# 4 Ways to Spark Math Engagement and Motivate Every Learner

Student motivation and engagement are key to success in math. However, recent NAEP results show eighth-graders continue to struggle, with confidence levels remaining lower than pre-pandemic levels. And while fourth-graders in the same study showed a slight rebound in math confidence and performance, drastic improvements are still required to truly achieve student success.

This white paper will explore four effective strategies to spark math engagement by building a positive math identity, making math more interactive, repurposing traditional gaming experiences for educational use, and integrating digital game-based learning into the classroom.

## 1. Cultivating a Positive Math Identity

Promoting math engagement starts with cultivating a positive math identity among students. Research[1] shows that students who have a positive attitude towards math perform better because their brain's learning networks are more activated. Educators can foster this mindset by encouraging students to view struggle and mistakes as natural parts of the learning process. Normalizing mistakes and celebrating effort helps students develop resilience and a growth mindset, boosting their confidence and helping them see themselves as capable math learners, which is crucial for long-term success. Confidence is another critical factor to consider. Students with stronger math

self-efficacy—the belief in their ability to do math—also perform higher[2].

Amplifying student voice and encouraging peer-to-peer interactions can also help students view math more positively. When students explain their thinking aloud and collaborate with peers, they develop a deeper understanding of math concepts and build confidence in their abilities. Activities like number talks, where students lead discussions and solve problems on the board, create a supportive and interactive learning environment.

Another method to build positivity towards math is personalized learning. By integrating this form of education, students feel empowered and confident to take control of their academic progress. Tools such as trackers and anchor charts, whether physical or digital, provide students with a visual representation of their growth, making the learning process more tangible and motivating. This approach not only enhances student engagement but also helps in building a strong foundation for lifelong learning.

[1]Chen, L., Bae, S. R., Battista, C., Qin, S., Chen, T., Evans, T. M., & Menon, V. (2018). Positive Attitude Toward Math Supports Early Academic Success: Behavioral Evidence and Neurocognitive Mechanisms. Psychological Science, 29(3), 390–402. https://doi.org/10.1177/0956797617735528

[2]Yang, Y., Maeda, Y. & Gentry, M. The relationship between mathematics self-efficacy and mathematics achievement: multilevel analysis with NAEP 2019. Large-scale Assess Educ 12, 16 (2024). https://doi.org/10.1186/s40536-024-00204-z

## 2. Making Math More Interactive

Mathematics is often perceived as a rigid and serious subject, but it doesn't have to be that way. Engaging students in math can be achieved through innovative and interactive methods that make learning enjoyable and meaningful.

Math educators can incorporate interactive cross-curricular activities like building a turkey with felt pieces or creating a weather forecast using statistical data. These activities require students to apply their mathematical knowledge in practical scenarios, making learning more relevant and relatable while helping students see the value and application of their learning beyond the classroom. Interactive Inflatable dice add an element of fun to problem-solving exercises.

Meanwhile, digital interactive tools like Canva and Pear Deck enable students to visualize problems and solutions, translating abstract concepts into more concrete examples. Interactive notebooks, where students can cut, paste, and manipulate elements, reinforce learning through tactile experiences. These methods encourage exploration and explanation, promoting critical thinking and problem-solving skills. Discussing common mistakes, for example, openly helps students understand that errors are part of the learning process, fostering resilience and a growth mindset.

## 3. Repurposing Traditional Gaming Experiences for Mathematical Learning

Traditional activities can be adapted to make math more engaging and reinforce mathematical concepts while catering to different learning styles. Board games and strategic play with rules, guidelines, and problem-solving tasks, such as Trouble and Connect Four, help students develop number sense and learn about turn-taking and strategy. Similarly, simple games like color-by-number or scavenger hunts transform routine practice into fun and competitive experiences.

Competitive students might excel in a capture-the-flag event where they solve math problems to earn points. Such activities keep students moving and interacting, helping them view math less like a chore and more like

and adventure. Incorporating physical movement and hands-on tasks also helps students retain information better and makes the learning process more dynamic.

## 4. Integrating Digital Game-based Learning

Digital game-based learning leverages students' natural interest in gaming to teach mathematical concepts effectively while increasing their engagement. The interactive and adaptive learning environments found in digital games like Prodigy, Minecraft, and 99math increase how much students enjoy math, even for those who are reluctant to learn. Studies indicate that students who initially did not enjoy math experienced a significant increase in math enjoyment after using digital games.
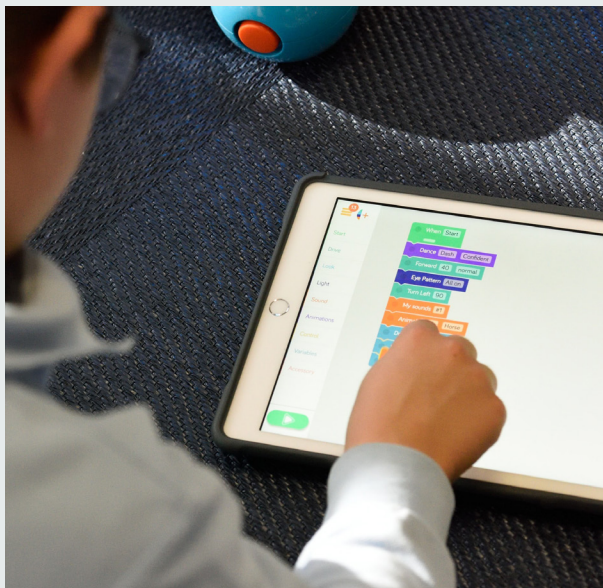


The concept of leveling up in games aligns with students' mindset, where struggling is part of the learning process and growth is anticipated. In this safe environment, educators can foster an atmosphere where students feel secure in taking risks and making choices, thereby boosting their engagement and confidence in their math abilities.

The ability to engage in battles and earn rewards differentiates instruction, catering to both high achievers and struggling learners. These features also naturally motivate learners and fuels competition. The motivation to improve skills to advance in the game fosters a positive attitude towards math, while the need to outperform their peers keeps students

engaged, even encouraging many of them to practice math outside school hours.

Game-based learning naturally spurs curiosity. Curious students are driven by a desire to succeed, rather than external pressures, fostering a lifelong love of learning. Making learning fun and rewarding helps students develop a growth mindset, viewing challenges as opportunities to learn and grow. This mindset is essential for academic success and personal development, empowering students to take ownership of their learning and strive for continuous improvement.

Additionally, game-based learning promotes a sense of community and collaboration among students. Participating in educational games often involves teamwork, fostering cooperation and mutual support. This collaborative environment encourages knowledge sharing, problem-solving, and celebrating each other's successes. By creating a sense of belonging and teamwork, game-based learning helps students develop essential social skills vital for overall development.

Another significant advantage of game-based learning is the ability to provide immediate feedback and track student progress. Unlike traditional assessments, which can be time-consuming and stressful, educational games offer real-time feedback that helps students understand their mistakes and learn from them. This instant feedback loop reinforces learning and keeps students motivated. The data generated by these games allows educators to monitor student performance closely and tailor their teaching strategies accordingly. This data-driven approach ensures each student receives the support they need to succeed.

# Final Thoughts

To spark math engagement effectively, educators must adopt a multifaceted approach that incorporates building a positive math identity, making math more interactive, repurposing traditional gaming experience for math and integrating digital game-based learning. Creating an environment where students feel confident and motivated is crucial for developing a lifelong love for math.

These strategies not only enhance academic performance but also contribute to a more equitable and inclusive education system. As modern education evolves, prioritizing student engagement and fostering a positive attitude towards learning is essential for success.

To learn more, **watch our webinar.**

*The webinar "Motivating Every Learner: Strategies to Spark Math Engagement" and this white paper were produced by District Administration and sponsored by Prodigy Education.*

**Watch On-Demand**

## About Prodigy Education

Prodigy is the leading math platform for teachers in the United States, used by more than 800,000 educators and 20 million students a year. Prodigy delivers unrivaled free access to a game-based learning platform with standards-aligned Math (for 1st to 8th grades) and English (for 1st to 6th grades) content which adapts to individual student needs. It also provides a zero cost teacher dashboard, which includes tools for 30-second assignment creation and reports for progress tracking, student insights, and intervention.

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