

Development of a Digital Educational Board Game

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Image 1: Game scenario.

ABSTRACT

Nowadays it can be noticed that the educational system has been lacking better dynamics and therefore subduing the stimuli it could have on the young minds there are populating our schools. Having in mind that some subjects present an outdated curriculum, which can be of difficult understanding, and that are based on traditional aspects without contextualization causing a certain lack of interest, this paper has the intent of providing an insight of a game that could be used by teachers as a tool for teaching. For that purpose, the game engine Unity was used. Developed entirely with the tool, the game was thought to have a generic environment making it possible to encompass many different school subjects. The coding also took place in the engine, as it has its own coding tool, the Monodevelop, which supports C#, used in this game, JavaScrip, and Boo. With the intention of having a generic game that could be used by as many different areas as possible, could abet the students and that could assist the teacher to root the knowledge in its pupil's minds idea of the old board game was brought forward. Currently known as "Jogo de Tabuleiro Educacional" the game is in its final stage, containing versions that vary in size, making it possible for the educator or student to make use of the game even with little time in their hands. In its testing stage, the "Jogo de Tabuleiro Educacional" has been used in events at the college where it has been developed, and will be presented in a federal school in Rio de Janeiro soon.

Keywords: Educational, Digital Board Game.

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1 INTRODUCTION

To construct significance, in the modern days, and facilitate communication in a natural way the teacher should introduce new languages between students and their environment. To fulfil that end, it's necessary for the educator to know of different techniques and resources to choose those that best fit the contents to be taught.

On the other hand, some subjects has shown an outdated curriculum, difficult to understand, that did not arouse much interest in the students, and even today, the pedagogical mediation has been based on traditional forms without contextualizing teaching and learning subjects [1][7].

In addition, some of these basic subjects are studied in a dissociated form from student reality which makes it less significant. Thus, a form of education that cannot sustain the student's attention and motivate them to engage in the learning process may cause them to prematurely leave schools.

On the other hand, the use of new educational Technologies should be further explored as teaching resource in the primary, secondary and higher education, according to Teixeira e Brandão [2]. In addition, the technological resources are increasingly present in the daily lives of students and with growing accessibility to computing environment, it is necessary to develop tools that help the user interaction with the machine. In education, for example, that demand for tools has grown substantially.

"Education, in general, has not considered this expansion of technological resources, which are part of the reality of the people. In Brazilian schools, even those that have many resources,

education remains technically conservative.”[3] In a school environment, the dynamization of the teaching material has been used as a method to keep and attract the student’s interest, as well as assist the teacher's work. In this aspect the game has a certain advantage.

In the educational process a digital game can be a major aid as it has the potential to make the learning process more attractive, dynamic and make the practice more active and motivating. [4]

In this regard, although still not included the reality of many educational institutions, some researchers have engage in researching new technologies to improve teaching and learning qualities. For example, games [5], combined with the curriculum provided by the subjects it can increase student motivation through challenges and interaction in a playful and innovative environment, thereby enhancing learning. In this context, computer games can instigate discussion, where the playful becomes the driving force between teaching and learning.

Furthermore, virtual reality techniques have been used as basis for production and dynamization of computer games and 3D videos. They have a strong communication appeal and are increasingly present in people's daily lives. In this sense, [6] it was proposed a development methodology for educational digital games, based on virtual reality technology, to be used as a tool in the teaching and learning process through educational motivation to increase students' interest in school, stimulate the generation of knowledge and promote learning.

From the foregoing scenario, the objective of this work is to develop a tool that can assist in educational practice. With this purpose in mind and based on older games, as well as the current technologies available, an educational board game was developed.

2 GAME ENGINE

Currently on the market there are several tools for game development, which are programs for the creation of video games.

2.1 Examples of Game Engines

- CryEngine 3
- Unreal Engine
- Source Engine
- Unity 3D

2.2 Unity

The Game Engine is one of the most complete game development tools, both in 3D and 2D; supporting creation of terrain textures application and use of physics (Figure 1).

The programming is done in a proper environment, "MonoDevelop" (Figure 2), which gives supports Boo, C # and JavaScript programming languages, and can even use all 3 simultaneously, in accordance with the order specified by the tool.

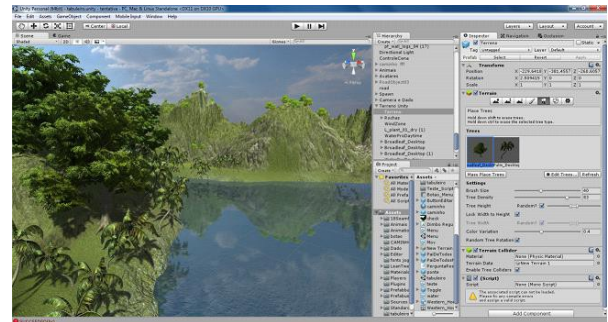


Image 2: Unity 3D Game Engine - building the game scenario.

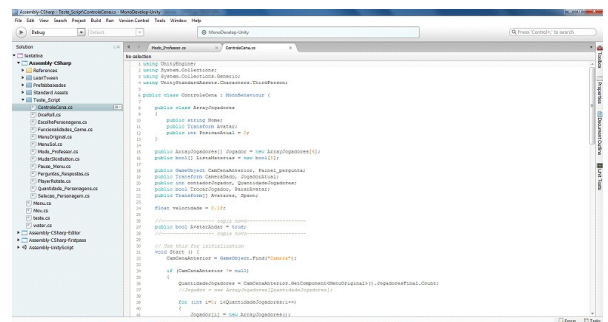


Image 3: Programming environment in Unity 3D: MonoDevelop.

3 DEVELOPMENT

3.1 Terrain Modeling

Developed in Unity, with its own tool for creating terrain, the game is characterized by a generic scenario, designed so that the software can be applied in various situations without compromising performance.

3.2 TRACK MODELING

The trail was created so that it can be adjusted in game editor at any time without great difficulty being arranged separately facilitating it's remodeling.

4 GAME FEATURES

The software was developed with the thought of a school environment and it gives support to be used by one (1) to six (6) players at the same time, respecting their shifts.

4.1 Interface

The development was made so that the interface is simple and facilitates the usability.

4.2 Dice and Tiles

As in a physical board game, the "Jogo de Tabuleiro Educacional" has the so-called "tiles" arranged end to end on the ground, where the character will move.

The movement is done only on the track, it is impossible to shift outwardly therefrom.

During the round you must use the "mouse" to click the dice and randomly select a number, causing the character to move down the runway.

4.3 Features of Characters

Soon as the game starts, the user can choose the number of players and their characters, between three (3) male and three (3) female, and name them. They are given an order of move that will direct them through the game.

4.4 Questions System and Features

The game has a "teacher mode" where the advisor can post questions and answers to create a bank of questions within the game. Before the beginning of the match the teacher can choose which questions will be used, thus having control over the content of the questions for each game, simply by opening the "teacher mode" by pressing down the key code "T".

Within this Mode the educator can type the questions and 4 answers to each query, 1 correct and 3 incorrect, which will be randomized. They can also be edited, removed or selected to fit a specific game.

The questions will be shown on the screen before the user clicks on the dice, which at first will be blocked. According to the accuracy of the response the dice will be unlocked and the user can click on it and walk the corresponding number of tiles. If the answer is incorrect the player will lose the round having to wait for the next shift to answer a new question.

Each of the "tiles" will be susceptible to the appearance of a random question in the screen. Thus, all students will answer questions and will not know in advance which they will respond.

The game will also feature elements of luck, classics in a conventional board game, as moving back and forth tiles and luck or setback, making the game flow more naturally and quickly, so as not to make it tedious.

Currently there are 5 versions of the same game, each one sustaining a different finishing time. The versions can be completed in 5, 10, 15, 20 and 40 minutes of play.

4.5 Dynamic

The educational game has been dynamised and evaluated at Learning Laboratory (LA) of a Federal School of Rio de Janeiro with children whose age range between 7 and 9 years old, with the guidance of the teacher and school phonoaudiologist. Currently, students in the first and second years of this school, who have some learning disabilities, attend LA, outside of the regular schools shift, to be included, without derail, among other things, the introduction of new content. On the opposite shift to regular schooling, support is added in Portuguese and Mathematics, cultural activities and playful moments.

As proposed methodology, teachers seek to integrate activities already developed in LA with new digital technologies. For this, at first, the teacher and phonoaudiologist worked with students reading text, suitable to their age. After reading, at the second moment, in the lab, they conduct a debate on the presented story. Then at the third moment, the teacher and phonoaudiologist inserted questions and answers on the digital board game, concerning the interpretation of the story presented, in addition to questions about grammar. The choice of questions and answers were selected by the teacher according to the difficulties faced by

children at the second moment activities. At the fourth moment, when the game was played with the children the teachers made the observations and notes that were included in the assessment of the game and dynamic displayed.

4.6 Evaluation

Some of the students in the learning laboratory (LA), have learning barriers. In this sense the learning workshops proposed in LA, without falling into a therapeutic approach, are all about offering diverse stimulation activities which incorporate the virtual interaction patterns increasingly used by younger generations. It has the proposition to be an area of growth and construction of knowledge to the student, and thus, be able to invest in overcoming learning barriers faced by students and teachers at school.

The teachers who accompanied the activity indicated that the children were at ease playing the digital board game, and unlike some authors point out, the game stimulated a greater attention of the children to try to answer the questions and address the challenges posed. The teachers reported that the use of digital games in association with other activities means that the students are more attentive and motivated, because anteriorly to this dynamic, the students had difficulty concentrating on activities proposed by the teacher, were agitated in the classroom and ended up not completing the tasks, which culminated in a poor school performance.

It was also reported that in subsequent evaluations of these activities, which included the use of digital games, these students with learning difficulties had performed as well as students.

Lima 2011 (cited Marques 2001) indicate that the use of educational software, can be seen, starting from the playful experience and reflection of it, that in the child's point of view, are the most fun way to learn. The educational software can be used for learning concepts that can be difficult to be assimilated by the fact that there are no immediate practical applications.

It is important to not only use a digital game, but also to place them within a teaching methodology that proposes dynamic differentiated use of educational materials integrated to propose better understanding of content, including those students who have greater difficulties. Therefore, it is important to note that most children correctly answered questions about the presented history and related to grammar. The teachers also indicated positive points such as promoting autonomy, reasoning, visual coordination in the choice of answers, self-control and patience to wait their turn; which shows the children's focus and understanding of the rules for the proposed task.

Finally, the research group in question proposes to continue the use of these new technologies in embedded education in new methodological proposals for both children with learning difficulties and the regular classroom, inserting new content in the game to match its use in different disciplines.

5 CONCLUSION

The main objective of the game is to help the student to study, and it can also be used as a method of assessment, while it may help

the teacher to reinforce the contents of the subject in a dynamic way and arouse the interest of the student since digital games are increasingly inserted in the reality of children.

Keeping in mind that "(...) digital games tend to take many hours of players and consume time that could be used in other activities such as study, for example"[4], the educational board game was developed so that it can make use of this potential, thus helping the academic development of students, in a generic but well directed way.

The Game is at present in terminal state to be a proper tool for the purpose of providing a generic scenario to be suitable for any discipline and to fit the desire of the teacher at any time and situation. As next steps an assessment of the game with both teachers and elementary school students will be made; the “Jogo de Tabuleiro Educacional” has been used in events at the college where it has been developed, and will be presented to a federal school in Rio soon.

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