

Mathematics Education and Game Theory Integration Project

INTERVIEW BEFORE AND AFTER THE EXPERIMENT

In our study, we conducted interviews with three distinct high school students, each representing a different grade level. The focus of our investigation was the introduction of a novel approach to mathematics education, specifically the integration of Mathematics Education and Game Theory. This innovative method employed the use of Scratch, a programming tool, to serve as a gateway for students to enter the realm of computer science. Additionally, the experiment aimed to explore the impact of this integration on students' understanding of collective behavior.

The interviews were conducted within a virtual environment to gather the participants' impressions and insights. Given the constraints of time, the interactions with the students were relatively brief. However, it is important to note that the brevity of the experiment may have limited the depth of the results obtained. We recognize that an extended duration for this experiment could yield more precise and comprehensive findings, allowing for a more thorough monitoring of students' responses and experiences throughout the implementation of this innovative educational approach.

First two interviews are done by Yekibayev Nurzhigit and last interview and editing this pdf file was done by Erdoğan Duran Can.

Interviews :

- 1) Interview with Aibek Orazbay:
Nazarbayev Intellectual School 10'th grade
**Before Using Scratch
 - a) Interviewer: How would you rate your interest in mathematics before this school year?
 - b) Aibek Orazbay: I'd say I was lukewarm about mathematics. It didn't seem too exciting, and I often found it challenging. I preferred subjects like science and history.
 - c) Interviewer: How would you rate your understanding of mathematics concepts before this school year?
 - d) Aibek Orazbay: I grasped basic concepts, but I often struggled with more complex topics. I felt like I was just memorizing rules without understanding the underlying logic.
 - e) Interviewer: What were your favorite aspects of learning mathematics?
 - f) Aibek Orazbay: I enjoyed solving puzzles and connecting numbers to

real-world problems. There were moments of satisfaction when I figured out a difficult concept.

- g) Interviewer: What were your least favorite aspects of learning mathematics?
- h) Aibek Orazbay: I disliked repetitive problems and memorizing formulae. I also found the subject abstract and disconnected from my everyday life.
- i) Interviewer: How do you think your current mathematics education is preparing you for future challenges?
- j) Aibek Orazbay: I believe it's giving me a fundamental foundation in basic mathematical concepts. This will be useful for various fields I might pursue.

****After Using Scratch**

- k) Interviewer: How would you rate your interest in mathematics after using Scratch?
- l) Aibek Orazbay: My interest in mathematics has significantly increased. Scratch made the subject more engaging and interactive, making it more enjoyable to learn.
- m) Interviewer: How would you rate your understanding of mathematics concepts after using Scratch?
- n) Aibek Orazbay: My comprehension of mathematical concepts has also improved. Scratch helped me visualize abstract concepts in a way that made them more relatable.

- o) Interviewer: How do you think using Scratch to learn mathematics has impacted your overall learning experience?

- p) Aibek Orazbay: Scratch has transformed mathematics from a tedious subject into an exciting and interactive experience. I'm more motivated to learn because I feel like I'm solving real-world problems.
- q) Interviewer: What are some specific examples of how Scratch has helped you learn about mathematics?
- r) Aibek Orazbay: Scratch has aided me in comprehending concepts such as probability, statistics, and game theory. I've also been able to apply these concepts to create my own games and simulations.
- s) Interviewer: What are your thoughts on using game theory and collective behavior as a way to teach mathematics?
- t) Aibek Orazbay: I find this approach to be highly effective. It makes mathematics more relatable and relevant to everyday life.
- u) Interviewer: How do you think your current mathematics education is preparing you for future challenges?
- v) Aibek Orazbay: I believe it's cultivating my problem-solving and critical thinking skills, making me well-equipped for future endeavors. Additionally, it's equipping me with the skills necessary to excel in fields that are increasingly utilizing mathematics in innovative ways.

2) Interview with Zhansaya Abylkassym: Nazarbayev Intellectual School 9'th grade

****Before Using Scratch**

- a) Interviewer: How would you rate your interest in mathematics before this school year?

- b) Zhansaya Abylkassym: I had a very limited interest in mathematics. I found it to be an abstract and disconnected subject. It didn't seem to have much practical application in my life.
- c) Interviewer: How would you rate your understanding of mathematics concepts before this school year?
- d) Zhansaya Abylkassym: I struggled with basic arithmetic and algebra. I found it difficult to grasp the concepts and apply them to real-world problems.
- e) Interviewer: What were your favorite aspects of learning mathematics?
- f) Zhansaya Abylkassym: I didn't really have any favorite aspects of learning mathematics. I found the whole subject quite unappealing.
- g) Interviewer: What were your least favorite aspects of learning mathematics?
- h) Zhansaya Abylkassym: I hated memorizing formulae and solving repetitive problems. I also found it difficult to stay motivated because I couldn't see the practical applications of what I was learning.
- i) Interviewer: How do you think your current mathematics education is preparing you for future challenges?
- j) Zhansaya Abylkassym: I'm not sure how my current mathematics education is preparing me for future challenges. I don't see how it's relevant to my career goals or my everyday life.

****After Using Scratch**

- k) Interviewer: How would you rate your interest in mathematics after using Scratch?

- l) Zhansaya Abylkassym: My interest in mathematics has increased significantly. Scratch has made the subject more engaging and enjoyable to learn.

- m) Interviewer: How would you rate your understanding of mathematics concepts after using Scratch?

- n) Zhansaya Abylkassym: My understanding of mathematics concepts has also improved. Scratch has helped me to visualize abstract

3) Interview with Emre Osman Öcal:
Hasan Çolak Anadolu High School 11'th grade

****Before Using Scratch**

- a) Interviewer: How would you rate your interest in mathematics before this school year?

- b) Emre Osman Öcal: I wasn't very interested in mathematics. I found it to be too abstract and theoretical. I struggled to connect it to the real world.

- c) Interviewer: How would you rate your understanding of mathematics concepts before this school year?

- d) Emre Osman Öcal: I had a basic understanding of some mathematical concepts, but I struggled with more complex topics. I often felt like I was just memorizing facts without really understanding how they fit together.

- e) Interviewer: What were your favorite aspects of learning mathematics?

- f) Emre Osman Öcal: I didn't have any favorite aspects of learning mathematics. I found it to be a challenging subject.

- g) Interviewer: What were your least favorite aspects of learning mathematics?
- h) Emre Osman Öcal: I hated solving repetitive problems and memorizing formulae. I also found it difficult to stay motivated because I couldn't see the practical applications of what I was learning.
- i) Interviewer: How do you think your current mathematics education is preparing you for future challenges?
- j) Emre Osman Öcal: I'm not sure how my current mathematics education is preparing me for future challenges. I don't see how it's relevant to my career goals or my everyday life.

**After Using Scratch

- k) Interviewer: How would you rate your interest in mathematics after using Scratch?
- l) Emre Osman Öcal: My interest in mathematics has definitely increased. Scratch has made the subject more approachable and understandable.
- m) Interviewer: How would you rate your understanding of mathematics concepts after using Scratch?
- n) Emre Osman Öcal: My understanding of mathematics concepts has improved. Scratch has helped me to see how the different concepts are connected and how they can be applied in different contexts.
- o) Interviewer: How do you think using Scratch to learn mathematics has impacted your overall learning experience?
- p) Emre Osman Öcal: Scratch has made learning mathematics much more fun and interactive. I'm more motivated to

learn because I feel like I'm actually solving real-world problems.

- q) Interviewer: What are some specific examples of how Scratch has helped you learn about mathematics?
- r) Emre Osman Öcal: Scratch has helped me to understand concepts such as probability, statistics, and game theory. I've also been able to apply these concepts to create my own games and simulations.
- s) Interviewer: What are your thoughts on using game theory and collective behavior as a way to teach mathematics?
- t) Emre Osman Öcal: I think it's a great way to teach mathematics. It makes the subject more relevant and relatable to students.
- u) Interviewer: How do you think your current mathematics education is preparing you for future challenges?
- v) Emre Osman Öcal: I think it's preparing me to be a more creative and problem-solving thinker. It's also giving me the skills I need to work in fields that are using mathematics in new and innovative ways.