

Math Runner

THE DEVELOPMENT OF SERIOUS GAMES IN EDUCATION IN SARAWAK, MALAYSIA

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The problem

- ▶ Digital divide
- ▶ Internet connectivity
- ▶ Books as the only available resource
- ▶ Face difficulties with Mathematics.

Our solution

- ▶ Offer a digital app where they can practice in Mathematics
- ▶ Through a fun way (serious game)
- ▶ Offline solution
- ▶ Available for smartphones

Serious Games in education

Serious games are games that have another purpose besides entertainment. They are used to promote learning and behavioural change.



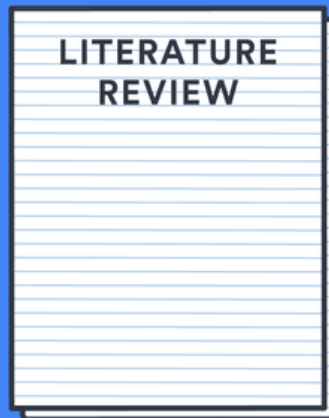
- develop an enthusiastic learner
- reduce monotonous learning methods

- motivate and engage students
- help students with focus, self-esteem, and memory

Research Questions

- ▶ Which are the basic principles, that someone should follow when creating a serious game in developing countries?
- ▶ What are the needs and preferences of Malaysian students and teachers when it comes to educational games?

Basic principles- Creating an educational game



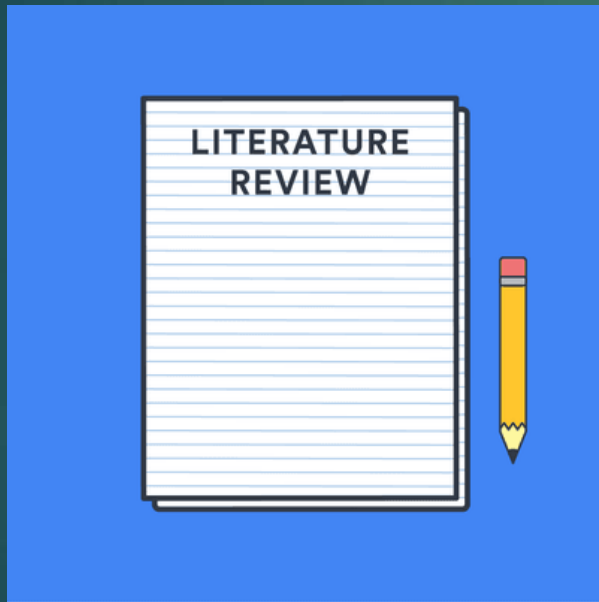
Successful learner

Users as part of the designing process

Understand your audience

Motivation and Engagement

Basic principles- Creating an educational game



Classroom vs Home

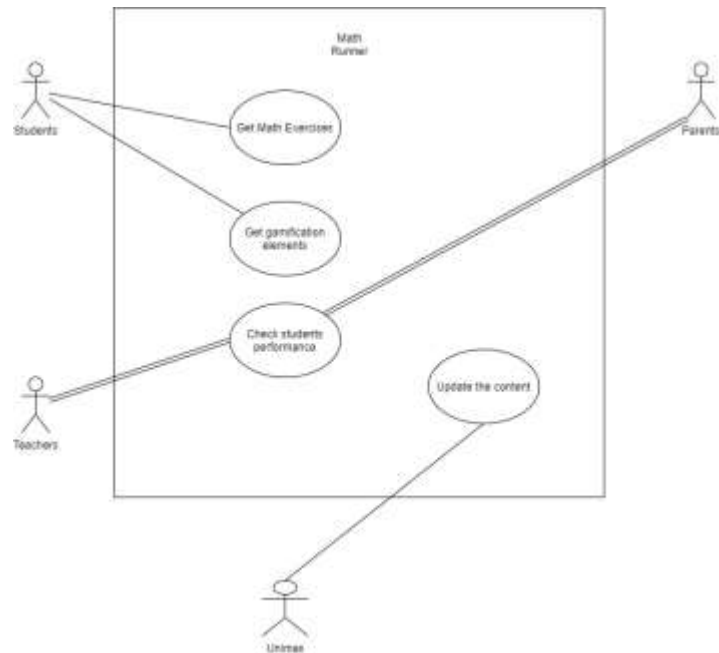
Gender differences

Cultural differences

Actors and goals

Stakeholder	Operational goal	Responsibility in the system
Students	Improve their skills in mathematics	Play the game. Inform teachers when they feel the content is irrelevant.
Teachers	Provide an extra studying resource for students. Be informed of whether the content of the game is suitable for kids based on the current curriculum.	Prepare content based on the curriculum or the students' needs. Ask Unimas for improvements.
Parents	Improve the educational level of their children.	Provide their smartphones to the kids in order to play the game.
Unimas	Improve education level in Sarawak	Provide STEM in the box and technical support of the game

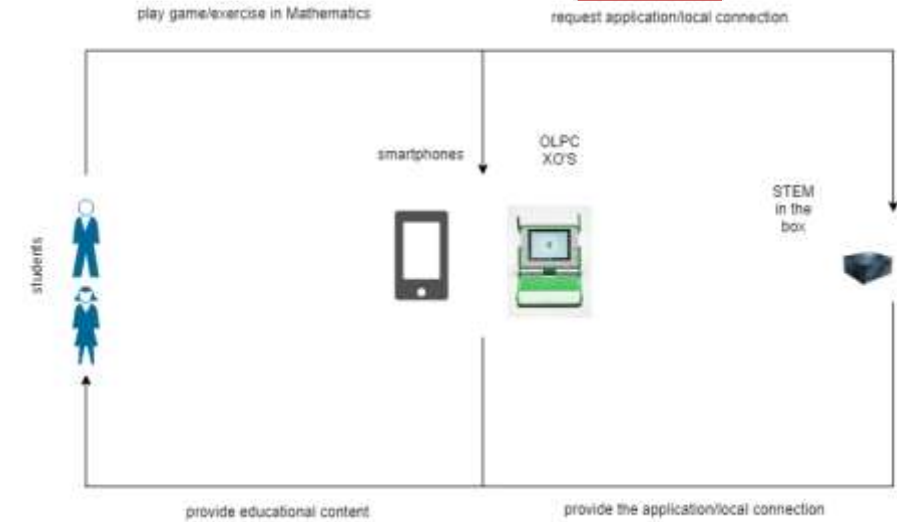
Use case diagram



ICT4D



Technology Infrastructure



Key Requirements

Must have	Should have	Could have	Won't have
Educational Math content	Math content should be based on the Malaysian curriculum	Check performance section Easy methods to add/change content	Advertisements.
Offline availability	Gamification aspects like sounds and visuals	Rewards	In-game purchases
Math content must be based on students' needs	Multiple choice questions	Ability to create a personal profile	Material different than mathematics
Math content must be divided into levels based on difficulty	Check performance section	Time spent on the app	

Commercial video games VS Serious games

Success

- ▶ Designed by professionals
- ▶ Education is not the primary goal

Failure

- ▶ Poorly designed game play
(Educators trying to develop a game)
- ▶ Poorly designed educational experience. (Gamers trying to create educational content)
- ▶ Entertainment comes in the second place after learning

MINECRAFT

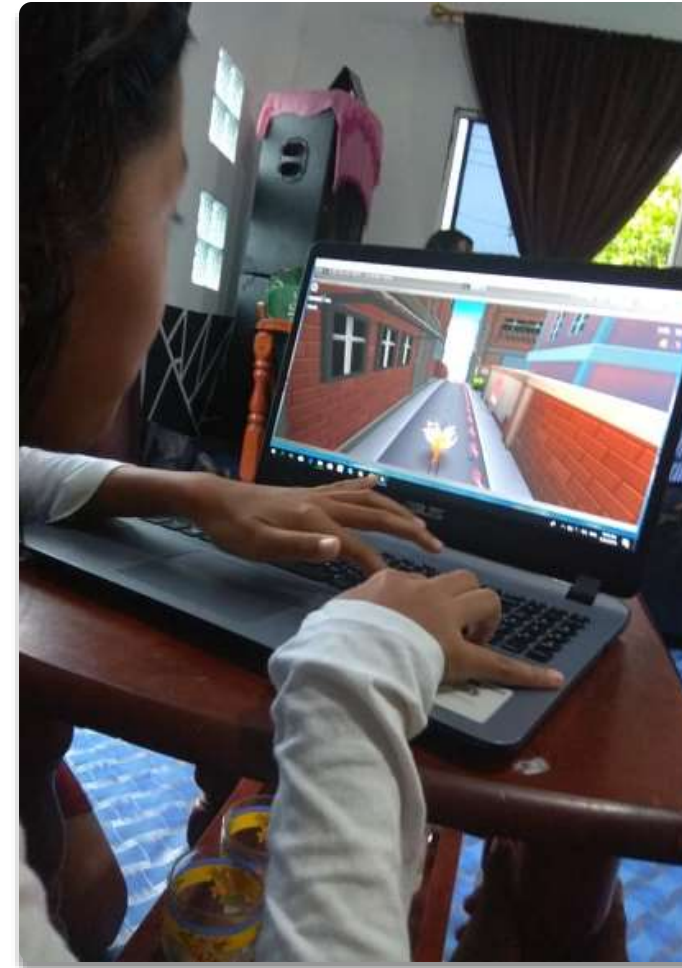
- More than 100 million active users
- Over 200 million copies sold by May 2020
- In 2016 MINECRAFT EDUCATION EDITION was launched





Unity Platform

- The game engine can support more than 25 platforms.
- Offers both free and paid services.
- One of most famous game engine for game development worldwide.
- Possible to create three-dimensional, two-dimensional, virtual reality, and augmented reality games.
- Hundreds of predeveloped environments to use.



Content

- Mathematical operations
- Repeated questions
- Endless Game
- High score
- Easy to adjust/change content

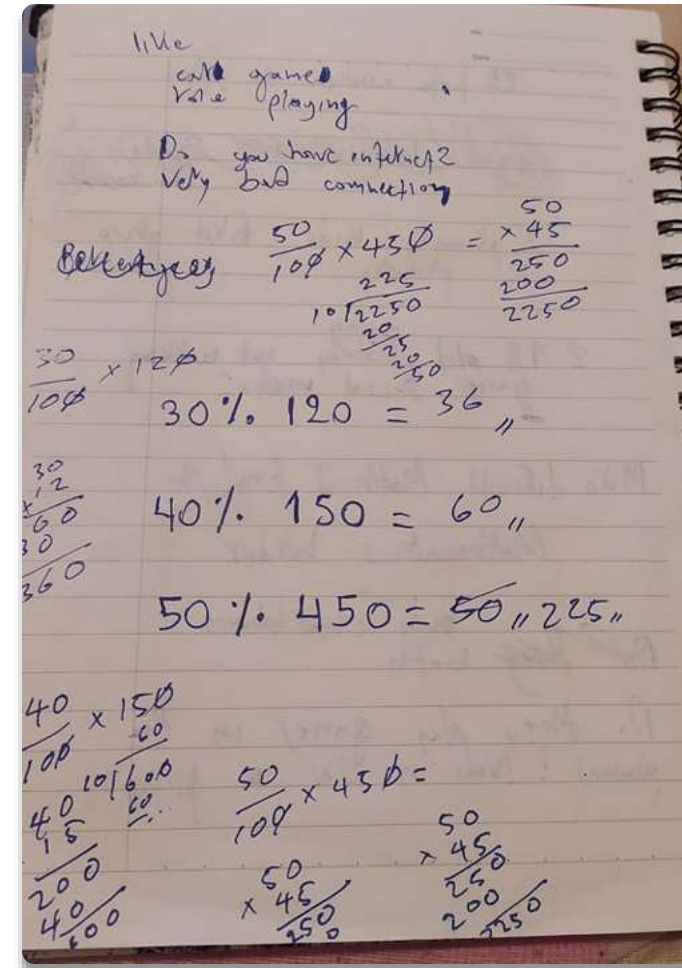
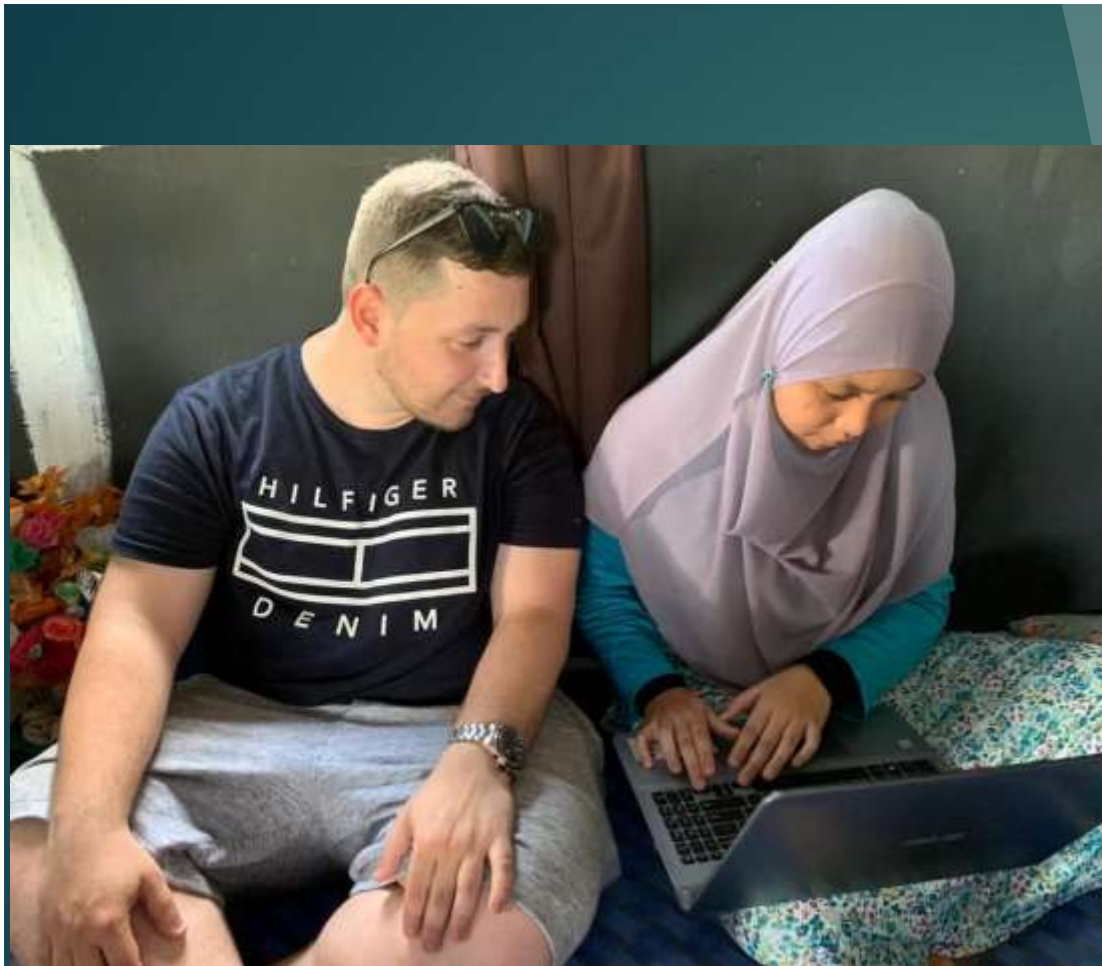


Characters and Animation

- Main character
- Sound effects
- Background
- Game elements
- Game speed
- Difficulty level



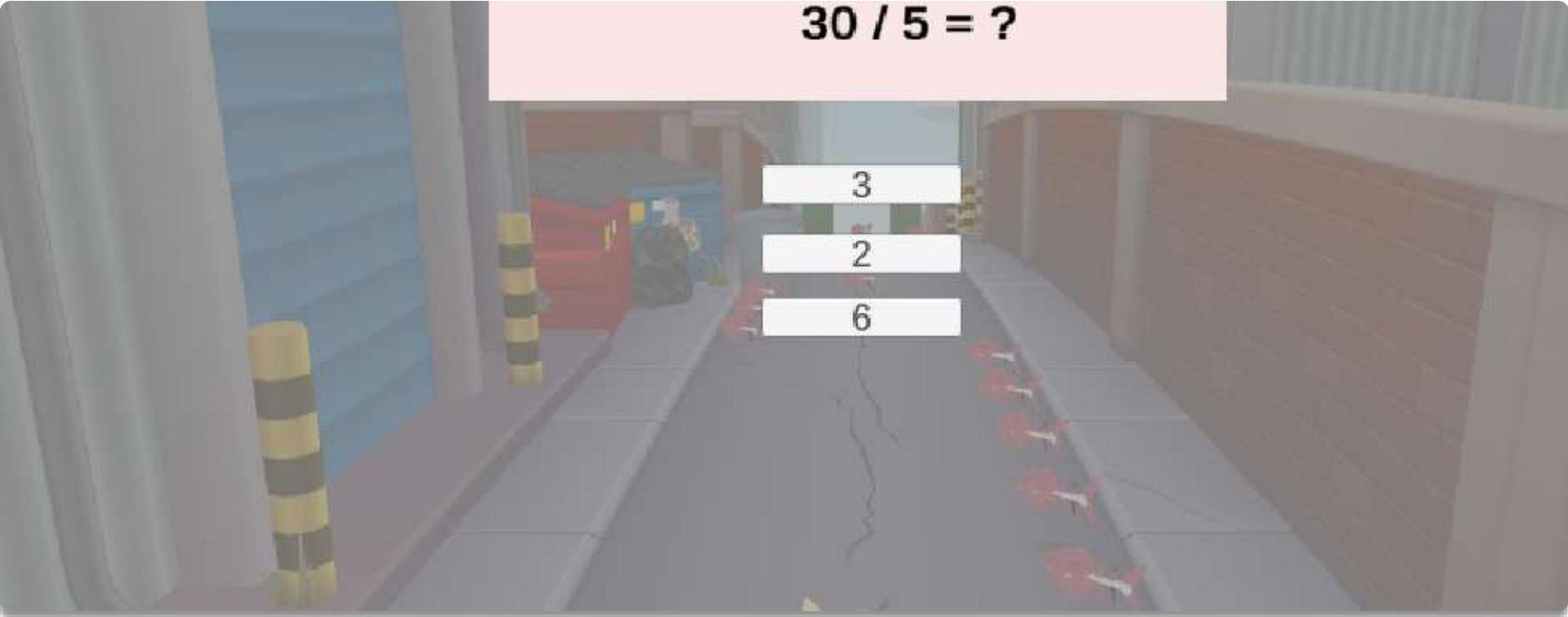
Interviews, Testing and Improvements



Interview with 17y.o student in Kuching, Malaysia



Math Runner

A 3D-rendered hallway with a math problem overlay. The hallway has a grey floor with a crack, blue walls on the left, and a brick wall on the right. There are yellow and black striped bollards on the left and red fire extinguishers on the right. A pink rectangular box at the top center contains the equation $30 / 5 = ?$. Below it, three white rectangular boxes contain the numbers 3, 2, and 6 respectively.

$30 / 5 = ?$

3

2

6

Math Runner



5

CONCLUSION AND FUTUREWORK

- A guide for people that want to introduce gaming in schools.
- Real example of Malaysian education- local limitations and needs.
- Try to fit education in already successful games instead of creating educational games
- Even in rural areas smartphones are widely available.
- Important to measure the impact of games in a specific amount of time.



Thank you

Questions?

