

## Bridging Knowledge Gaps: The Impact of Technology-Integrated Multidisciplinary Curriculum on Student Learning

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### ABSTRACT

The rapid advancement of technology has revolutionized education, enabling students to explore multiple subjects in an interconnected way. This research examines how integrating technology into a multidisciplinary curriculum enhances student engagement, learning outcomes, and problem-solving abilities. Using data from various colleges and universities, the study compares the performance of students who experience technology-enhanced multidisciplinary learning with those in traditional educational settings. It also identifies the challenges educators face in implementing such curricula and suggests solutions for effective integration. The findings highlight that students in technology-driven multidisciplinary programs develop stronger analytical skills, deeper subject connections, and better adaptability to real-world problems.

**Keywords:** *Technology in education, multidisciplinary learning, digital tools, student engagement, curriculum innovation, educational transformation*

Traditional education follows a subject-specific approach, where each discipline is taught separately. However, in today's fast-changing world, knowledge is interconnected, and real-life challenges require expertise from multiple fields. Technology has opened new possibilities for merging different subjects, allowing students to engage with content more deeply. A multidisciplinary curriculum integrated with technology helps students connect concepts, develop creativity, and solve complex problems.

This study explores the impact of technology on multidisciplinary learning, focusing on student performance, engagement, and adaptability. It aims to answer key questions, such as how technology influences student learning in multidisciplinary education, what challenges educators face, and what strategies can improve the implementation of technology-integrated curricula.

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## REVIEW OF LITERATURE

Education experts have long emphasized the benefits of integrating multiple subjects into learning. John Dewey (1938) advocated for experiential education, where students connect knowledge with real-life situations. Vygotsky (1978) highlighted the role of social interaction in learning, which aligns with technology-enhanced collaborative education. Piaget's constructivist theory suggests that students learn best when they actively explore different subjects, making technology an effective tool for bridging disciplines.

Different technological models support multidisciplinary education. Blended learning combines online and offline teaching, allowing students to interact with different subjects digitally. Project-based learning (PjBL) integrates technology to enable students to complete interdisciplinary projects using digital tools. Gamification introduces game-like elements to make learning more engaging and interactive. AI-powered personalized learning tailors educational content based on student needs, fostering better understanding across multiple disciplines.

Studies suggest that technology improves student engagement, enhances problem-solving skills, and promotes deeper understanding. Research by Prensky (2010) shows that digital tools increase motivation in learning. A study by Mishra and Koehler (2006) on the TPACK model (Technological Pedagogical Content Knowledge) explains how integrating technology with pedagogy enhances teaching effectiveness. However, challenges remain, including lack of teacher training, digital divide issues, and difficulty in assessing interdisciplinary learning outcomes.

## METHODOLOGY

This research follows a **mixed-method approach**, incorporating both qualitative and quantitative data.

A survey was conducted with 250 students and 60 teachers from various higher education institutions to understand their experiences with technology-integrated multidisciplinary learning. In addition, structured interviews were conducted with 20 educators to explore challenges and best practices in implementing digital tools for interdisciplinary teaching.

Student performance was analyzed by comparing grades, engagement levels, and problem-solving abilities in technology-enhanced multidisciplinary courses versus traditional courses. The data was evaluated using statistical techniques such as mean comparisons, t-tests, and correlation analysis.

## ANALYSIS AND INTERPRETATION

### 1 Student Performance Comparison

The comparison between students in traditional and technology-enhanced multidisciplinary courses revealed notable differences in learning outcomes and engagement levels.

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Course Type	Average Score (%)	Student Engagement (out of 10)	Problem-Solving Ability (%)
Traditional	70.3	6.5	63.4
Tech-Integrated Multidisciplinary	85.1	8.9	80.7

Students in technology-driven multidisciplinary courses performed significantly better in terms of knowledge retention, engagement, and problem-solving skills compared to those in traditional courses.

### Comparison of Student Performance in Traditional vs. Tech-Integrated Multidisciplinary Courses

Comparison of Student Performance in Traditional vs. Tech-Integrated Multidisciplinary Courses



### Graph Interpretation

The bar graph compares student performance in traditional education and technology-integrated multidisciplinary education based on three key factors: average scores, student engagement, and problem-solving ability.

- Average Score:** Students in technology-driven multidisciplinary courses achieved a significantly higher average score (85.1%) compared to those in traditional courses (70.3%). This suggests that integrating technology helps students understand and retain knowledge more effectively.
- Student Engagement:** The engagement level was 8.9 out of 10 for students in technology-integrated multidisciplinary courses, while those in traditional courses rated their engagement at 6.5. This indicates that digital tools make learning more interactive and enjoyable.
- Problem-Solving Ability:** Students in technology-enhanced courses demonstrated stronger problem-solving skills (80.7%) than those in traditional courses (63.4%). This

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highlights that integrating technology helps students apply their knowledge in real-world situations.

### **Overall Interpretation**

The data shows that a technology-integrated multidisciplinary curriculum significantly enhances student learning, engagement, and problem-solving skills. The higher scores and engagement levels suggest that students find digital tools helpful in understanding complex subjects. However, for successful implementation, institutions must train teachers, ensure equal access to technology, and develop structured assessment frameworks. By addressing these challenges, education can be transformed to better prepare students for the future.

### **2 Educators' Perspectives**

Interviews with educators highlighted the benefits and challenges of integrating technology into multidisciplinary learning. Many teachers reported that students were more engaged and demonstrated better critical thinking skills. However, they also faced difficulties in adjusting their teaching styles, selecting appropriate digital tools, and assessing students across multiple disciplines.

### **3 Student Feedback**

Survey results showed that 88% of students found technology-integrated multidisciplinary courses more interesting than traditional methods. 82% reported that digital tools helped them understand complex subjects better. However, some students initially struggled with adapting to new learning technologies.

## **RESULTS AND DISCUSSION**

The findings clearly indicate that integrating technology with multidisciplinary education enhances student learning outcomes. Higher engagement levels suggest that digital tools make education more interactive, while improved problem-solving abilities show that students can apply their knowledge in real-life situations.

The key challenges identified include lack of teacher training, unequal access to technology, difficulty in assessing multidisciplinary knowledge, and technical issues with digital tools. Addressing these challenges requires institutions to provide structured training programs for teachers, ensure equal access to technology, and develop effective assessment methods for interdisciplinary learning.

## **CONCLUSION AND RECOMMENDATIONS**

This study confirms that technology-integrated multidisciplinary education enhances student learning, engagement, and problem-solving skills. However, challenges such as teacher readiness, assessment complexities, and digital accessibility must be addressed to fully realize the benefits of this approach.

To improve the effectiveness of technology-driven multidisciplinary learning, institutions should:

- i. **Train educators** in using digital tools effectively for interdisciplinary teaching.

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- ii. **Ensure equal access** to technology for all students, reducing the digital divide.
- iii. **Develop structured assessment frameworks** for evaluating multidisciplinary knowledge.
- iv. **Integrate AI and adaptive learning** systems to personalize education for each student.
- v. **Encourage collaborative projects** where students apply technology to solve real-world interdisciplinary problems.

By implementing these strategies, educational institutions can create a dynamic learning environment that prepares students for the complexities of the modern world.

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#### *Conflict of Interest*

The author declared no conflict of interest.

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