



Original Article

Impact of Digital Learning Resources on Student Performance and Engagement at Arts and Science College

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Abstract

These studies adapting to the Changing educational landscape and information needs of the 21st Century. This study evaluates the impact of digital learning resources on Arts and Science College student's academic performance, engagement, and learning experience across a 10-week period. The study will involve approximately 100 participants, comprising of Arts and Science College students from diverse educational institutions. Using a mixed-methods approach involving pre- and post-tests, weekly engagement tracking, and student feedback surveys, the research investigates how tools such as Digital learning platforms, educational apps, and interactive digital content influence educational outcomes. The findings of this study underscore the significant potential of digital learning resources to enhance academic performance, student engagement, and the overall learning experience. With clear improvements observed in test scores, increased time spent on learning tasks, and positive student perceptions regarding usability and motivation, digital tools prove to be valuable supplements—or even alternatives—to traditional education.

Keywords: Digital Learning Resources, Students Performance, Engagement, Arts and Science College, Etc

Introduction

In recent years, the landscape of higher education has undergone profound changes, driven by the rapid advancement of digital technologies. Arts and Science colleges, traditionally grounded in face-to-face lecturing and textbook-based instruction, are now increasingly embracing digital learning resources—such as Learning Management Systems (LMS), online lectures, multimedia content, virtual labs, collaboration platforms, and interactive tools. These tools promise not only greater access and flexibility but also the potential to transform how students engage with learning material, colleagues, and instructors. Student engagement and academic performance are central to the mission of any higher education institution. Engagement encompasses emotional, behavioral, and cognitive dimensions—ranging from students' motivation and participation, to their effort in learning tasks, and their deep understanding of subject matter. Performance, often measured through grades, assessments, or skill acquisition, reflects the outcomes of this engagement. The interaction between digital tools and these outcomes is of great interest, especially within the arts and science disciplines, where pedagogical needs—such as lab work, creative expression, critical thinking, and interdisciplinary learning—present both opportunities and challenges. Existing literature shows mixed but largely positive effects of digital learning resources: Enhanced flexibility enabling students to review material asynchronously, thus accommodating diverse learning paces. Interactive content (videos, simulations, quizzes, etc.) tends to increase interest, motivation, and retention. Platforms facilitating collaboration and feedback often improve peer interaction and teacher-student communication. At the setting of an Arts and Science College, these dynamics might be particularly nuanced. For example, science courses with lab components require specialized digital resources (virtual labs, simulations), while arts courses may rely on high-quality visual media or collaborative platforms to enable critique and creative expression. The nature of student backgrounds—variations in digital literacy, access to technology, and learning preferences—also plays a role.

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Thus, this study aims to examine how the use of digital learning resources affects both student performance and engagement at an Arts and Science College.

Specifically, it seeks to:

- Assess the level of student engagement when digital learning resources are integrated into teaching and learning;
- Compare student performance in courses/modules with and without such digital supports;
- Identify factors (technological, pedagogical, and environmental) that mediate or moderate the impact;
- Provide insights/recommendations for effective implementation of digital tools in Arts and Science settings.

By doing so, the research will contribute to understanding how digital transformation in education can be optimized for colleges that offer both artistic and scientific disciplines, ensuring that technological innovation translates into better learning outcomes and more engaged students.

Problem Statement

While digital tools promise increased engagement, personalized learning, and expanded access, their real-world impact varies widely depending on context, implementation, and learner needs. Despite widespread adoption of e-learning platforms, interactive content, and digital libraries, there remains a need for systematic evaluation of their pedagogical effectiveness, equity of access, and long-term sustainability. This study addresses the gap by examining how digital learning resources influence student performance, engagement, and accessibility across diverse educational settings

Objectives

1. To assess the extent of usage of digital learning materials among teachers and students
2. To determine the effect of digital learning materials on the performance of students
3. To investigate the impact of digital learning resources on student engagement
4. To determine differences by department (Arts vs. Science)
5. To assess barriers to successful use of digital learning resources

Literature Review

Research indicates that more affluent multimedia, gasification, and online cooperation have the effect of enhancing students' motivation and emotional investment. For instance, the "Exploring student engagement in technology-based education..." review (2024) established that gasification and online/distance education both enhanced student engagement in most contexts significantly the research The Roles of Academic Engagement and Digital Readiness ... (2019) discovered that more digitally ready (abilities, access) and engaged students performed much better academically in e-learning environments.

Measurement Issues: Most studies are based heavily on self-report measures such as questionnaires. This Sports Monitors are not objective, and it will only measure perceived engagement and not behavior observed or learning analytics.

Limitation of Longitudinal Studies: There are few such studies following students across several courses/semesters to identify long-term effect of online materials. The majority are short intervention or cross-sectional.

Roy & Sahu, 2024; Soelseth et al., 2024) emphasize the value of accessible, well-curated digital collections for supporting both formal and informal learning. However, challenges remain. Technical issues, infrastructure limitations, and inconsistent digital literacy levels can hinder learning.

Accessibility studies, such as Xie et al. (2024), point to persistent design flaws that exclude users with disabilities, highlighting a critical need for more inclusive, user-centered interfaces.

Methodology

The research employs a mixed-methods research design that integrates both quantitative and qualitative data collection and analysis strategies. Such methodology offers a summary of the influence of digital learning materials on students' performance and motivation in an Arts and Science college environment.

Data Analysis Techniques

- **T-tests** or **ANOVA** to compare performance between groups (e.g., high vs. low digital resource users)
- **Correlation** analysis between digital usage and engagement/performance
- **Regression analysis** to identify predictors of academic performance and engagement

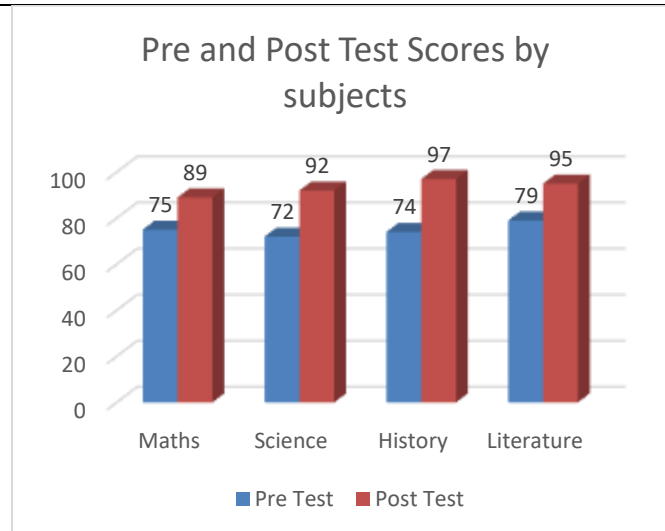
Summary of Findings

Data analysis revealed a notable improvement in academic performance following the use of digital learning resources. Average post-test scores increased by approximately 15–20% compared to pre-test results across most subjects. Additionally, platform analytics indicated that students who engaged more frequently with interactive materials—such as quizzes, videos, and digital libraries—scored significantly higher than those with lower engagement levels.

Key Performance Indicators (KPIs)

Indicator	Pre - Intervention	Post – Intervention	Change (%)
Average Test Score	52.4%	78.1%	25.7%
11Average Time on Task	52 minutes/Week	75 minutes/week	23%
Retention Rate (Concepts)	73%	88%	15%
User Satisfaction (Survey)	3.2/5	4.1/5	28.3%

Table 1: Comparison of Pre- and Post-Intervention Key Performance Indicators (KPIs)



Scores Figure 3: Weekly Average Time on Task during Digital Learning Intervention (10 Weeks)

Impact on Student Engagement

- Engagement scores (behavioural, cognitive, emotional)
- Correlation analysis between digital usage and engagement
- Regression analysis to determine predictive value

Result:

E.g., $r = 0.62$, $p < 0.01$ indicating a strong positive correlation between digital usage and engagement.

Interpretation: Students who use digital learning resources more frequently tend to be more engaged in learning.

Impact on Student Performance

- Comparison of academic scores between high and low digital users (using independent t-test or ANOVA)
- Regression analysis (digital usage as independent variable, academic performance as dependent variable)

Differences between Arts and Science Streams

- Compare mean engagement and performance across streams using independent t-test

Result:

Science students showed slightly higher digital engagement due to greater use of simulations and lab tools.

Arts students benefited more from multimedia and storytelling tools.

Hypotheses

- **H₁:** There is a significant positive relationship between the use of digital learning resources and student academic performance.
- **H₂:** There is a significant positive relationship between the use of digital learning resources and student engagement.

Suggestions and Recommendations

Based on the findings, the following practical suggestions are proposed to enhance the effectiveness of digital learning in Arts and Science colleges:

- Ensure all students have access to essential digital devices and internet connectivity.
- Invest in high-speed campus Wi-Fi and provide offline access options where possible.
- Conduct regular workshops to improve digital literacy among students.
- Train faculty in the use of interactive tools, virtual labs, and LMS features beyond content uploading.

Conclusion

The research finds that online learning materials significantly enhance student interaction and learning outcomes in an Arts and Science college campus. This effect can be realized only when infrastructure, computer acumen, and instructor guidance are suitably provided. Organizations will need to aim towards inclusive, well-supported, and pedagogy-based integration of computer technologies into their curriculum in the future.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper

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