

# **“Design and Implementation of a Game / Quiz platform for e-learning”**

## **The Retro Quiz Game**



**UNIVERSITY OF CRETE**  
**COMPUTER SCIENCE DEPARTMENT**

**Odisseas Zidianakis**

Supervisor: **Yannis Tzitzikas**

**June 2022**

## SUMMARY

RQG (Retro Quiz Game) is a “hybrid” of an RPG (Role Playing Game) and a Quiz.

It is addressed to teachers. It provides them with the ability, when they want to put their students through a Quiz, instead of passing them some pieces of paper, to assign it to them through the interactive RQG.

In RQG, the teacher uploads their file of questions (a json file), clicks the button for the game to start and it is the student’s turn to take the reins. They have to choose between one of the three available Heroes, each of whom has a unique power that will help them survive in RQG.

As soon as the student confirms their choice of Hero the Quiz begins. According to the size of the Quiz (number of questions), they are given their Stocks while some other data related to the Level system are set, a feature that will be described in detail in chapter two. Each time they answer a question wrongfully they lose a Stock. If all their Stocks are lost they “die” and the Quiz ends there.

Each time the student succeeds in answering correctly a given number of questions (based on the size of the Quiz), they Level Up to a Level which now corresponds better to their level of knowledge, related to the subject of the Quiz their teacher put them through. Additionally, in each Level Up they unlock a Retro Game for when the Quiz is completed as a reward and they are given the chance to take a small break (maximum of two minutes) and do a test-run of the game they unlocked.

In case of “death”, the student can choose to play whichever one of the games they have unlocked up until their level reached, for as long as they desire, or start it from the beginning and attempt to reach even higher, unlocking even more games. If on the other hand they manage to survive the Quiz, that is in case of it’s successful completion, they are given the opportunity to choose whichever one they want from all the available games of RQG, also for as long as they are eager to play, or else restart it and go for a higher score.

## CONTENTS

1.	Introduction .....	4
1.1	Purpose .....	4
1.2	What follows .....	5
2.	Functional Features .....	6
2.1	Stocks and Levels .....	6
2.2	Heroes .....	6
2.2.1	The Cat .....	6
2.2.2	The Fox .....	6
2.2.3	The Owl .....	7
2.3	Retro Games .....	7
3.	Points of Interest .....	9
3.1	Home Page .....	9
3.2	Choose you Hero .....	10
3.3	Question Format.....	11
3.4	Level Up .....	13
3.5	Death or Quiz Completion .....	15
4.	Architecture .....	18
5.	Possible Expansion .....	19
6.	Epilogue .....	20
7.	Sources .....	21

# 1. INTRODUCTION

## 1.1 Purpose

In the present age, a big part of our lives resides on the Internet. Due to this and to the fact that pandemics have proven to be a real threat once again, the need for e-learning has emerged. Another characteristic of this era is the popularity and the rapid growth of video games. So, we could combine the need for e-learning with the evolution and expansion of video games.

A video game is in general an interactive, imaginary, digital world. All three of these elements could be proven useful in the case of teaching. Interaction goes without saying. The imaginary and digital part is also a strong combination of qualities we can use to make the process of learning more attractive and pleasant for students, and consequently easier for their teachers.

There are some basic elements of learning, that can be amplified via the above and other characteristics of video games. One of those, probably the most important, is motive. For someone to learn something, they have to want to learn it. So, in case of a student, who let's say, that all the motives they already have to learn something are not enough, such as there might come a time in his life that that knowledge is going to be useful for him, or simply to get a good grade, or even to impress someone of the people around him with that knowledge. Here comes RQG to provide the student with more motives closer to his own language. That is in the language of a kid of age between 4 and 18 years old, which means video games. For example, if they answer the question correctly, they will Level Up and will be able to take a short break to play a Retro Game.

Another fundamental aspect of the process of learning is memory. It is a common observation that it helps us to combine things with each other in order to be easier for us to remember them (thus the concept of the mnemonic rule). Being more specific, as far as RQG goes, there are many and various reference points for a student to correlate something they learned with one of its elements. For example, "If I didn't recall that 'thing' at that question, I wouldn't reach the next Level and I wouldn't unlock Pac-Man!". The student is going to remember that 'thing' for a while after that experience.

With learning comes progress. Progress/improvement is one of the most addictive and satisfying concepts for humans, not only students. Seeing that, the effort, the time and the work you invest in something, bares results. In order to help students notice their own progress or not on a certain subject, the method of punishment and

reward was developed. Particularly in case of RQG, Level Up and Retro Games as a reward, losing Stocks and “Death” as a punishment.

At this point I would like to focus on the point of view of a kid and emphasize the difference in having in front of them a piece of paper (usually black and white) with ten multiple choice questions and actually playing it in RQG. We could parallel those to something dead versus something alive.

On one hand they read the question, read the possible answers, circle the answer they believe is the right one and move on to the next. On the other hand they choose their Hero, see how many Stocks they are given, see in how many questions they can Level Up if they survive and adding up all of the above they will answer. This means, that at that point, their answer bares a lot more weight than it originally would.

## **1.2 What follows**

In the present report there will be a functional and technical presentation of this application.

- Chapter 2 contains an analysis of the functional features of this application.
- Chapter 3 presents the most important points of this application along with their graphical display.
- Chapter 4 deals with the application’s architecture.
- Chapter 5 discusses the idea of a possible expansion of this application.
- Chapter 6 mentions some thoughts and conclusions related to this application and the subject it approaches in general.

## **2. FUNCTIONAL FEATURES**

### **2.1 Stocks and Levels**

At the beginning of the game some data are set based on some rules depending on the number of questions of the Quiz.

Firstly there is the question of whether there will be an RQG or a simple Quiz. If it's less than ten questions, one Stock is given and it's just a simple Quiz, without Levels and without Retro Games. For ten or more, it transforms into the interactive RQG.

Another piece of data that needs to be set is the number of Stocks that are given to the student. The rule is, one Stock for every ten questions. In case the number of questions is not round (10, 20 etc), we round it based on the generally known rule: five or more we round up, or else we round down.

Last but not least, the number of different Levels available needs to be determined. The student always starts off as a Newbie. For twenty or more questions there are three different Levels (Skilled, Intermediate, Expert) they can conquer. For more than twenty, the Levels are five (Rookie, Skilled, Intermediate, Advanced, Expert).

### **2.2 Heroes**

There are three available Heroes to choose from and they are the well-known and beloved to all animals: the Cat, the Fox and the Owl. Each one of them has a unique Hero Power that has to do with its nature as an animal as explained in more detail below.

#### **2.2.1 The Cat**

The Cat, which as we were told since we were little kids, based on legend, has nine lives. Therefore its Hero Power is as follows: It passively gains one bonus Stock every ten questions.

#### **2.2.2 The Fox**

The Fox is known for its cunning character. Therefore its Hero Power is as follows: For every ten questions it can choose to skip one question and move on to the next one with the click of a button.

### 2.2.3 The Owl

The Owl, known for its wisdom. Therefore its Hero Power is as follows: Twice every ten questions it can remove one of the wrong answers with the click of a button.

## 2.3 Retro Games

Retro Games are the prize that awaits the student who manages to survive the Quiz up until the next Level Up. These were chosen because they are simple, up to the point that playing them for two minutes has a meaning but they will also leave you unsatisfied, so that you want to finish the Quiz to be able to enjoy them for as long as you like.

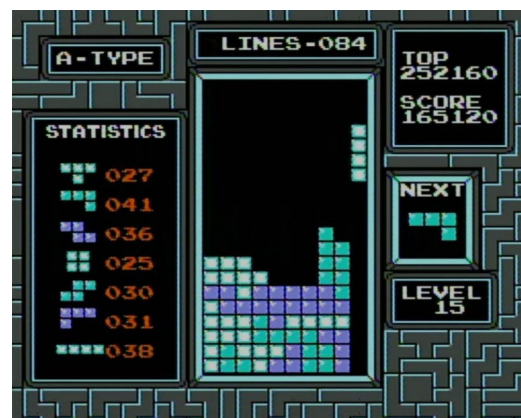
These games are “borrowed” from the site [www.retrogames.cc](http://www.retrogames.cc). They follow the embedded file logic, which means that you copy their HTML code from the site mentioned above, you paste it at the point of your site you want them and they are set and ready.

More specifically:

Galaga



Tetris



Asteroids



Q\*bert



Pac-Man



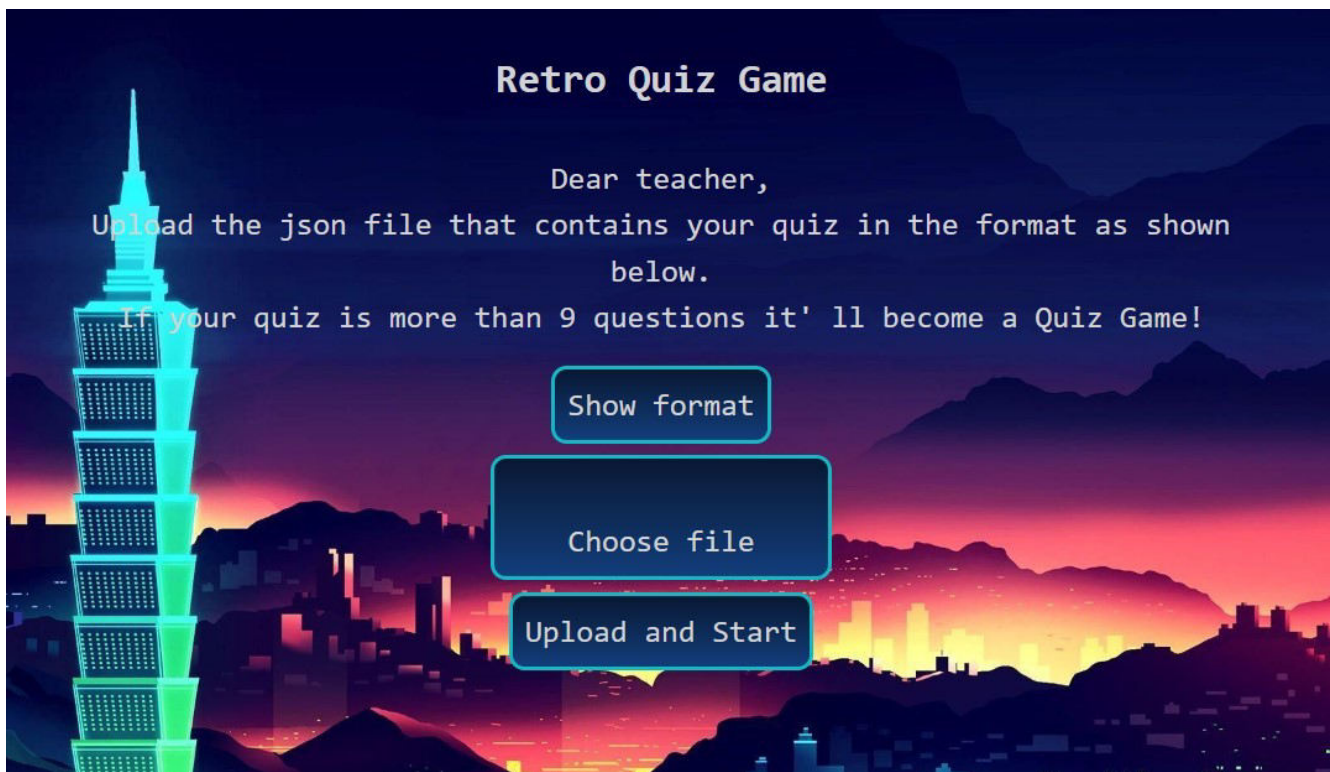


### 3. POINTS OF INTEREST

#### 3.1 Home Page

This part is addressed exclusively to the teacher who sets the Quiz. It guides him to upload his file of questions (json file), which has to be in a specific format that is shown if he clicks on the “Show Format” button below.

He clicks on the “Choose File”, selects the json file containing his Quiz from his local files, clicks on “Upload and Start” and the RQG is on the go.



Hide format

```
{
  "questions" : [
    {
      "question" : "Question 1",
      "answers" : [
        "answer_1",
        "answer_2",
        "answer_3",
        "answer_4"
      ],
      "correct" : 2 - number that matches the correct answer -
    },
    {
      "question" : "Question 2",
      "answers" : [
        "answer_1",
        "answer_2",
        "answer_3",
        "answer_4"
      ],
      "correct" : 3
    },
    {
      "question" : "Question 3",
      "answers" : [
        "answer_1",
        "answer_2",
        "answer_3",
        "answer_4"
      ],
      "correct" : 2
    }
  ]
}
```

### 3.2 Choose your hero!

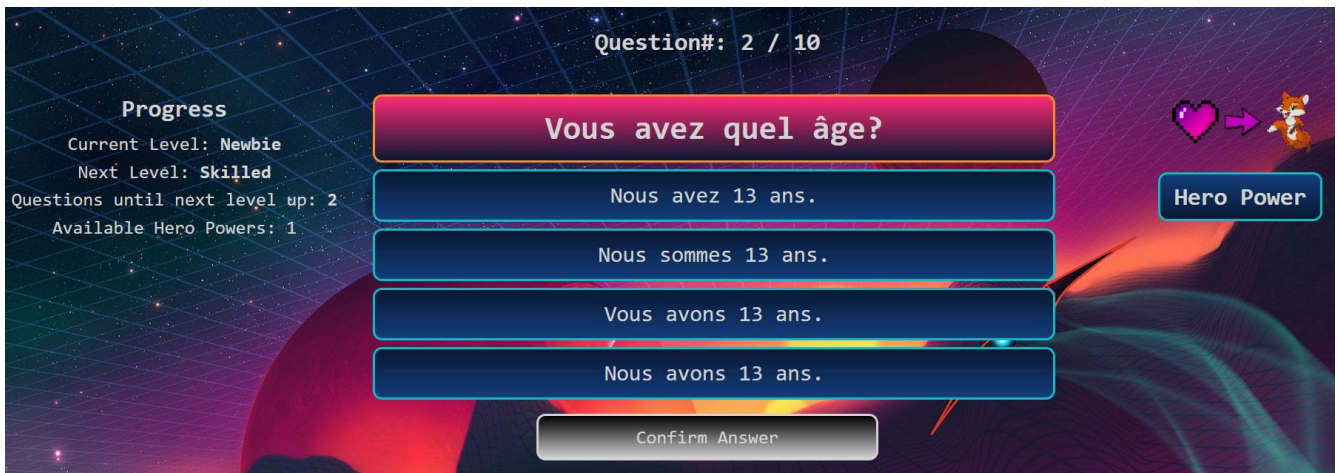
The game has begun and the student now holds the reins. He has to choose one of the three available Heroes.



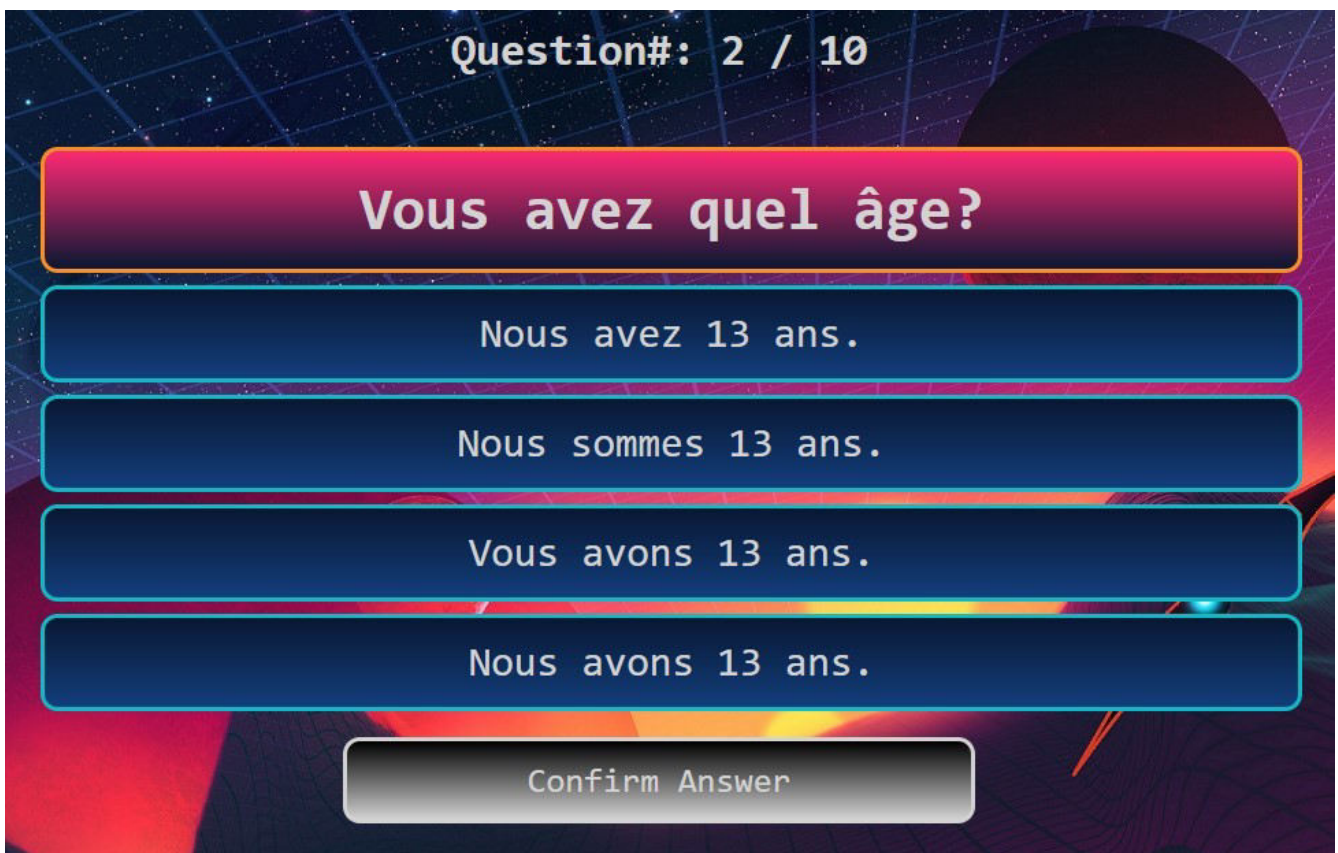
### 3.3 Question Format

We can see here the general display of a question as seen by the student. There are three fictional parts.

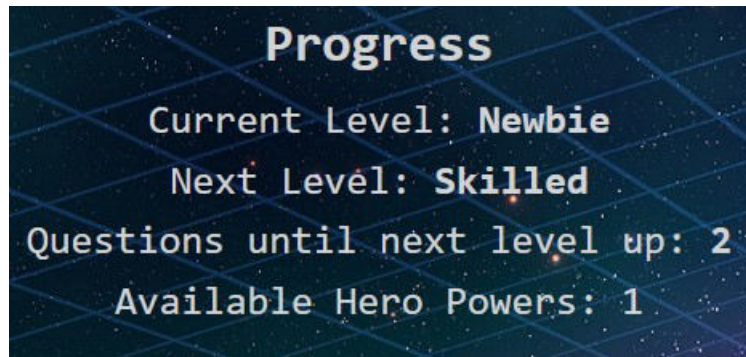




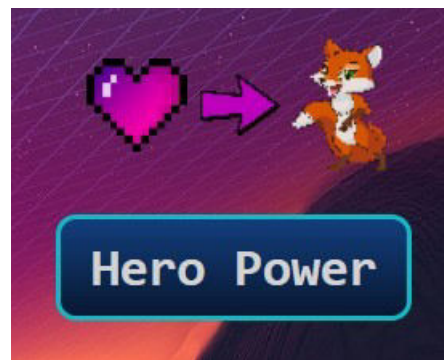
The question is in the middle in the large pink frame, the possible answers in the smaller blue ones and the “Confirm Answer” button below. Above all these, the number of this question compared to the total number of them.



On the left part, there is the information concerning the progress of the student up to this point. It shows his current Level, the next one, in how many questions he will reach it and the available Hero Powers he has in his disposal.

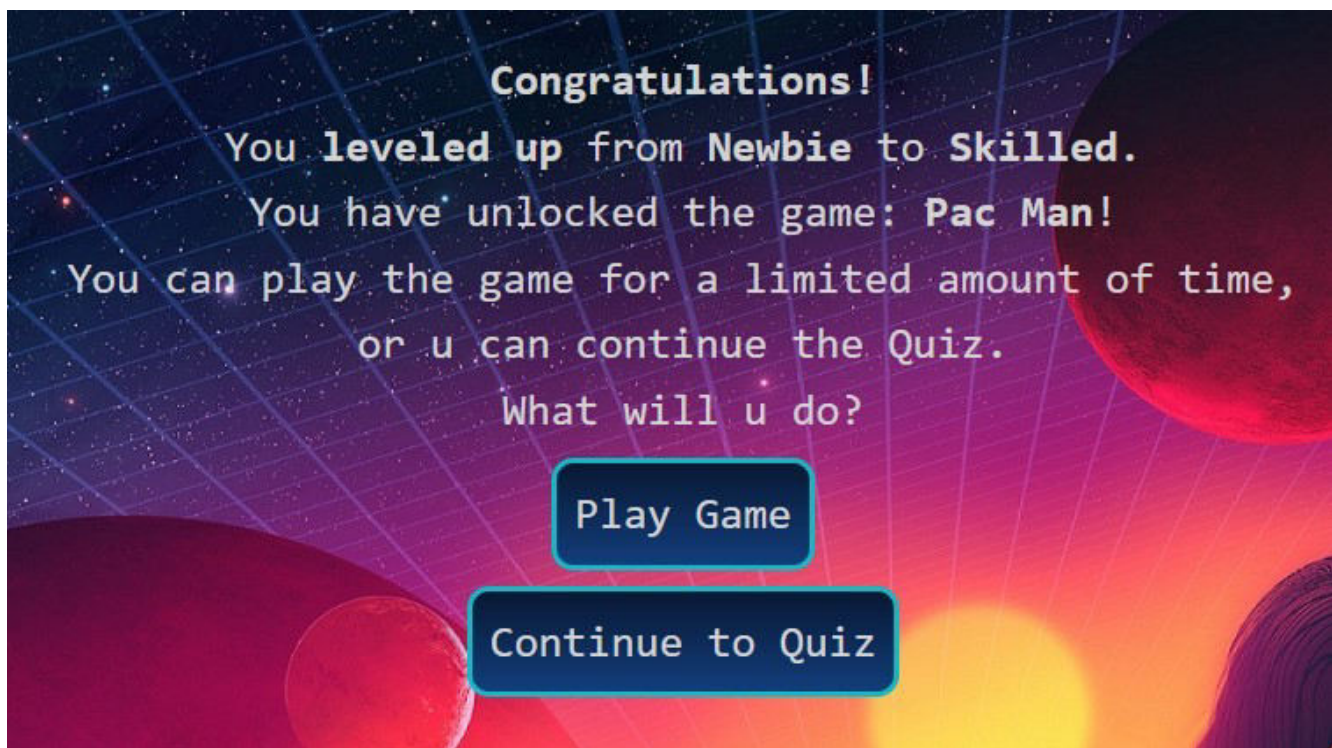


Finally, on the right part the number of his Stocks left and the button that activates the Hero Power.

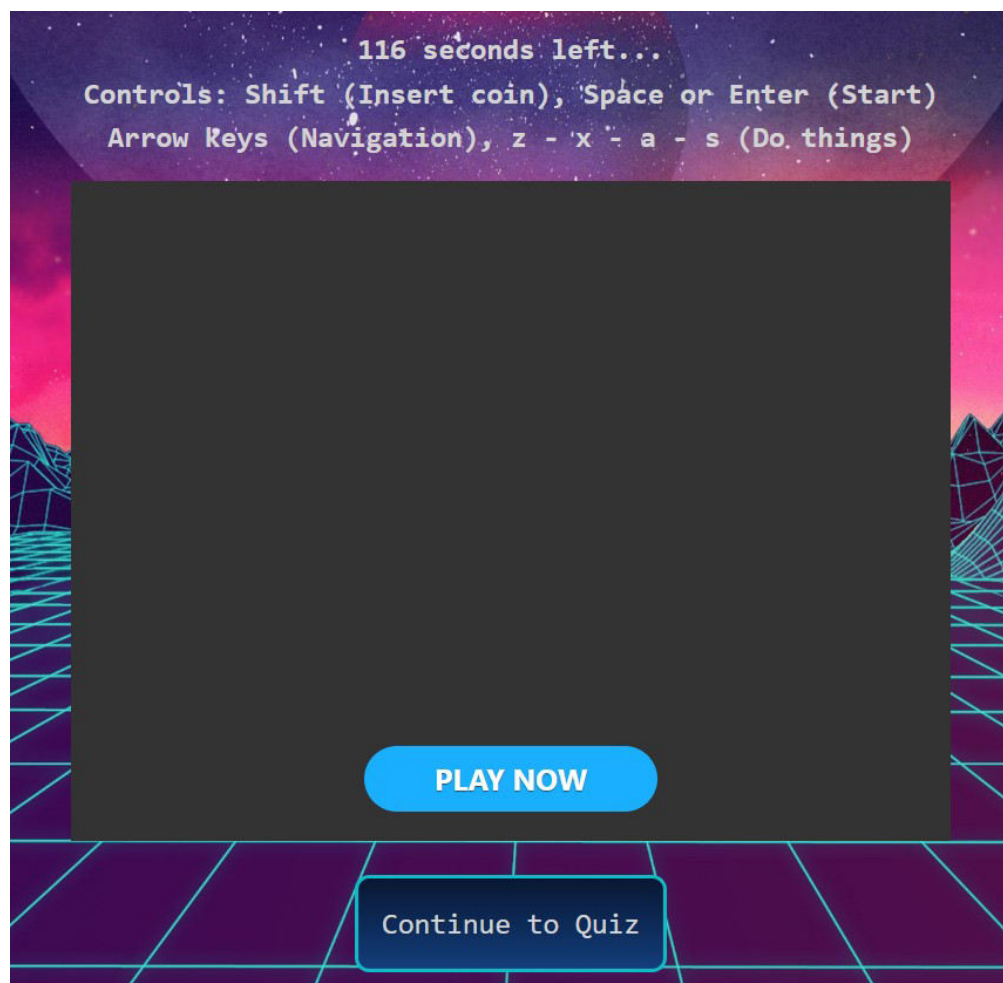


### 3.4 Level Up!

The student just confirmed the fact that they have the knowledge necessary to climb up to the next Level and receive their reward (the Retro Game). Two choices are now available, they will either play the game unlocked, for a maximum of two minutes, or continue to the next question.



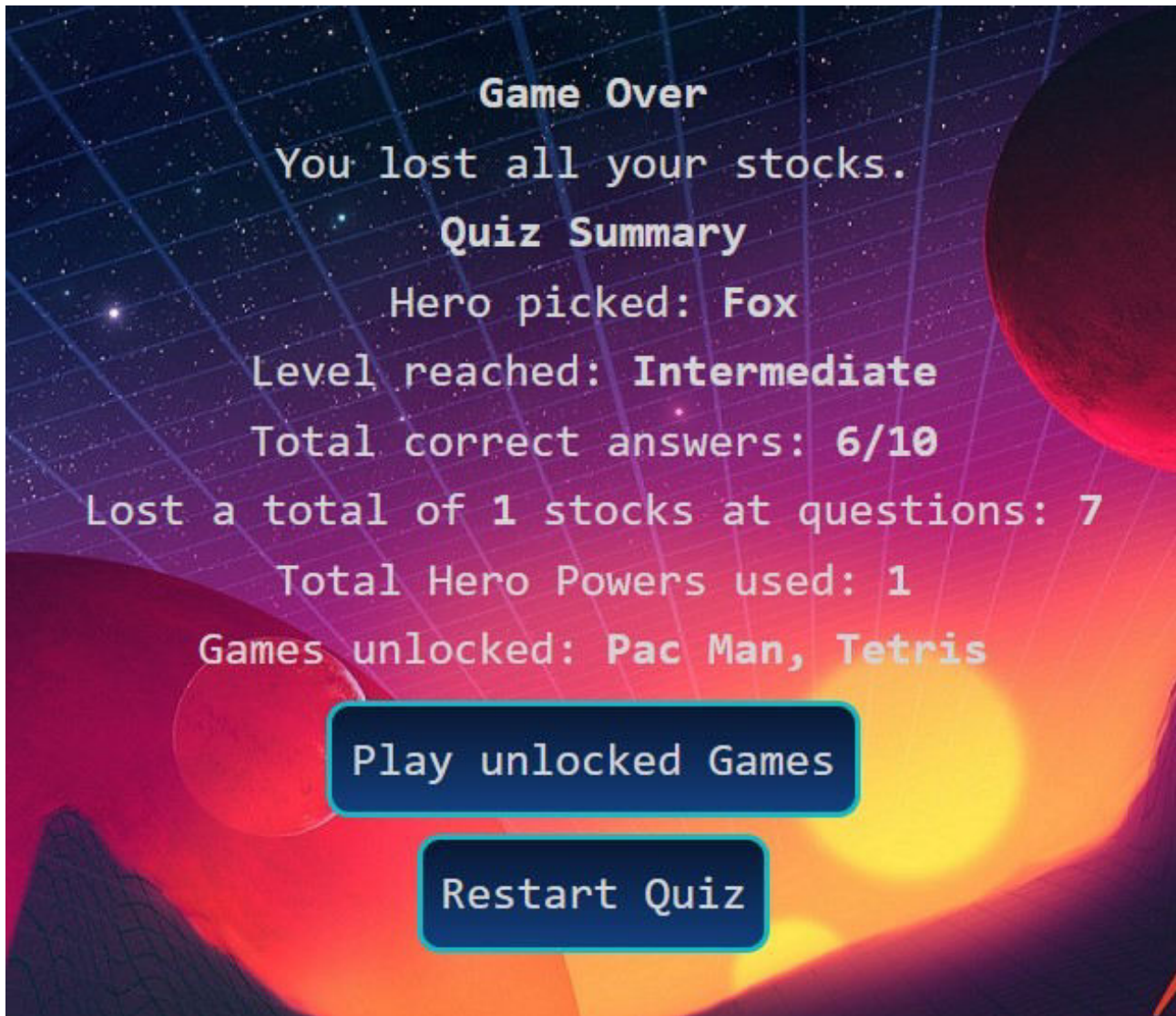
If they decide to play, above the game there is the time countdown and some indications about the controls.



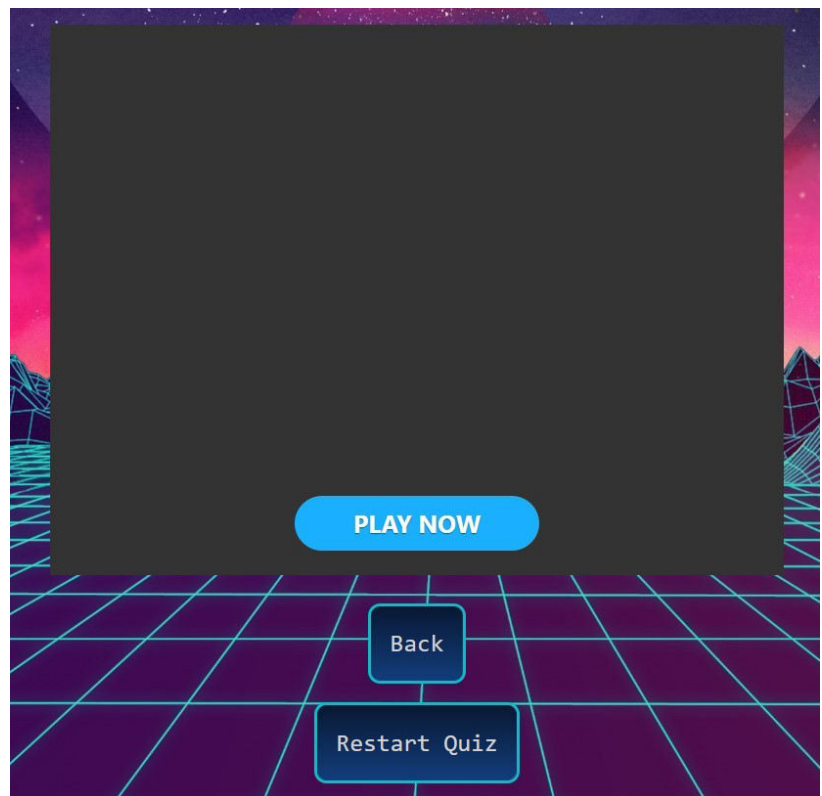
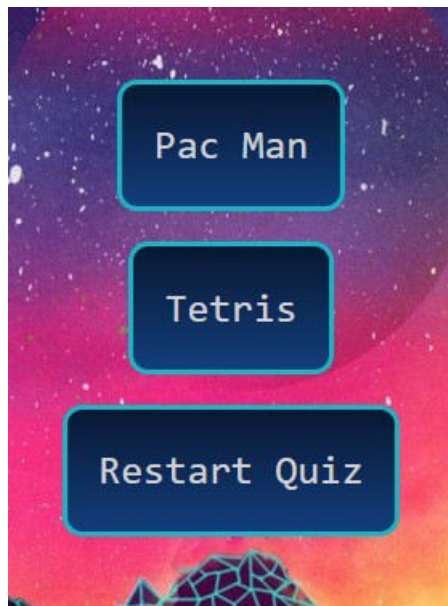


### 3.5 Death or Quiz Completion

In case of death, detailed information about the Quiz appear as shown below. The student can either play the games unlocked or restart the Quiz from the “Choose you Hero” point.

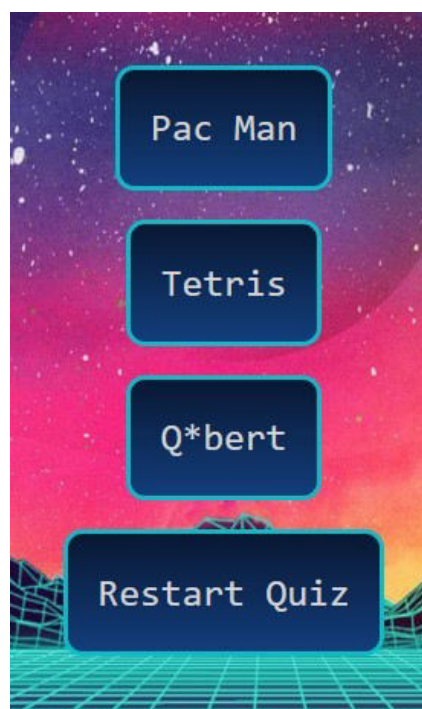
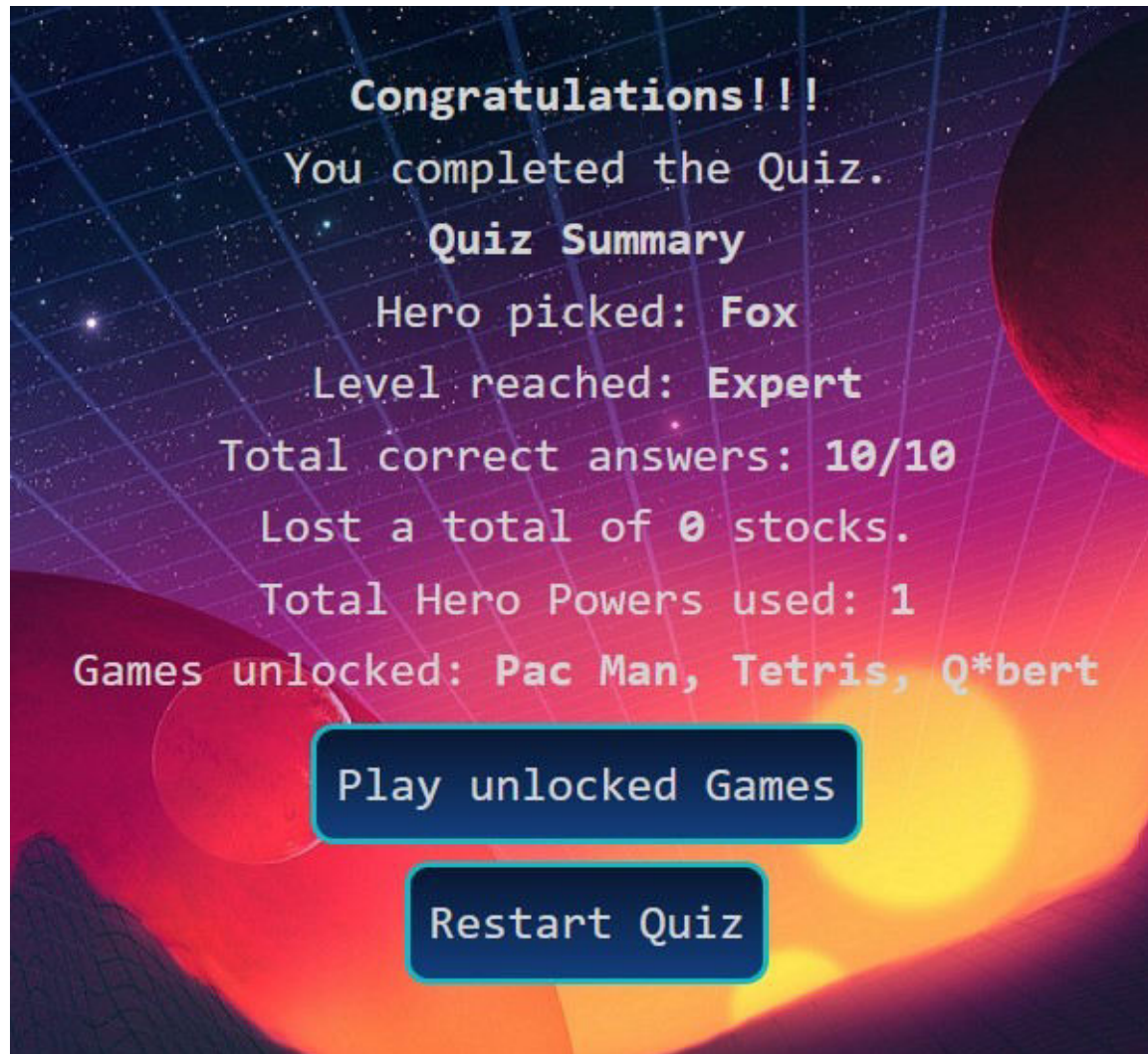


If they choose to play, they select whichever game of the unlocked ones they want and then with the “Back” button they can return to the list of games and select another one.



Similar is the case of successful completion, which is also the only way for the student to achieve the Level “Expert”, with the differences of Level reached and the number of unlocked games (all of them in this case).





## 4. **ARCHITECTURE**

RQG is a single-page application that interacts with the user by dynamically rewriting the current web page with data received from those interactions, instead of the default method of a browser loading entire new pages. This design allows for faster transitions that make the application feel like a native one.

This particular implementation essentially operates as a parser of a json file. There is no back end that allows server-side saving of information. Everything takes place client-side. On the next chapter we will see the vision of this application with the back end implemented.

## 5. POSSIBLE EXPANSION

When the implementation of RQG started, it was more or less what it is now. That is an answer to the question: “How will we make a Quiz more attractive and pleasant for the student and consequently easier for the teacher?”.

Finishing its implementation though, it is now viewed as a part of a much bigger project. A project with users, students and teachers. Quizzes will be at the most part customizable by the teachers.

Firstly they will be able to determine the number of the possible answers, in contrast to being limited to exactly four as it is in the current version. Adjusting the number of Stocks based on the difficulty of the Quiz at hand. The background images will be up to them to set according to the nature of the Quiz. So if for example the subject is History, they could use images related to the time period their quiz refers to.

Respectively, the teacher will also have the upper hand on the selection of the games that are being used as a reward. The concept of embedded games is popular enough on the Internet so that they can find and add games to better match the character of their quiz. They also will be able to adjust the time their students can test-run the games they unlocked.

In addition the ability of saving and editing Quizzes will be available for the teachers. Also Sending them to their students or even to other teachers who will be registered on the platform. This network could include the students and teachers of a whole school or even multiple ones.

Finally since now there is back-end for this platform too, there will be the ability of implementing another reward system for the students. It will be based on accumulating points according to their performances on the Quizzes. Via those performances their teachers will reward them depending on their judgment. For example for a given number of points they can add 0.5 at the trimester grade or “If all the students of this class gather a total of x points or more we will go on an excursion!”.

All of the above in a nice and well designed User Interface. We are not going to force the teachers into programming.

## 6. EPILOGUE

Through the preoccupation with this topic, that is, the combination between education and entertainment, some worth mentioning conclusions came about.

Surely it can work but the right balance between those two concepts needs to be found. According to the kind and purpose of the application being implemented, the establishment of that thin line separating the inspiration and motivation of the student from plain distraction is particularly important. Especially from the entertaining side of the application.

It also shows that these applications can help bridge and enhance the teacher-student relationships, since they will have more common ground especially moving further into the future. Particularly in the case of RQG where students come into contact with games of the generation of their parents and teachers, they used to enjoy themselves with.

The new generations grow up in an era where information is abundant, flows continuously in front of them and they are getting used to that fact more and more. That means that dealing with a few things at a time tends to be a boredom to them. So they can, and want to, manage large amounts of information. Video games can offer that. They require decision making, they challenge the critical ability of their users and enhance their imagination and creativity.

## 7. SOURCES

[www.wikipedia.com](http://www.wikipedia.com)

[www.stackoverflow.com](http://www.stackoverflow.com)

[www.geeksforgeeks.org](http://www.geeksforgeeks.org)

[www.retrogames.cc](http://www.retrogames.cc)