BrainSpark Games: *Math Quest 2*

BrainSpark aims to revolutionize EdTech games by making them more fun and engaging for students. Previous successes, such as Math Quest 1, have proven the demand and importance of such games. However, we are working to make Math Quest 2 an even better experience for both college students and educators.

Problem Statement

1. **I am**: a college student. **I am trying to**: receive help in my math classes from engaging supplementary tools that work alongside the curriculum. **But**: most supplementary tools are not engaging to me. **Because**: they're not fun. **Which makes me feel**: bored and unmotivated to use these tools regularly.
2. **I am**: an educator (TA or professor). **I am trying to**: offer extra educational resources for my students. **But**: many available resources fail to keep students interested or don't align with my curriculum. **Because**: they lack the creativity or interactivity that captures attention or are rigid and cannot be adjusted. **Which makes me feel**: frustrated with the limited options for engaging learning.

Goals

- Create a game that successfully combines education with high engagement to improve learning metrics (i.e., retention and completion rates).
- An increase in daily active users, completion rates of educational modules with an increase in GPA at the end, and positive student and educator feedback
- Avoid creating a cost-focused game that limits the quality of user experience or restricts access to only basic content.

Target Audience

We target two main audiences: students and US university STEM department heads.

1) Undergraduate students enrolled in advanced math courses at US universities.

Profile: Students aged 18-25, enrolled in rigorous math courses, often balancing multiple responsibilities.
Their needs and challenges are limited time for self study; need for flexible, engaging, and self paced study tools to help them tackle complex math concepts beyond lectures and textbooks.

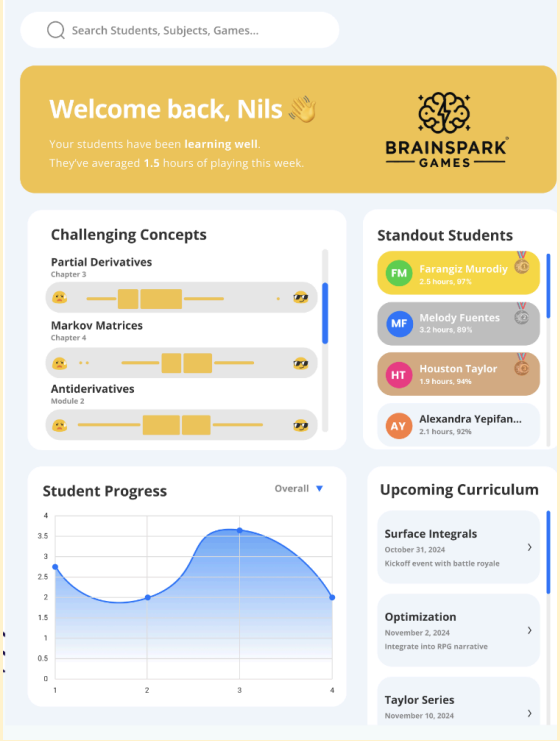
They desire to have interactive problem solving, real time feedback, and visualization aids to reinforce understanding.
Their expected outcomes are increased comprehension, reduced time on difficult concepts, and improved confidence in problem solving.

2) US University STEM Department Administrators and Educators

Profile: Academic leaders including department heads, administrators, professors, curriculum developers, advisors seeking innovative educational solutions.
Their needs and challenges are high standards for curriculum alignment, budget constraints, and a desire for measurable improvements in student engagement and learning outcomes.
They desire to have cost effective tools that align with the curriculum, analytics on student performance, and integration capabilities for easy implementation.
Their expected outcomes are improved student performance metrics, increased engagement, and more efficient resource management.

Unique Value Proposition

BrainSpark Games' Math Quest 2 offers an interactive math solution that enhances learning outcomes with course-aligned, adaptive gameplay. Professors benefit from real-time tracking and aligning modules to fit their class needs, while students engage with a fun, RPG-style experience that makes complex math more approachable. With **unique course integration**, **a fun approach to study**, and **institutional licensing**, Math Quest 2 stands apart from generic study apps, directly supporting university-level math education.



Core Features

- **Teacher Dashboard**: A simple portal where teachers can align in-game content with courses and understand where their students are struggling, directly addressing the teacher's problem that fun educational resources don't align with their curriculum.
- **Battle Royale**: A new game mode which allows students to team up against other schools and fight to be the best, creating a more engaging experience adding replayability and educational value, directly addressing the student's concern that supplementary tools aren't fun or engaging

Validation

Testing was conducted to explore Math Quest 2's core assumptions in universities:

1. **Effectiveness of Narrative-Based Learning**
   Math19 students compared narrative-based explanations of the product rule to standard expository explanations. The narrative group averaged a score of 4.125/5 and completed tasks 0.5 minutes faster, showing an advantage in comprehension and retention. These findings align with existing research from Urmia University, finding that RPG elements in learning can enhance speed, attention, and consistency in math scores by 10%.
2. **Engagement for Storylined Studying**
   Student engagement was examined by immersing participants in RPG trigonometry problems. Students responded enthusiastically, adopting character roles and expressing enjoyment of storyline elements, with all students exhibiting increased engagement. This is further supported by Chiayi University, which found as far as a 20% engagement increase of tasks when gamified.
3. **Course Adoption Potential**
   Feedback from TAs in Math Quest as a supplementary teaching tool was generally positive, with TAs appreciating the platform's ability to personalize and gamify learning. One TA suggested that the tool could foster more active student feedback and reduce "social loafing" in group activities. An average interest rating of 6/10 indicates moderate interest, which can be improved if Math Quest were marketed as an optional tool that engages students at their own pace outside of class.

Sources

Mahmoudi, H., Koushafar, M., Saribagloo, J. A., & Pashavi, G. (2015). The effect of computer games on speed, attention and consistency of learning mathematics among students. *Procedia - Social and Behavioral Sciences*, *176*, 419–424. https://doi.org/10.1016/j.sbspro.2015.01.491

Zi-Xuan Ding, T.-S. W. (2023). Using a level-based RPG educational game to enhance students' knowledge of mathematics. *Tuijin Jishu/Journal of Propulsion Technology*, *44*(4), 6998–7007. https://doi.org/10.52783/tjjpt.v44.i4.2503