TREBALL FINAL DE GRAU

PROGRESS REPORT II

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1. INTRODUCTION

Teaching music to children is mainly conducted outside the compulsory teaching hours. Additionally, the learner must be consistent and train often in order to improve their abilities and increase their knowledge of music. Like in any other subject of study, making the learning fun and entertaining always encourages the student to invest more time and be more passionate about it. Two different ways of achieving this is by the usage of video games or by gamificating the process of learning and working.

According to Growth Engineering, an expert organisation in applying gamification to learning environments, gamification can be defined as “the application of gaming mechanics in non-gaming environments to make difficult tasks more palatable”. Some gaming mechanics that can be applied to this process are giving the user a score based on their performance, having rewards for achieving big or difficult tasks or showing a scoreboard of all the users. All these elements contribute to make the user be more involved in learning or working.

A music school wants to help students in their process of learning concepts relevant to the subject, such as rhythm, scale or music history, as well as to improve their skills. They also want to address the problem of students being inconsistent with their studies. In order to address all this, they want us to develop an application that can be used by students in their free time.

This application is to be used as an extra tool by the students outside the classroom. To get them to invest their time and have them improve their skills, we want it to be as fun and entertaining as possible. For this reason, we will be developing a music video game. The main characteristics of it, such as the genre, visuals and game structure, will be defined in future meetings with music teachers of the school.

2. STATE OF THE ART

Nowadays, we can find music-related video games whose only purpose is to teach how to play musical instruments, such as Ubisoft's *Rocksmith*. In this video game the user can learn how to play the guitar from scratch and build their skills to mastery, starting from the initial steps of just playing some basic notes to being able to play a whole musical piece. The game achieves this by progressively increasing the difficulty of the songs the user plays and adding extra mini games. These help the user improve in different aspects of playing the guitar such as correctly positioning their fingers or moving the hand along the guitar's neck.

There are much simpler video games and applications such as *Music Crab* or *Music Tutor*, which share a common concept but are targeted towards a different age group. These help the user learn how to differentiate between the different notes in a scale by making them correctly identify the note that is being shown. *Music Crab* (fig 1) is a video game for mobile phones targeted to children where the users have to press the note that corresponds to the position of the crab on the stave. The difficulty of the level increases as the game progresses, making the user learn and adapt to being able to correctly identify every note.

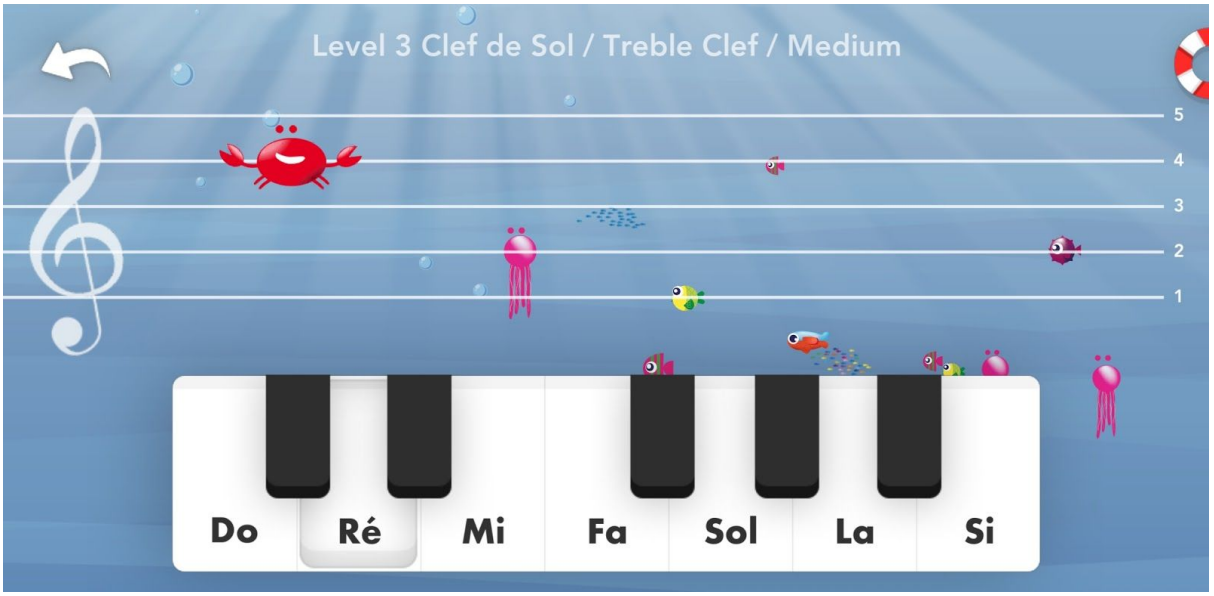

Fig 1. Music Crab.

Even some educational institutions have started to find an ally in video games and are now creating their own and incorporating them into their teaching methods. The University of New South Wales (UNSW) in Sydney, Australia, is a good example of this. *Playconomics* is a video game developed by LionsHeart Studios used in UNSW's School of Business. Students have to apply the contents that are taught throughout the course to run a city and earn money while making their citizens happy, which in turn increased the productivity of the city. By doing so, they gain points and they compete among themselves in a public leaderboard. This feature, added to the fun of testing your knowledge about the subjects and getting some extra marks by playing a video game instead of by taking tests and writing reports, makes the students want to invest more time in the subject and contributes to making learning a less tedious task.

When we want to make learning be more fun and we aim to make students invest more time in their studies without making it be more tedious, a video game is not the only successful solution we have on our reach. As stated before, we can also use gamification. Language learning platforms like *Clozemaster* (Fig 2) often apply this concept in their applications and websites. Investing time in learning a new language is always tedious, but it can be made more enjoyable if the player earns points every time they write the right answer and then compete against players from all over the world to see who has improved the most during that month.

Fig 2: Clozemaster. The user earns points every time they choose the right answer.

Gamification is also being used in universities. The Universitat Autònoma de Barcelona (UAB) has developed *TOP Enginyeria*, a platform where Computer Science students earn badges and points for achieving some goals in their subjects. They are then classified in a global ranking. This encourages students to invest more time in earning the badges (and thus learning the contents of the subjects) and compete among themselves.

3. MAIN GOALS

To give us a clearer idea of the project, we have developed a means-goals tree (Fig 3). This tree and its goals has been further developed from our initial means-goals tree that we created for our Initial Report, as the project has been further detailed during the meetings with the music teachers.

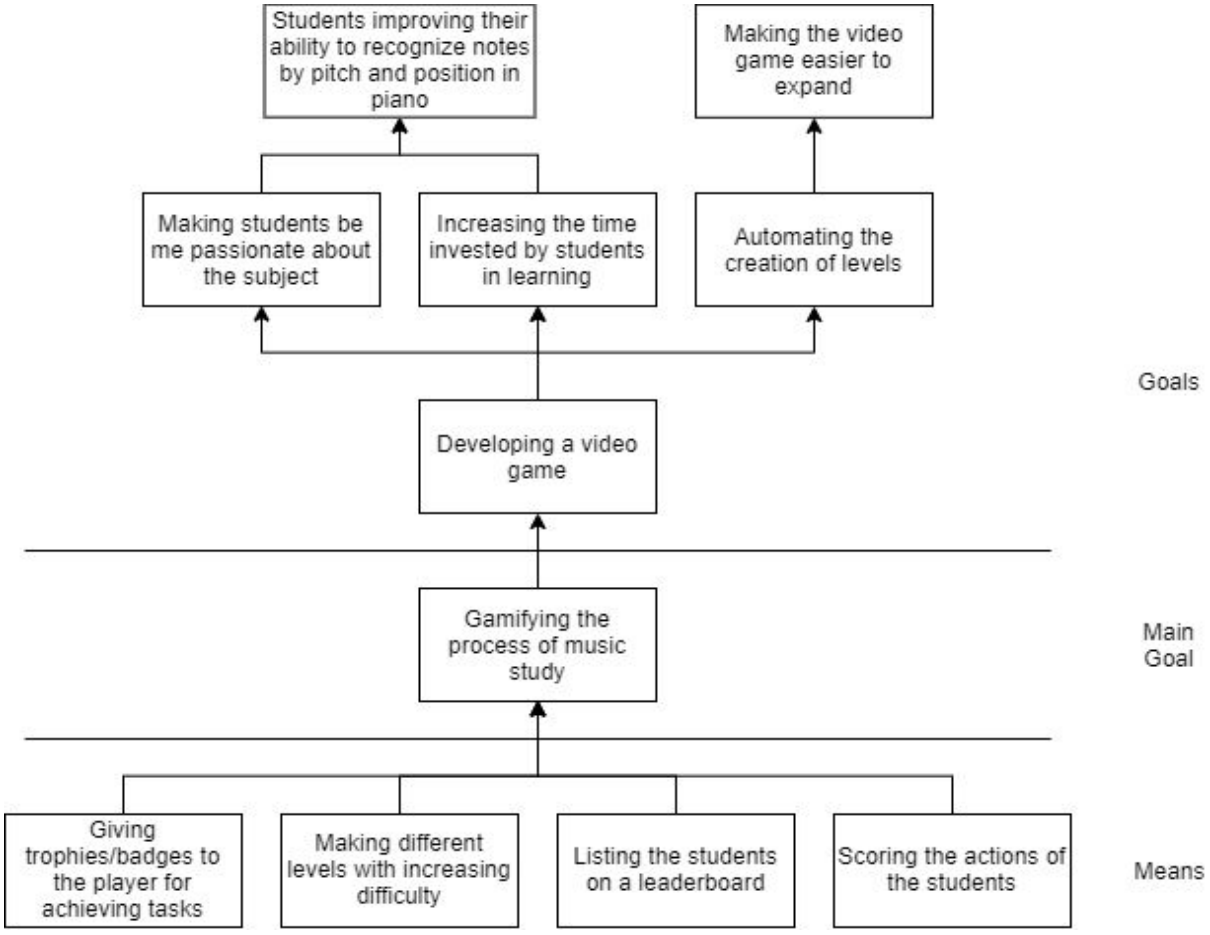

Fig 3: Means-goal tree of our project.

After the meetings with the music teachers, we have determined that the main goals of our project are:

- Gamifying the study of music by:
  - Having songs grouped by difficulty and allowing the player to go through the levels of difficulty as they progress on the game.
  - Scoring the actions of the students when playing the game.
  - Creating a leaderboard with the students and their scores.
  - Giving trophies/badges to the player when they achieve certain tasks.
- Developing a video game where we apply the concepts of gamification explored.
- Automating level-creation so that the video game can be expanded in an easier way.
- Making students invest more free time in learning and be more passionate about it.
- Getting students to increase their ability to recognize notes by pitch and position in a piano.

4. PLANNING

In order to plan the tasks of our project, we have created a Gantt Chart (Fig 4). For the time estimation of each task, we have followed a bottom-up approach. This entails estimating each task individually and then adding all the estimations to get the total of each phase and the total estimation for the project, but adjusting it so it fits our schedule for the project.

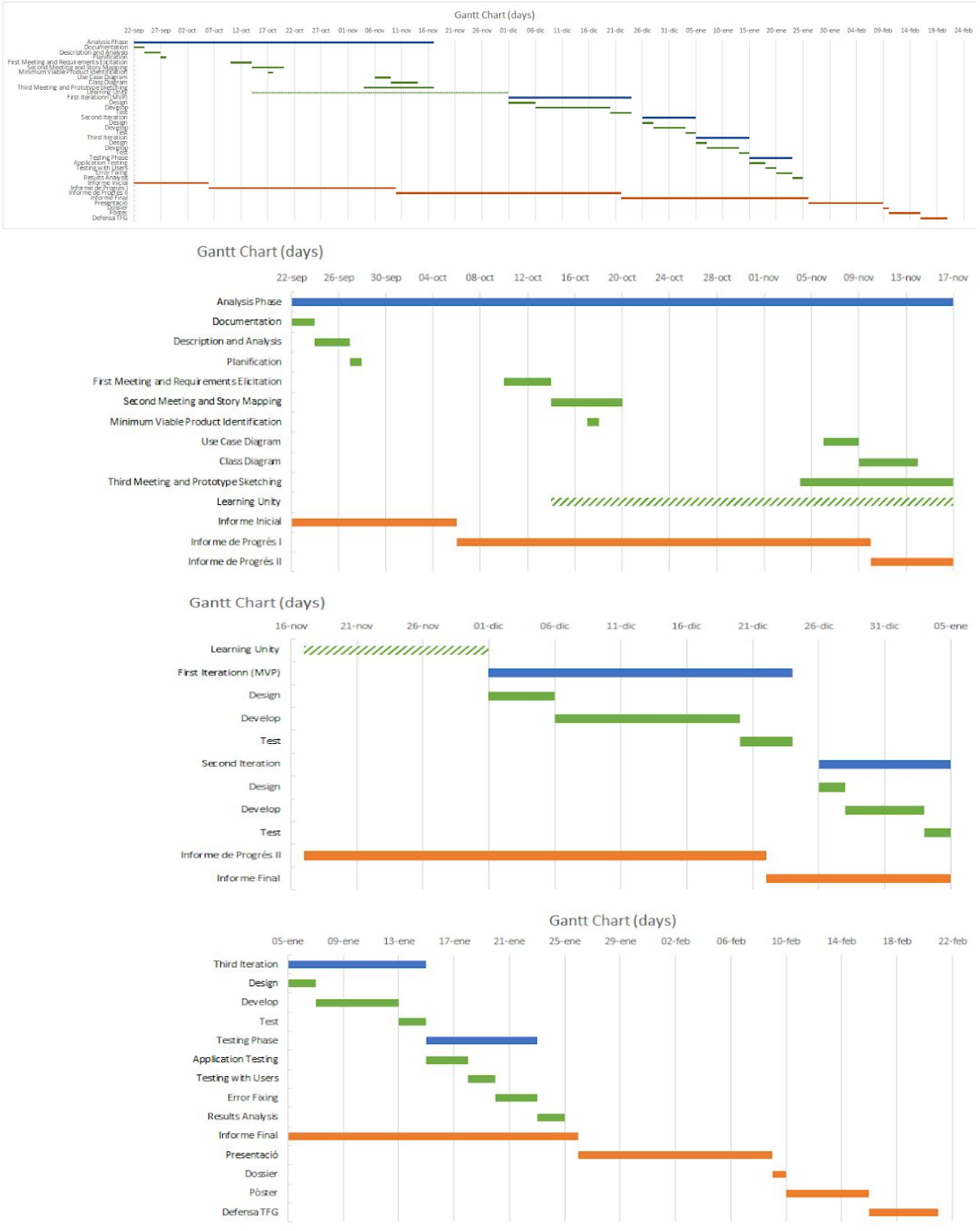

Fig 4: Complete Gantt Chart and its sections so it is easier to read.

Since we created our initial Gantt Chart for the Initial Report, we changed it to achieve a better planning of the project:

- Changed the format of the Gantt Chart from Hours to Days so we have a calendar we can refer to when checking our progression and if we are on or off schedule.
- Added progress documentation tasks:
    - Informe Inicial.
    - Informe de Progrés I.
    - Informe de Progrés II.
    - Informe Final.
    - Presentació.
    - Dossier.
    - Pòster.
    - Defensa TFG.
- Changed the colour of the tasks to represent the different types of tasks we have:
    - Orange for progress documentation tasks.
    - Blue for grouping tasks.
    - Dotted green for “Studying Unity”, since it is a task that will be done throughout the project.
    - Green for project tasks.

This Gantt Chart does not say that, during the days when the tasks are carried out, we are going to be working 8h. It is just specifying the ideal start and end date in order to be on schedule.

5. METHODOLOGY

The project will we run in an agile-style development, with incremental iterations. We have decided to follow this approach since agile methodology brings us really valuable benefits, such as:

- Having a working piece of code after each iteration.
- Demonstrating functional code to the customers and getting feedback from them.
- Being able to implement changes rapidly and with less time cost, since we do not implement them at the end of the developing process but instead after the iterations are presented to the customers.
- Adapting the product to the customer needs and expectations.

Agile methodology ensures a higher product quality and customer satisfaction, and reduces the risks and the cost of changes since we are working closely with the customers and we can get their feedback from actual pieces of code.

We have planned an initial Analysis Phase where we are going to be working closely with our customers, the music teachers, in order to describe and specify the project and its components. From this phase we will agree on a Minimum Viable Product (MVP), that is the minimum features that ensures a working product that can satisfy the customers.

Each of the following iterations will develop a functional piece of software. During the first iteration, we will develop the MVP to ensure that the software is both functional and useful for the main goal.

We are planning to work on the automation of level creation during the second iteration to make the game easier to expand, thus being a more powerful tool for the music teachers and students.

For the third iteration, the initial plan is to work on the graphical aspect of the video game, changing the sprites, menus and animations that we are using as placeholders to more professional ones to make the game more attractive to

After the game is completed, we have a Test Phase where we will test the game as a whole with the users. We will also analyse their performance to check if the video game is actually able to help improve the music students' skills and ability to correctly identify the notes. Upon completion of this phase, we will analyse the results to draw our conclusions from the project.

During the developing of the project, we will be using GitHub, a cloud storage platform that allows version control. We will store code files and documents like the interviews' outcomes and reports made. If there is anything that we cannot upload to GitHub, we will store it in Google Drive. To do the version control, we will be using GitHub Desktop, a software tool that checks if there has been any changes to the code and allow us to push and commit the changes to our GitHub repository.