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
- motivate and engage students
- reduce monotonous learning methods
- 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

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Operational goal</th>
<th>Responsibility in the system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>Improve their skills in mathematics.</td>
<td>Play the game, inform teachers when they feel the content is irrelevant.</td>
</tr>
<tr>
<td>Teachers</td>
<td>Provide an extra studying resource for students. Be informed of whether the content of the game is suitable for kids based on the curriculum or the students’ needs, ask Unimas for improvements.</td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>Improve the educational level of their children.</td>
<td>Provide their smartphones to the kids in order to play the game.</td>
</tr>
<tr>
<td>Unimas</td>
<td>Improve education level in Sarawak.</td>
<td>Provide STEM in the box and technical support of the game.</td>
</tr>
</tbody>
</table>

### Use case diagram

![Use case diagram](image)

### Key Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Must have</th>
<th>Should have</th>
<th>Could have</th>
<th>Won’t have</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Math content</td>
<td>Math content should be based on the Malaysian Curriculum</td>
<td>Check performance section</td>
<td></td>
<td>Advertisements.</td>
</tr>
<tr>
<td>Offline availability</td>
<td>Gamification aspects like sounds and visuals</td>
<td>Rewards</td>
<td>In-game purchases</td>
<td></td>
</tr>
<tr>
<td>Math content must be based on students’ needs</td>
<td>Multiple choice questions</td>
<td>Ability to create a personal profile</td>
<td>Material different than mathematics</td>
<td></td>
</tr>
<tr>
<td>Math content must be divided into levels based on difficulty</td>
<td>Check performance section</td>
<td>Time spent on the app</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Technology Infrastructure

![Technology Infrastructure diagram](image)
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
The game engine can support more than 25 platforms.

Offers both free and paid services.

One of the 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.
Interviews, Testing and Improvements

Content

- Mathematical operations
- Repeated questions
- Endless Game
- High score
- Easy to adjust/change content
Interviews, Testing and Improvements

Characters and Animation

- Main character
- Sound effects
- Background
- Game elements
- Game speed
- Difficulty level
Interview with 17y.o student in Kuching, Malaysia
Math Runner
30 ÷ 5 = ?

Options:
3
2
6

Math Runner
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?