An Award System for Gamification in Higher Education

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Introduction
Introduction

Structure

Introduction

Gamification in Higher Education

Award System

Evaluation

Conclusions
Introduction

Objective

Adopt gaming concepts and elements to improve students’ motivation and provide a full set of gameful learning experiences.
Bologna
Characterized by giving to the student a central role in the learning process.
Introduction
Concepts

Bologna
Characterized by giving to the student a central role in the learning process.

Games…
- Are absolutely player centric, and
- The player is responsible for his own options and actions
Introduction

Concepts

Gamification
Using game-thinking and game mechanics to solve problems and to engage audiences.
Gamification in Higher Education
Gamification in Higher Education

Game mechanics

Tools and other functional components, with the ability to guide the player actions.

- Points
- Levels
- Leaderboards
- Badges
- Challenges
- Onboarding
Gamification in Higher Education

Adaptation of a higher education subject to gamification

- The selected subject’s syllabus is structured in four chapters
- Each chapter has several themes that should be mastered before advancing
- The final assessment and classification depends on
  - the success on each section
  - the student creativity
  - the level of knowledge demonstrated on every subject
- Students are graded from 0 to 20
Gamification in Higher Education

Adaptation of a higher education subject to gamification

- Five chapter or levels
- Each level has three degrees of difficulty
- Soft currency to foster autonomy and motivation
- Learning experiences
  - Practical assignments and group work
  - Design and implementation of education games
  - Card game
  - Board game
  - Tabletop Role-Playing Game
Gamification in Higher Education

Adaptation of a higher education subject to gamification

- The central component has to foster motivation
- Rise some curiosity
- Provide constant and up-to-date feedback of student progress
- Such game mechanic is instantiated in an Award System
  - For progress measurement
  - Classification
  - And feedback
Award System
Assessment and grading follows a reward structure design pattern

- Minimum requirements to succeed
  - Overcome all the sections, or “levels”
  - This will grant the 10th grade
- Within each level, the increasing number of overcame obstacles will grant the student with a higher grade
- Soft-currency to stimulate autonomy
Award System
Progress and Classification

10
## Award System

### Grading

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castle</td>
<td>Awarded for each completed level. Student will need five castles to succeed in the course.</td>
<td>Up to 10</td>
</tr>
<tr>
<td>Star</td>
<td>Each level will award up to 2 stars.</td>
<td>Up to 10</td>
</tr>
<tr>
<td>BitPoint</td>
<td>Awarded when completing a level. Can be used to buy tools or information.</td>
<td></td>
</tr>
</tbody>
</table>
Award System

Level map
Award System

Stars

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Description</th>
<th>Stars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>The most simple exercises and games</td>
<td>0</td>
</tr>
<tr>
<td>Normal</td>
<td>More complex exercises and games</td>
<td>1</td>
</tr>
<tr>
<td>Hard</td>
<td>The most difficult exercises and games</td>
<td>2</td>
</tr>
</tbody>
</table>
Award System

Shop

Command Line String

With this item you can execute a command in the Linux terminal, to start, stop, edit or configure a service.

Buy
# Award System

Shop items

<table>
<thead>
<tr>
<th>Price</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Command line string</td>
</tr>
<tr>
<td>250</td>
<td>Virtual machine file</td>
</tr>
<tr>
<td>350</td>
<td>Step-by-step configuration recipe</td>
</tr>
<tr>
<td>500</td>
<td>Configuration file</td>
</tr>
<tr>
<td>999</td>
<td>Service configured</td>
</tr>
</tbody>
</table>
Award System

BitPoints

\[ \text{BitPoints} = \text{Difficulty} \cdot \left( \frac{3}{2} - \frac{e^{\frac{x}{2}}}{1+e^{\frac{x}{2}}} \right) + \text{Participation} \]
Award System
BitPoints

\[ BitPoints = Difficulty \cdot \left(\frac{3}{2} - \frac{e^{\frac{x}{2}}}{1+e^{\frac{x}{2}}} \right) + Participation \]

\[ Difficulty = \begin{cases} 
30 & \text{if Easy} \\
45 & \text{if Normal} \\
75 & \text{if Hard} 
\end{cases} \]
Award System

BitPoints

\[ BitPoints = Difficulty \cdot \left( \frac{3}{2} - \frac{e^{x/2}}{1+e^{x/2}} \right) + Participation \]

Difficulty = \begin{cases} 
30 & \text{if Easy} \\
45 & \text{if Normal} \\
75 & \text{if Hard} 
\end{cases}

Time = Difficulty \cdot \left( \frac{1}{2} - \frac{e^{x/2}}{1+e^{x/2}} \right)
Evaluation
Evaluation
Methodology

• The class had 24 enrolled students
  • 1 dropped out after 1 week
  • In total, 21 students finished successfully the subject
• Each learning experience was characterized by:
  • A due date, associated to the BitPoints to earn
  • A difficulty level, to provide different challenge degrees to students
• A total of 21 learning experiences were presented to students
• Each student had to complete at least 7 to succeed
Evaluation

Results

• In average, the students completed 8.1 learning experiences
• One student completed 10 and six completed 7
• Initially, they chose several learning experiences in each level, opting for the highest difficulty level
• As the semester progressed, they started to opt for lower difficulty and less learning experiences in each level
Evaluation

Results

![Graph showing evaluation results with difficulty levels and level scores](image-url)
Evaluation

Results

Days after deadline in each level
Conclusions
Conclusions

• A Gamification approach was applied to a HE subject
• The award mechanism provides a mean for the students:
  • to be constantly aware of the progress within the subject
  • a classification methodology
• Contributes to distribute the student’s work through the semester
• Motivating them to spend more time and energy learning and organizing the skills they are acquiring
• Different difficulty learning experiences contributes to some restlessness
• Fostering curiosity and motivation