



# Digigogy: Digital Games to Enhance Mathematical Learning

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Manuscript ID:  
BIJ-SPL1-MAR26-EDU-044

Subject: Education

Received : 23.01.2026  
Accepted : 04.02.2026  
Published : 14.03.2026

DOI: 10.64938/bijsi.v10si1.26.Mar044

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## Abstract

*In recent years, the use of digital technology in Indian classrooms has increased rapidly, creating new opportunities to improve teaching and learning. This paper focuses on the role of digigogy and digital game-based learning in enhancing mathematics education. It explains how digital games make learning more interesting, interactive, and enjoyable for students, especially in a subject that many learners find difficult. Through game-based activities, students develop better understanding, problem-solving skills, and confidence while learning at their own pace with immediate feedback. The study also highlights the importance of teachers' digital skills and positive attitudes in effectively using these tools. Digital games encourage active participation, teamwork, and critical thinking, creating a supportive learning environment. However, challenges such as limited infrastructure, internet access, and a lack of training still exist in many schools. Despite these limitations, the paper concludes that integrating digital games into mathematics instruction can improve learning outcomes and foster joyful, meaningful learning in Indian classrooms.*

**Keywords:** digigogy, digital games, mathematical learning, digital pedagogy

## Introduction

In nowadays, technology has played a important role in teaching and learning. At the moment, the educational framework observes their point of view. The digitalization of instructional techniques using specialized instruments has replaced traditional chalk-and-talk teaching methods (Asad, M. M., et al., 2021). Furthermore, to demonstrate excellent subject knowledge and pedagogical competence, teachers now need to successfully incorporate technology into their lesson plans (Ngao et al., 2022). Consequently, Teacher education programs are redesigning curricula to equip aspiring educators to meet the needs of technologically advanced classrooms. In the educational context, Digital games have emerged as

a potent pedagogical tool for enhancing student involvement and improving the teaching and learning process. These games serve as an appealing and inspiring tool for students by combining enjoyable and challenging elements with instructional content, encouraging curiosity, creativity, and a desire to learn. The National Education Policy (NEP) 2020 recognizes the "extensive use of technology in teaching and learning" as a key concept to enhance educational efficacy, overcome language barriers, and increase access. The term "digigogy," or "digital pedagogy," refers to this integration, which seeks to replace memorization with experiential, interactive, and personalized learning. So now see in the article how digital games improve mathematical learning



and the various roles they play in the student learning process.

### **Digigogy as a Innovative Pedagogy**

Digigogy blends with on digital and pedagogical elements. Digigogy is about teaching techniques within a technological framework, whereas pedagogy is about teaching techniques. Digigogy is about rethinking our approaches to teaching in the future, from hardware to software, from educational technology theory to application. The new way of learning is a complete teardown and rebuild of traditional teaching, where learning is a joint effort and roles are reborn. We can incorporate 21st-century, new, and current literacies into our pedagogy through the use of digital tools. These literacies include digital literacies (software and hardware), visual literacies (graphics, photography, art, video, and more), and classical literacies (listening, speaking, reading, and writing) (Janaki, S., & Dr.N.Devaki, 2024). These are particularly important in contemporary educational contexts characterized by Online learning, flipped classrooms, and mixed learning models for the classroom. Strong digital teaching skills can create inclusive and engaging learning experiences. That accommodate a variety of learning styles and needs (Beaudrow, J., .2014). They are capable of integrating activities for both synchronous and asynchronous learning, giving prompt feedback via digital tools, and supporting continuous learner engagement beyond the actual classroom (Janaki, S., & Devaki, N., 2024).

### **Digital Games based Learning**

Digital games are an interactive tool that can be used in a multimedia learning environment to efficiently and engagingly support learning, especially for younger students. Researchers and game designers have recognized the importance of various models and frameworks to support multimedia learning environments. Teachers use games in the classroom as a beneficial educational technique that engages students in learning activities to achieve specific learning objectives and outcomes. (Mat Zin, et al., 2009). Since interactive online environments are

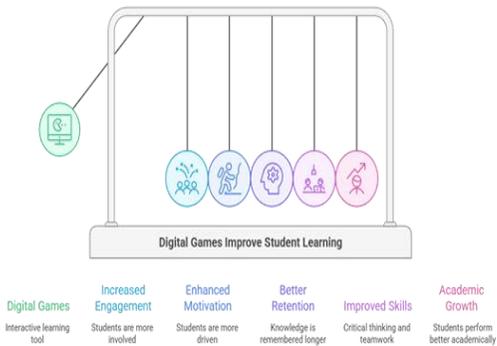
essential to the current generation of students, education is one of the primary application areas where the proper implementation of digital games can yield many creative and beneficial developments. Additionally, teachers can use digital games to engage students in instructional activities and draw their attention to achieve specific learning objectives. Digital games' main characteristics include strong motivation and engagement, immersive, feedback-driven, and contextual learning, as well as interactive learning environments and student-centered teaching methods. Interest, fantasy, role-playing tasks, rules, goals, challenges, competitiveness, control, pleasure, incentives, interaction, adaptability, feedback, and multimodal presentation are among the primary game elements that affect students' involvement and enjoyment (Theofylaktos Anastasiadis et al., 2018). In comparison with textbooks and traditional classroom instruction, which can sometimes be too uninteresting to capture and retain students' attention, students are thus encouraged to participate in their education actively. Unlike traditional techniques for evaluating and validating students' knowledge for teacher assessment, DGBL approaches offer immediate feedback on the decisions students make while playing games. Digital games allow pupils to learn from their mistakes in real time and enhance their problem-solving skills practically immediately (Baltezarević, Radoslav & Baltezarevic, Ivana. 2025).

### **Key Features of Digital Games in Learning Progress**

Debnath (2025) reported that digital games improve student Engagement, motivation, long-term knowledge retention, and speed and accuracy. According to Santos et al. (2024), digital games help foster students' critical thinking, decision-making, and teamwork while also developing their cognitive and socio emotional abilities. Participants generally believed that students' academic performance had improved following the implementation of these classroom resources. The study's findings demonstrate the value of digital games as a teaching tool in the classroom and their capacity to raise instructional standards. To optimize its positive



effects and reduce its negative ones, it is imperative to address the obstacles and constraints to its execution.



**Figure 1 Key Features of Digital Games in Learning Process**

Diagram created by author using AI tools (2026)

### Effectiveness of Digital Games in Mathematics Learning

Math teachers' views influence how they teach, learn, and assess in the classroom. How teachers perceive games greatly impacts what makes up a Digital Game-Based Learning environment in a school. The success or failure of DGBL (Digital Game-Based Learning) programs largely relies on how teachers implement games in their classrooms. A teacher's willingness to include digital games connects to their view of the games' value, especially in helping students improve their math skills (Jukić Matić, Ljerka & Bokun; Mirela, 2024). Vygotsky (1978) suggested that play allows kids to engage in activities beyond their age and abilities. This promotes their zone of proximal development, where they can handle tasks with support from others. This leads to a better understanding of math concepts and problem-solving skills (McLeod, Saul, 2024). Research by Alkan and Korkmaz (2021) shows that many games enhance math abilities. The digital game should raise student motivation and enjoyment. Effective game mechanics are key for boosting student motivation and improving speed and accuracy. Furthermore, Al-Barakat et al. (2025) found that digital game

applications significantly advanced mathematical thinking, interactive problem-solving, repetition, reinforcement, and critical thinking. Including digital games in math education increases student engagement and fosters deeper understanding and critical thinking skills, positively impacting learning outcomes, according to research.

### Opportunities of Digigogy

Digital game-based learning offers valuable opportunities to improve mathematics education in India. National initiatives like Digital India and the National Education Policy (NEP) 2020 encourage schools to use technology in teaching and learning. This creates a solid foundation for incorporating digital games into the classroom. One key advantage is flexible and self-paced learning. Digital games allow students to learn anytime and anywhere, at their own speed. Slow learners can revisit concepts as needed while fast learners can move ahead quickly. This flexibility makes learning easier and less stressful. Digital game-based learning is also affordable for students. Many educational games and apps are free or available at a low cost. This supports learners from economically weaker backgrounds in continuing their studies without heavy financial burdens. Regular practice through games improves students' skills, confidence, and problem-solving abilities. Another major benefit is better job prospects and exposure to global practices. Digital platforms and online games help students become familiar with modern technology and different learning methods, preparing them for future careers. Blended learning, which mixes traditional teaching with digital activities, further improves learning outcomes. Digital game-based learning also supports the development of quality digital programs and boosts teacher skills. Teachers gradually improve their digital abilities and adopt new teaching methods while using educational games. This leads to better engagement in the classroom and more effective



instruction. Digital game-based learning provides flexible, affordable, skill-oriented, and globally connected learning opportunities. With proper guidance and institutional support, it can significantly transform mathematics education in India.

### **Challenges and Limitation of Digigogy**

Although digital game-based learning can improve mathematics education, using it effectively in Indian classrooms faces several challenges. One major issue is the lack of adequate digital infrastructure, especially in rural and government schools. Many institutions still have limited access to computers, smart devices, and stable internet. This restricts the regular use of digital tools (Asad et al., 2021; Ngao et al., 2022). It creates inequality between urban and rural learners. Another significant challenge is the lack of digital training for teachers. Many teachers are not well-prepared to use digital games in their teaching. Without proper training, teachers may struggle to choose suitable learning games and connect them to curriculum goals (Janaki & Devaki, 2024). As a result, digital games may not be used effectively for learning. The pressure to cover the syllabus and focus on exams also limits the adoption of game-based learning. In India, there is a strong emphasis on finishing the syllabus and performing well on exams. Due to time constraints, teachers often prefer traditional methods over innovative ones like digital games (Debnath, 2025). Concerns about students are also important. Without proper supervision, students may focus more on playing than on learning. Excessive screen time can affect their health, concentration, and social behavior (Santos et al., 2024). Parents and teachers frequently worry about these issues. Furthermore, unequal access to digital resources remains a serious problem. Many students from economically disadvantaged backgrounds do not have smartphones, computers, or internet connections at home. This limits their ability to learn outside of school hours (NEP, 2020). In conclusion, while digital games can support effective mathematics learning, their success in India depends

on improving infrastructure, increasing teacher training, reducing curriculum pressure, and ensuring equal access for all learners.

### **Future Scope and Recommendations**

Digital game-based learning has great potential to shape the future of mathematics education in India. With the ongoing growth of digital infrastructure, online platforms, and smart classrooms, the use of educational games is likely to increase in the coming years. Government initiatives like Digital India and the National Education Policy (NEP) 2020 support technology-based education, leading more schools to adopt digital game-based learning as a regular method of teaching. In the future, tools like artificial intelligence, adaptive learning systems, and virtual reality can be added to digital game-based learning to create more personalized and engaging experiences. These technologies can help identify students' learning gaps and provide customized support, making mathematics learning more focused on the student. Research can further explore the long-term effects of game-based learning on academic performance, creativity, and emotional well-being. To ensure successful implementation, several recommendations should be considered. First, schools should invest in improving digital infrastructure by providing enough devices, internet access, and technical support. Second, regular training programs should be organized for teachers to boost their digital skills and confidence in using game-based tools. Well-trained teachers are essential for turning digital games into meaningful learning experiences. Third, curriculum developers should make sure that digital games align with learning objectives and assessment methods. This ensures that game-based activities support academic goals instead of acting as mere extras. Fourth, awareness programs should be held for parents to help them understand the educational benefits of digital games and reduce any negative perceptions. Finally, policymakers should guarantee equal access to digital resources for students from disadvantaged backgrounds. Financial assistance, free educational apps, and community learning centers can help close the digital gap, with careful planning, investment, and teamwork among



teachers, schools, parents, and policymakers, digital game-based learning can be a powerful and lasting approach to improving mathematics education in India.

### Conclusion

Digigogy, which combines digital game-based learning, has become an effective and innovative way to improve maths education in India. By merging technology with good teaching practices, it makes learning more engaging, enjoyable, and meaningful for students. Digital games boost motivation, problem-solving skills, confidence, and academic performance. They also promote self-paced and inclusive learning. However, successfully implementing digigogy depends on having the right infrastructure, well-trained teachers, balanced curriculum planning, and equal access to digital resources. With ongoing support from policymakers, educators, and institutions, digigogy can greatly improve joyful and effective math education that prepares students for the future.

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