



Comparison between two Development Platforms of Games to E-learning Courses

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Abstract

The actual level of the interaction between humans and computers is growing stronger every day. To follow the advent of technology, a lot of specific areas may use this as a good way to improve them. Education is one of them. No matter how much technology grows, the main problem of Education still remains: motivation. To solve this problem, many educators around the world are trying to use alternative teaching techniques. One of the most relevant techniques that may be used to engage students is the Gamification [1]. This alternative may be a good choice to raise the bond between people in any academic area. To integrate Gamification with Education is not an easy task. This requires efforts from all professionals involved, from the students to the educator's institutions [2]. To ease the path on making games focused on education, it is necessary to choose a good platform of development. The objective of this paper is to test and compare two development platforms: e-Adventure and GameMaker Studio. The e-Adventure platform is an environment created to further the development of educational games and simulations. It is Open Source, can be integrated with HTML5 and support the creation of point-and-click games and third-person games. The GameMaker Studio is a tool focused in rushing the development of games with a small team of developers. It is compatible with HTML5, Android, iOS, Mac OS and Windows. This platform has its own programming language, called GML. These two tools were tested with applications oriented for learning, considering programming language, interoperability, interface and support. A comparison between e-Adventure and GameMaker Studio was made to determine which one is the best choice to develop games to let students learn while playing.

1. Introduction

The dynamics of learning is a concern. The traditional classroom-based learning is the most common way to pass on information and knowledge. It is a fact that the classroom technique is an effective learning process. The interaction between students and instructors, and even students interactions, may be a great advantage of the traditional method. Nevertheless, there are disadvantages too. There is no flexibility on classroom-based learning, in what concerns the schedule [3]. It can be harsh for all the students to meet the schedule at the same time, delaying the learning process of a group in some cases. Other events may delay classes, like holidays, transit traffics, and all kind of unforeseen events, therefore, other means of learning may be necessary.

A meaningful method of teaching is the Distance Learning [4], which can be very flexible. Most of the problems of classroom-based learning are solved in this way. Another good point of this method is the easy accessibility of the content, especially in the web-based Distance Learning.

If well managed, Distance Learning may surpass the classroom-based learning, in what concerns knowledge retention. Some attributes of Distance Learning may be the reason for that result, like the individual attention, the time for learning and reflection and the motivation needed to use this way of learning [4].

However, this technique has some issues. The lack of entertainment may complicate the learning process to its full effectiveness.

Any educator who wants to elevate the level of interest of students needs to find a way to instigate them. A good way can be the Gamification. The main reason to use this method of learning is to lure the attention of the students. Gamification can be a great solution to optimize time and reduce the learning curve [4]. This method can provide entertainment and can be a good solution to Distance Learning.

Game development is hard work and needs a lot of planning. A development platform must be chosen to reach the final product. If the game requirements needs full integration with Distance Learning, the platform of development must favor this approach.



The goal of this work is to decide which platform is better to develop an educational game focused on Distance Learning. The chosen platforms to make a comparison and provide the best way to meet all the game requirements are e-Adventure and GameMaker: Studio.

This paper is organized in Background Chapter, which provides all the previous necessary knowledge to understand the importance of this comparison; Methodology Chapter that has the experiment description to reach the analysis results; Results Chapter, with the information extracted from the methodology and the knowledge acquired and; Conclusion Chapter, which contains the final analysis of the comparison.

2. Background

This chapter contains all the necessary knowledge to understand the goal of this paper.

2.1 Distance Learning

Distance Learning (DL), since its creation, has used several technologies to transfer knowledge between teacher and student. With the advent of communication and computation, some resources provided by the internet was incorporated to this education method, and today, the DL is applied in all teaching levels.

With the objective of amplifying the possibilities of access to knowledge, DL does not seek to substitute traditional classroom learning [5]. The main characteristic that differ traditional classroom-based learning and DL is the space separation between teachers and students. The contact is done through technological resource.

This modality of education has many advantages. The reach of a large number and diversity of people, the possibility to exercise the listen, debate and teamwork, the use of means of communications, such as television, radio and computer, and the development of independency and self-education are some examples.

Usually, people who decide to use DL as a resource cannot meet schedule of classrooms. Reasons that varying in aging problem, distance or lack of time. The main reason to use DL is to surpass the geographical difficulties, reduce costs and the democratization of education access [6].

The most recurrent perspective in research about online learning are that related to social constructivism, because of the fact that with the internet, the DL is presented as an important element in the education reform when it creates a global web of learning where the sharing of experiences and new knowledge amplifies and become more reachable [7].

2.2 Gamification

Gamification is the use of game mechanics in non-games applications [8]. Its most common use is the marketing application, to attract certain types of clients. One of the most famous uses of Gamification is the localization application *Foursquare*, which induces a client to check in several times in one place.

The use of Gamification may be extended to educational systems. Educational Gamification proposes the use of game-like rule systems, player experiences and cultural roles to shape learners' behavior [1]. In fact, Gamification techniques may raise the experience of learning, pushing the user to get achievements while learning and feel that his actions is being rewarded.

2.3 E-Adventure

E-Adventure is a game development platform created for making games and simulations focused in education and Virtual Learning Environments [9].

Developed by *Universidad Complutense de Madrid*, its main characteristic is that it has Open Source license, is written in Java language, it has the capacity to export games in .jar format, that is platform independent, there is a custom interface, has an easy integration with HTML5, supports real-time adaptive learning scenarios and point & click features.

There are some advantages in using e-Adventure platform. This tool has a low learning curve, making it easy to non-programmers to develop games, because of its intuitive design; The menus are well organized, making it easy to find all the resources; It is very light to run on any computer; it is supported by all common operational systems, like MAC OS, Windows and Linux; It is capable of producing Third Person Games with point-and-click features and First Person Games with static images; The debugger tool is useful and easy to understand; The algorithm of the platform is event based, and there are features of macros, variables, flags, timers and global states.



The cons of this platform are that its simplicity may limit the creativity and so as the fact that there is not an explicit program language. Beyond that, the community support is very limited and there are few materials to explore and few people working with this platform.

2.4 GameMaker Studio

GameMaker Studio is a private tool developed by the YoYo Games Company. The main objective of this game platform is the development of games with a small team of developers or even one person developer [10].

The features of this tool includes compatibility with the main platforms in the market, like Windows, MAC OS, Web, Android and iOS, there is a sprite editor, timelines, paths, room editor, a custom language called GameMaker Language (GML) and connection with external databases.

There are some pros using this game development platform that consists in good performance; Pretty and attractive design; The editors, if well handled, can be very powerful; It is easy to learn to non-programmers, but easier to anyone who knows the basic of programming; GML is very simple and object-oriented.

The cons consists in being a paid software with a free version very limited; The tool is focused almost exclusively in 2D development, despite the fact that there is 3D support; May limit the creativity of non-programmers, as the platform have few specifics events and timelines in the user interface, that can be better used with GML.

3. Methodology

An authoring tool offers a high level development environment and allows the developer to skip phases when specifying tasks. Authoring tools may be used to save authors from the complexity of creating software.

The development of games requires artistic talent, in the context of electronic games, to create all kind of media needed, such as sound and image media, beyond that, requires knowledge in programing and data transmission. The authoring tools focused on game development available nowadays do not require this depth of technical knowledge.

There are some authoring tools in the market focused in game development, and the goal of this chapter is to analyze two of them, the GameMaker Studio and the e-Adventure, taking these characteristics into consideration.

The attributes of GameMaker Studio that has meaning in the context of educational game creation is that it has all the properties of an authoring tool as specified before. The way a person can make games easily, the interactivity with external tools, the mechanisms that helps the user to reuse pre-constructed libraries and the support of all mainstream platforms in the market, make this tool a potential choice to making education games.

E-Adventure platform was made to facilitate the integration of educational games and Virtual Learning Environments and has all the features required to turn the game creation and Gamification easy and effective. Its authoring tools, integration with Learning Management System through export and the educational pattern like SCORM 1.2, and the capacity to export a game like an independent application or an applet for online education, makes this platform a good choice to create educational games in a short period.

This methodology implies a comparison in the main features of these two tools, in the context of educational games. The features must be analyzed with the focus in the importance to the e-learning resource.

4. Results

The comparison of the features of GameMaker Studio and e-Adventure is in Table 1.

Feature	GameMaker Studio	e-Adventure
Drag & Drop Interface	Yes (weak)	Yes (strong)
Programming Languages	Yes (GML)	No
2D/3D Graphics	2D/3D	2D
Physic Suport	Yes (Box 2D Physics)	No
Sound Effect & Music	Yes	Yes
Internal Code Editor	Yes	No



Multi-Plataform Export	Windows/Mac/Linux/iOS/Android/HTML5	Windows/Mac/Linux/HTML5
Database Connectivity	Yes (MySQL)	No
SCORM	No	Yes
Perfil	Private	OpenSource

Table 1. Comparison table between GameMaker Studio and e-Adventure

5. Conclusion

Observing the range of features offered by the two tools analyzed, we conclude that both converge to the availability of the same resources, with difference only in the development environment and application.

It is necessary to explain that the most important differences between the two platforms are in the concept of vision of development and synchronism of events. The known authoring tools focused in games are being adapted for the conception of authors of applications with new profiles.

Both platforms have its advantages in the conception of e-learning games and the best one can be adapted to any situation. Whoever wants simplicity – a platform that does not use programming methods and that follows educational patterns as SCORM – may choose e-Adventure; same goes for those that need to reduce the costs with licenses and time, e-Adventure is the best choice. Now GameMaker Studio presents more sophisticated planning features, thus, more creativity can be explored, so if the development team has professionals with programming skills, GameMaker Studio may be chosen.

The choice of a good development platform is up to the situation requirements, but both show excellent results.

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