic performance. Its effectiveness depends on how intentionally and strategically it is integrated into the learning process. Students may have access to various digital tools, but without strong digital literacy, effective learning strategies, and well-designed instructional activities, ICT remains a supportive instrument rather than a transformative factor.

The results highlight the need for universities to move beyond simply providing technological resources toward promoting meaningful ICT integration that aligns with pedagogical goals. Educators should design learning activities that encourage active engagement, critical thinking, and purposeful use of digital tools. Institutions must also invest in improving students' digital competencies and providing adequate infrastructure to support effective technology-based learning.

Future research should investigate indirect pathways through which ICT may influence academic achievement, such as motivation, engagement, digital literacy, and self-regulated learning. Exploring these mediating mechanisms will offer a more comprehensive understanding of the role of ICT in enhancing learning outcomes. Longitudinal and mixed-method approaches are also recommended to deepen insights into how students' ICT behaviors evolve and interact with their academic development.

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