OpenGames: A Framework for implementing 3D Collaborative Educational Games in OpenSim

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Educational Games

We want to develop an easy to use and configure ***game framework*** that can be used to create ***3D collaborative educational games*** with ***hidden questions***.

Addresses the following research questions:

- What ***feelings*** created the experience of 3D virtual environments to the students during their participation in a game learning activity based on OpenGames framework?
- Can OpenGames be utilized to create serious games that motivate the participated students to ***study better*** the course material?

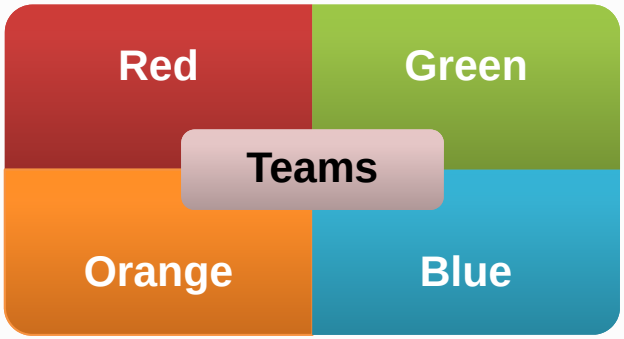
Functional Requirements

- The final framework should provide ***flexibility***.
- The structure of the code should be ***simple*** and open to changes without great ***cost***.
- The game should be ***transferable*** in virtual worlds and the framework should operate independently of the objects that exist in each one.
- The educator should be able to easily change the questions and the number of these should be variable.
- Key elements of the game should be ***customizable***.
- There should be detailed ***statistics*** after each game, available to all players
- It should support ***multiple players*** per team and their number should be variable.

Educational Games

1. Goal

- 4 teams participate:

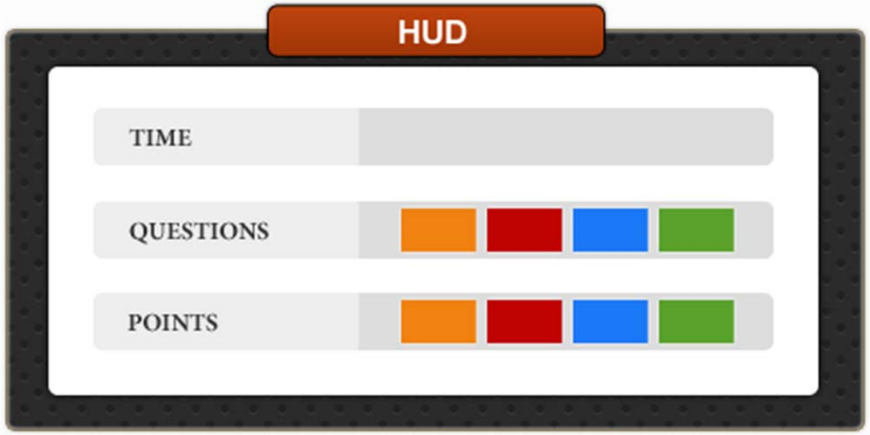


- Players should discover hidden objects
- Objects contains multiple choice questions
- Players should answer them correctly
- For each correct answer they gain points
- The team with the most points wins!

HUD (Head Up Display)

2. Preperation

- **TIME:** It displays the appropriate messages for team registration and ending of the game.
- **QUESTIONS:** It shows the number of all unanswered questions for each team.
- **POINTS:** Here the player can see the points of each team in real-time.



Educational Games

3. The Game

- Left-click on an object that contains an object
- A pop-up window with a question appears
- The player should choose between three answers or ‘HELP’ option
- Each time a player opens a question, his team is charged some points
- If two or more players from the same team answer the same question simultaneously the on from the fastest player is submitted
- Each time a player chooses ‘HELP’ option, his team is charged extra points
- The ‘HELP’ option remains for the rest of the members of the team

Educational Games

4. Game Finale

- When one team answers all the questions, the game time remaining decreases
- If all teams answer all the questions or the timer expires, then the game ends automatically
- The team with most points wins the game

Awards

Reward of the Wise: answered the most questions

Reward of Speed: found all the questions first

Platforms

1. Unity

2. Second Life

3. OpenSim

Framework Components

1. **LSL Code**
    1. Base script
    2. Team registration scripts
    3. Questions scripts
    4. Results script
    5. HUD scripts
2. **HUD**
3. **Statistics Website**

Configuration and Management of the Game - Customization

- The ***name*** of the game
- The ***statistics website*** URL address
- The ***duration*** of the game in seconds
- The game ***time left*** after one of the teams answers all the available questions
- The ***maximum*** number of players per team
- The ***bonus points*** given to each team when the game starts
- The ***points*** a team will be charged when a player opens a question
- The ***points*** a team will be charged when a player asks for help in a question
- The ***points*** a team will get when a player answers correctly a question
- The ***list of names*** of authorized users
- The ***list of questions***
- The ***list of help text*** in each question
- The ***list of correct answers*** for each question

Configuration and Management of the Game – Game States

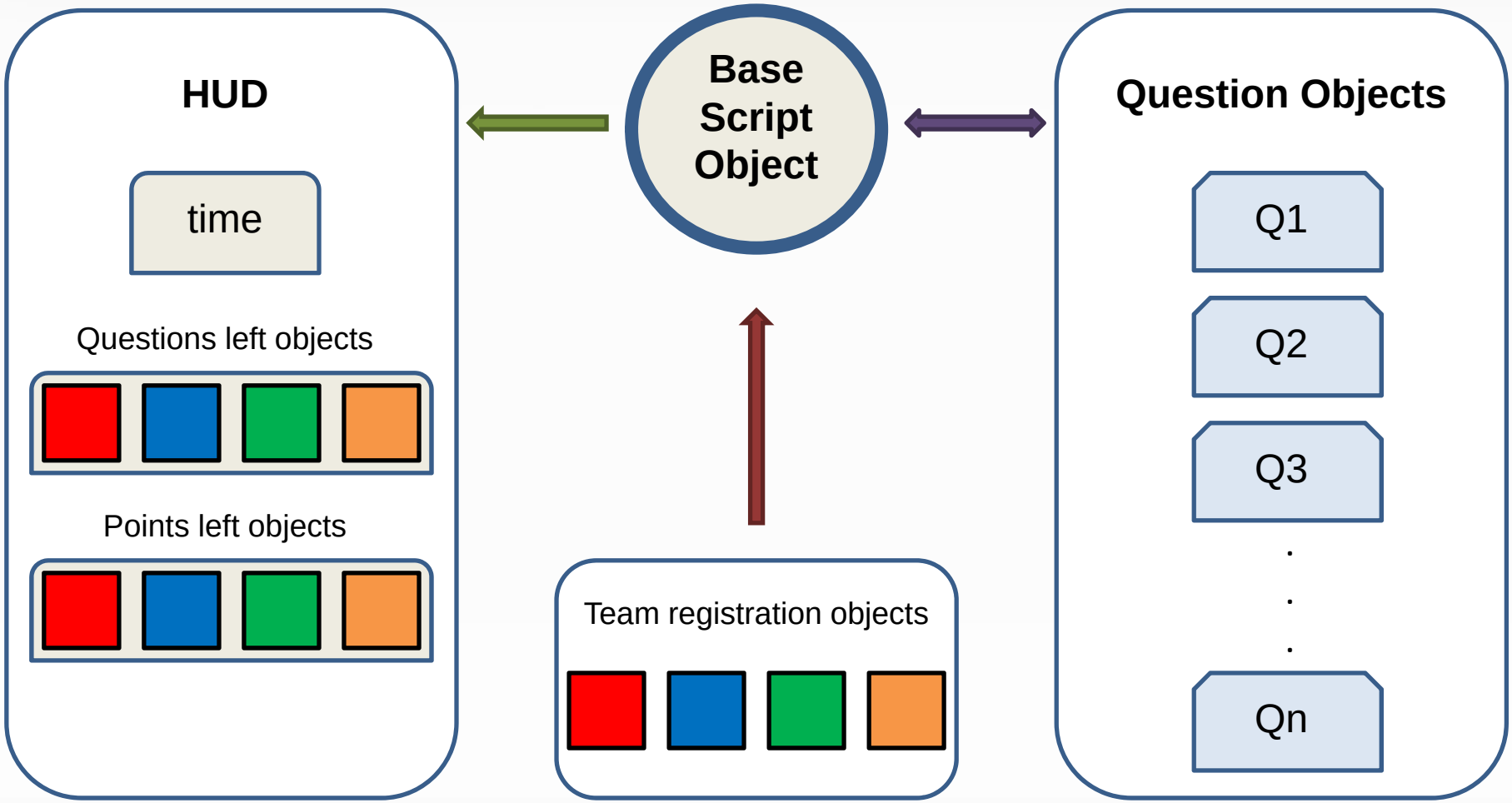
- ***Default**:* The game has not started yet. By selecting 'Setup' we go to the next state.
- ***Setup**:* In this state players can register to their teams and after that, the game can be started by selecting the relevant option.
- ***Game running***: In this state the game is running and the players start playing. From here we can either end the game manually or ask for the available statistics, up to that time. When the time ends, the game finishes and we go to the finish state.
- ***Game finished***: By selecting the option 'Running', we can return to the game. The 'BackUp' option sends the statistics data, something useful in case the backup process goes wrong in the first place. Moreover, we have the option to display the final statistics to the game chat.

Code Structure

- **Variables**: Declaration and initialization of script variables
- **Functions**: Declaration and implementation of functions (useful for code that often used)
- **States**: Several states can exist in the same script with the default always executed on script initialization. After that we can dynamically change code states in runtime.

```
1
2  /* Variables */
3  ...
4
5  /* Functions */
6  ...
7
8  /* States */
9
10 default
11 {
12     ...
13 }
14
15 state setup
16 {
17     ...
18 }
19
20 state running
21 {
22     ...
23 }
24
25 state finish
26 {
27     ...
28 }
```

Objects' scripts communication



Activity [1/2]

Parameters

- Game time: **2 hours**
- Game time left after a team answers all the questions: **10 minutes**
- Starting bonus points: **1000**
- Points charged to a team when a player opens a question: **20**
- Points charged to a team when a player asks for help in a question: **30**
- Points the team wins for each correct answer: **150**

Activity [2/2]

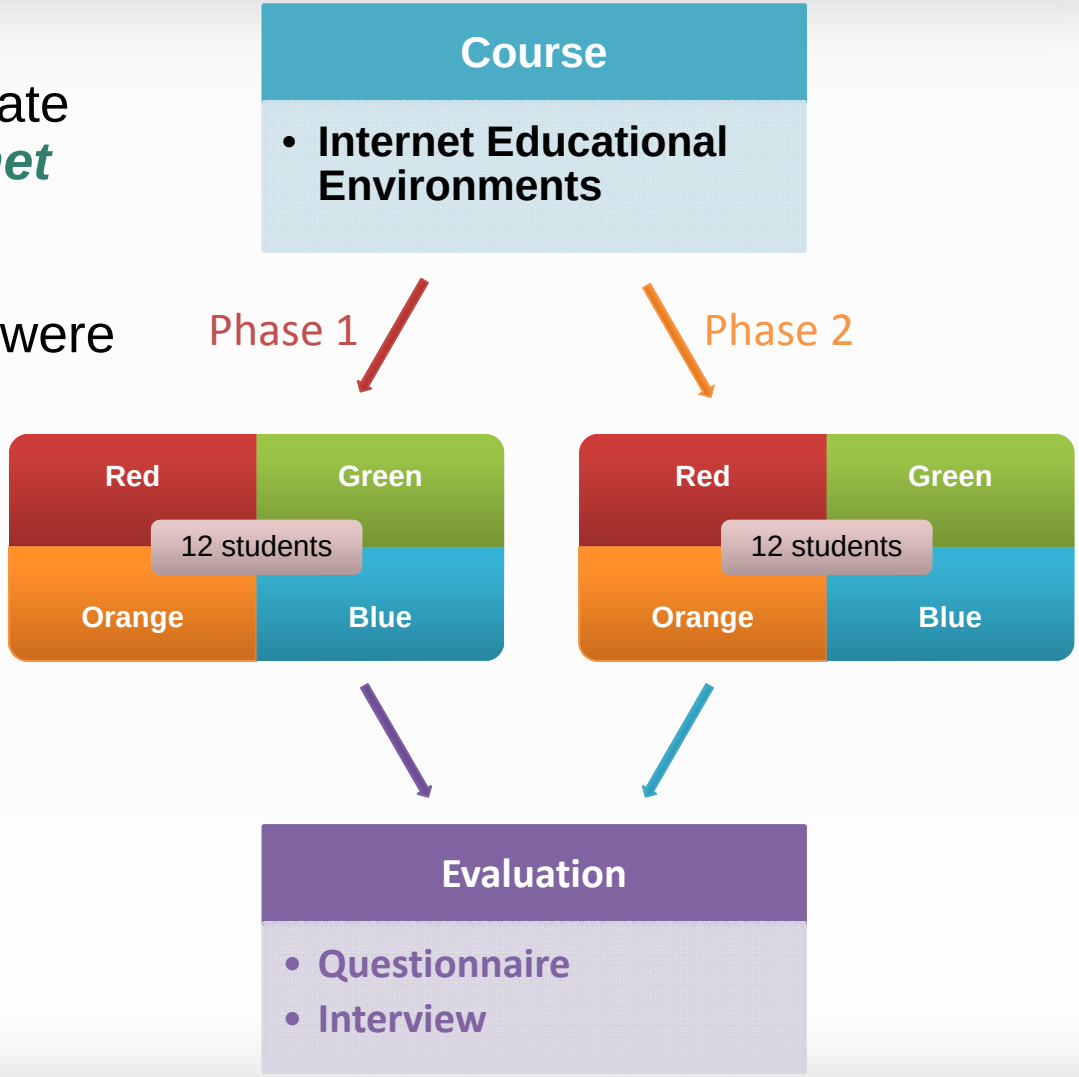
Twenty four (24) undergraduate students attending the "***Internet Educational Environments***" course, of the Informatics Department in our University, were divided into ***2 groups of 12***

First Phase

- Procedural issues
- Issues concerning the framework

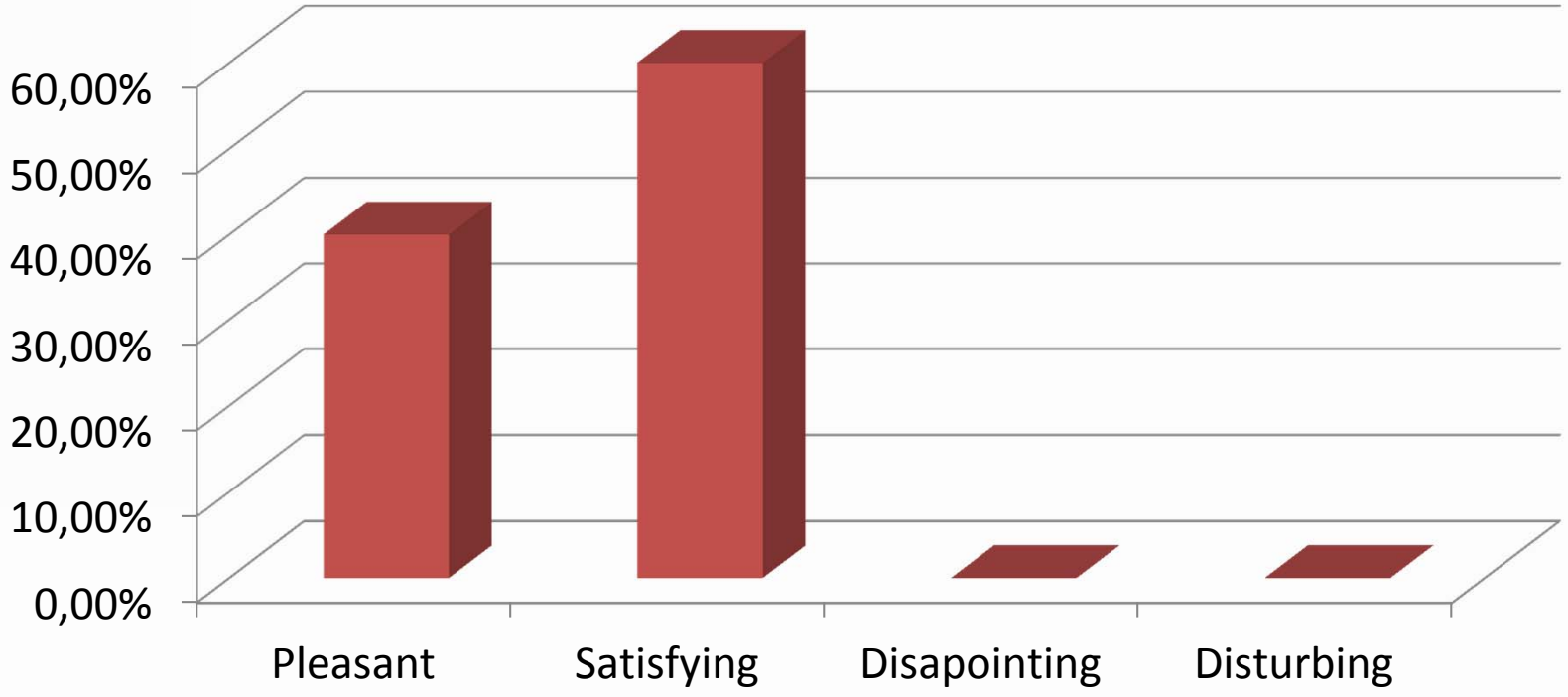
Second Phase

- No issues at all!



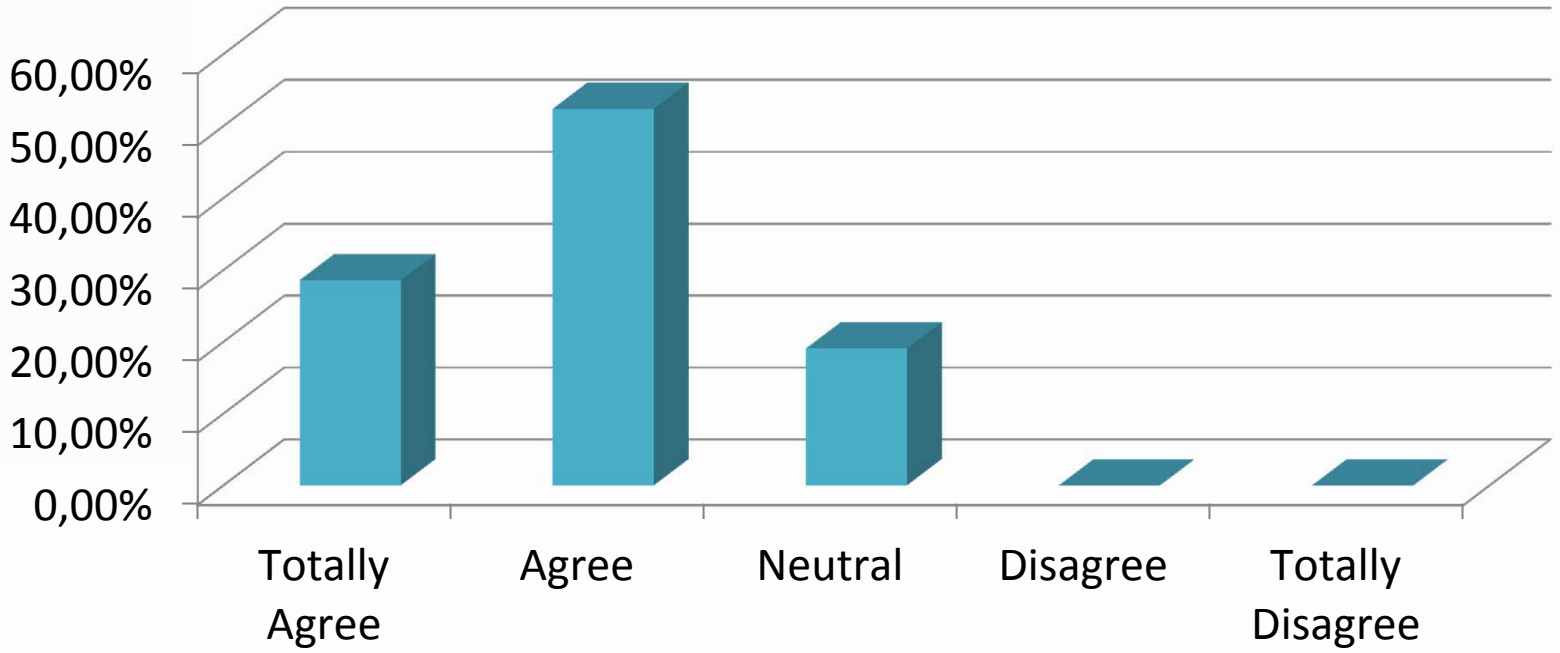
Evaluation: Questionnaire [1/2]

What feelings created the experience of 3D virtual environments to the students during their participation in a game learning activity based on OpenGames framework?



Evaluation: Questionnaire [2/2]

Can OpenGames be utilized to create serious games that motivate the participated students to study better the course material?



Short interview

Comments

- Attractive, innovative, interesting, impressive!
- Not specific problems related to the framework

Suggestions

- Future updates on framework and new features

Conclusions

- The framework works correctly
- It can be used easily
- Highly customizable
- It meets the learning objectives
- Small technical issues arisen, mostly due to the immaturity of the platform

Future Work

- Solve small issues to improve the game framework
- Enriching it with new features
- Creation of a web interface for customizing all aspects of the game
- Support of variable number of teams
- New point system
- Combine 3D collaborative educational games with traditional educational approaches

Thank you! Questions?

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