

# SERIOUS GAMING HELPS CHILDREN VIEW HIGHWAY CODE FROM ANOTHER PERSPECTIVE

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## ABSTRACT

Technology has made great strides nowadays and continues to do so in a very rapid manner. Therefore, at the moment, it is not only used just for scientific but also for educational purposes. It is exactly for that reason that people have started to use e-learning platforms. These e-learning applications help students study with a very different perspective.

However, even though e-learning has improved significantly the way of studying, there are some general issues that do not meet the anticipated expectations, especially as students at earlier ages are concerned. Those problems could be alleviated via the implementation of aspects of serious gaming. In this essay a description of the theoretical background of serious gaming will be attempted. After that, significant benefits of Highway Code will be given, as well as and the proposed idea for future work and dissemination of the game.

## INTRODUCTION

Serious games refer to digital games used for purposes other than mere entertainment, but are used for advertising, training, education, or simulation that are designed to run on personal computers or video game consoles. They simulate environments and systems, and allow learners to experience cases that are not possible in the real life for reasons of safety, cost, time, etc. Analyses that have been conducted over the years consistently show that games promote learning.

Serious gaming is started being used for educational purposes a few years ago. Before that, people did not realize how many benefits serious gaming might had, the possibilities it presented and its full potential. Educational games transferred the learners to another world via experimental exercises. In those scenarios, the learners apply their skills, strategies and knowledge in order to manage the execution

of the roles assigned [2]. In other words, serious gaming is a new type of e-learning that changes the way that students perceive the learning process and make them wish to continue learning. It can be said that serious games originated from e-learning, after all serious gaming has been characterized as —the newest trend in e-learning (Marc Prensky, *Digital Game-Based Learning*, 2000). In addition to these, serious gaming engages the students to encourage behavioral changes. It also helps students improve their learning results through training in a restricted and controlled environment and develop their practical skills.

Moreover, the Federation of American Scientists suggest that kids from 8 to 18 years old usually spend approximately 50 minutes per day playing video games [3]. This means that they are already adequately familiar with that kind of technology.

Furthermore, serious games cannot be considered as a theory, at least not yet. Commonly, many websites describe serious games as wanting to achieve something more than entertainment, and considers it more of a movement than a defined area of its own. For example, it has been described as a movement that is —cross-appropriating video game techniques, technologies, tools and structures from the video game industry to other fields of human endeavor (outside of entertainment) like policy and management issues. However, the domain of serious gaming has potentials to become an important one, when developments will make its limits more specific, its purposes more clear and the games that will be created are more based on science (psychology, sociology etc.) to target specific areas of interest to the players.

## SERIOUS GAMES AND EDUCATION

Learning is acquiring new, or modifying existing, knowledge, behaviors, values, skills, or preferences and may involve synthesizing different types of information. The ability to learn is processed by humans, animals and some machines. [6]

A knowledgeable pedagogue who constructed and transmitted knowledge on a specific topic to people (learners) via

some accepted instructional technologies such as books, prelections, and articles is a typical procedure for learning. It was believed that this process is effective. The more isomorphism between the message sent and the message which is received, the better the communication. Also a better education can be achieved with more complete learning. However, there are seven main limitations of that learning paradigm. Bellow we mention those limitations: [7]

- This framework implies that learning and teaching are integral linked activities.
- The ultimate testing and skill acquisition and knowledge it is not usually for knowing but it is usually in the ability to use the knowledge appropriately.
- The paradigm that used in schools tends to emphasize the transmission of knowledge from an acknowledged special to individuals in isolation.
- Learning only what a person intends is not necessarily the most desirable.
- The physical layout of classrooms the structure of classes, and the traditional model transfers a number of metessages about knowledge creation, acquisition, and use.
- The classic model of education has small capacity to accommodate issues of emotion and the practical and theoretical link ages between affective, behavioral, and cognitive domains.
- Those traditional learning paradigms are often too predictable, unchallenging, and static. In other words we could say that are “boring”.

However, the dissemination of gaming, the need to create more engaging educational practices and the worldwide use of the Internet have led us to think serious games as a new type for training and education. Even though many people begun to see a potential for serious gaming because this could augment and supplement traditional typical education, it is believed that the potential of serious games is to offer a paradigm shift. This paradigm shift shows us how the education and training should be delivered in the 21st century. This paradigm shift will comprise the espousal of: “distributed tutoring models using avatar-driven scaffolded approaches, models of assessment and accreditation towards peer- and personalized modeling of the learner and provide an emphasis upon social interactive learning based upon dialogue and social interactions rather than tutor-based and individual study.”(S.Freitas & F. Liarakapis ). This would increase the opportunities for feedback loops and generally for synchronous feedback. It is also means the integration of multimodal interfaces (haptics and brain- computer interfaces). [8] As mentioned in previous section, serious gaming is used for educational purposes. The markets that serious games addresses are: educational games,military

games,corporate games, government games, ,healthcare games, and art,political, and religious games (Michael & Chen, 2006). Serious gaming could enhance education but the scenario of the game must be targeted according to each case. Games can be used as simulators for some educational purposes. In case that the actual training would be costly or dangerous, simulations in computer and serious gaming would be extremely helpful. But it would not be optimal for every type of education. Why for example to simulate a programming environment when you can practice on the actual computer environment. We should be careful how we use serious games because it can be helpful for all educational purposes but it should be well targeted. Do not create a simulation of a computer environment game but a game with critical questions and fast thinking about programming, as a learning software.

## **KNOWLEDGE TYPES THAT DEVELOPED BY USING SERIOUS GAMING**

Serious games players receive and process information, facts, and descriptions. The gamers also gain more skills through experience and education. Knowledge can be gained from serious gaming. Still there are things that cannot be transferred through serious gaming. Think of smell, sense, weather, injuries, hunger and tiredness. Take for example people that play car and racing games. They do not mind driving fast and reckless. That is because they know they will not get harmed. Also computers are trustworthy and consistent compared to human beings. Thus, there is a poor development in human social aspect. Knowledge types that can be developed using serious gaming:

- Communication knowledge is knowledge being transferred through symbols, imitation and observation, verbal exchange, and video and audio recordings. Throughout the era of videogames or serious games knowledge is being transferred through audio and video.
- Situated knowledge is knowledge specific to a particular situation. In the military they use serious gaming so the trainees and soldiers get familiar with certain situations.
- Tacit knowledge is sometimes referred to as know-how (Brown & Duguid 1998) and refers to intuitive, hard to designate knowledge that is largely experience based; it can be practical skill or expertise.
- Imperative knowledge: the knowledge exercised in the performance of some task. If through repetition one performs the same task, his performance will reach a higher level.
- Explicit knowledge: the knowledge that has been or can be articulated, codified, and stored in certain media.

- Embedded knowledge: the knowledge that is locked in culture, products, processes, routines, structures, or artifacts.

## **KNOWLEDGE PROCESSES THAT ARE SUPPORTED**

Serious gaming can support knowledge processes like hand and eye co-ordination, spatial awareness, memory en lateral thinking, cognitive thinking, self-assessment and analysis, spatial abilities, more accurate, the capacity for mental rotation. Serious gaming can also support people, job-specific skills, organization, communication skills, and strategy skills (Michael and Chen, 2006). Eventually the degree of skill and knowledge must be transferred from the virtual to the operational environment.

## **SOCIAL ASPECTS THAT INVOLVED IN SERIOUS GAMING**

Serious games are (digital) games used for purposes other than mere entertainment. Serious games can be applied to a broad spectrum of application areas, e.g. corporate, government, military, educational, and healthcare. It is noticeable that yet the concept is defined in many ways; definitions agree on some matters, but also vary depending on different perspectives and interests. Moreover, serious games encompass the same goals as edutainment, but extend far beyond teaching facts and rote memorization, and instead include all aspects of education – teaching, training, and informing – and at all ages (Michael & Chen, 2006). There are some aspects that involved in serious gaming. First of all, serious gamings allow the learners to experience situations that are not possible to experience in the real world for reasons of safety, cost, time, etc. That can also have positive impacts on the players, development of knowledge and of a number of different skills. Furthermore, serious gaming can support the development of a number of different skills, as discussed by Mitchell and Savill-Smith (2004); analytical and spatial skills, insight and strategic skills, learning and recollection capabilities, psychomotor skills, visual selective attention, etc. It is also used for improvement of problem recognition, self-monitoring, and problem solving, better long-term and short term memory, decision making, and increased social skills such as negotiation, collaboration, and shared decision making. Last but not least, gamers develop their thinking strategies towards more analogical thinking rather than trial-and-error thinking (Hong & Liu, 2003) and that game elements such as competitive scoring, role playing, and increasingly difficult levels have proven useful in corporate training (solution to business problems) Except from that, the categorization of serious games into a number of markets, provided by Michael and Chen (2006), is adopted. Video game playing has a number of advantages for the military, such as improved hand-eye coordination, the ability to work in a team using

minimal communication, improved multitasking skills, and the willingness to take aggressive action (Michael & Chen, 2006) Games that developed for the government may concern a number of different kinds of tasks and situations, like different types of crisis management, for instance, dealing with terrorist attacks, disease outbreaks, biohazards, health care policy issues, city planning, traffic control, firefighting, budget balancing, ethics training, and defensive driving (Michael & Chen, 2006; Squire & Jenkins, 2003). Games can help in the development of a number of various skills: planning, strategic thinking, group decision making, communication, and collaboration. Finally from a Healthcare perspective serious gaming has a number of advantages, such as *physical fitness, education in health/self-directed car, distraction therapy, recovery and rehabilitation, training and simulation, diagnosis and treatment of mental condition or mental illness, cognitive functioning, and control.*

## **SIGNIFICANT BENEFITS OF HIGHWAY CODE GAME**

The Highway Code serious game is developed in order to teach the children the Highway Code. Through that application children will be able to exercise and learn the signs. Except the basic goal of that application there are some other benefits that need to be referenced. It is noticeable that that these benefits have already discussed in previous sections. Children will have some benefits if they use that application. This application will help them to increase their skills and to obtain some different types of knowledge. Below we will mention some of the most significant benefits that obtained from the use of Highway Code:

- Situated knowledge
- Tacit knowledge
- Embedded knowledge that is locked in processes
- Hand and eye co-ordination
- Spatial awareness
- Memory en lateral thinking
- Cognitive thinking
- Self-assessment and analysis and
- Spatial abilities

## **STEPS THAT FOLLOWED DURING THE DEVELOPMENT PROCESS**

This mobile application is built for iPhone devices. It is built only for portrait mode. We used a platform in order to write and execute the code. The platform that we used is called Appcelerator Titanium. It is a platform for developing mobile, tablet and desktop applications using web technologies. In other words it is a phone web based application framework that allows web developers to apply existing skills in order to create native applications for iPhone and

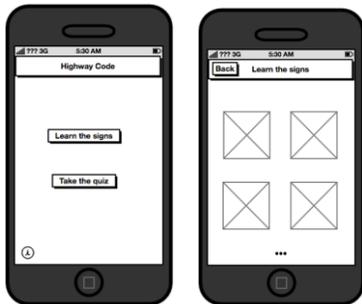
Android. [9] Users need to use JavaScript syntax. Also users need to learn the Titanium API. Titanium API is a framework which contains modules and components that developers can use for creating applications. Moreover, in order to complete our application we followed some steps; Brainstorming, creation of wireframes, writing the code, build the application. Below we will explain each step with more details.

## Brainstorming Analysis

The first think that we thought is that we need to create an application which will be helpful and innovative (as innovative as it could be nowadays) at the same time. Children have much less limited attention span than the adults. In order to concentrate on something they really need to have fun with it. Thus we thought about creating an application for children that will give them the opportunity to learn about the Highway Code.

## Creation Of Wireframes

Wireframes help us to analyze the characteristics that we wish to be concluded in an application. The application should be user friendly in order to motivate people to play with it. In screenshots bellow you can see how the application will look like.

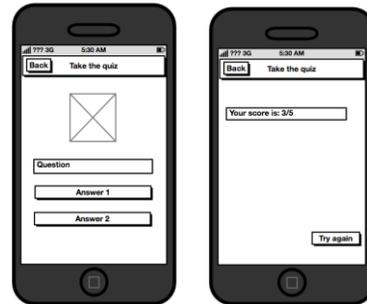


1. Main Window (left) and “Learn the signs” window (right)

The screen bellow is the main window of our application (Figure 1). In the top of the screen there is a label which contains the title “Highway Code” of the application. In the middle of the screen there are two buttons; “learn the signs”, and “take the quiz”. Users can tap on both buttons. The third button is the information button which is placed in the left down corner of the window. From main window, if we tap on the “Learn the signs” button we will be transferred to the window is shown in figure 1. This window does also have a label on the top of the screen with the title of the window. It does have a back button as well. If we tap on back button we will be transferred to main window. The main concept for the “Learn the Signs” window is to contain different signs and teach the users about the signs. Users can scroll through different views and watch different signs. They are able to tap on the signs. When they tap on the signs an alert is shown which contain information about the specific sign. If users click on “OK” button they will see again the whole view which contains the sings. It is noticea-

ble that the users are able to go back to main window from each view. For instance, if we have 4 views with sings and the user is watching the third, they can tap on the “Back” button and move to main window.

The other option from the main window is the “Take the Quiz” button. When you tap on that button you will be transferred to the appropriate window (figure 2). This window contains a label where the title “Take the Quiz” is showed. That window does also have a “Back” button which moves the users to the main window. The main idea of that window is to take a quiz based on the signs that have already showed in the “Learn the Sign” window. In the middle of the screen there is a label which contains the questions. Bellow there are two buttons. In the first button the first answer is showed. In the second button the second answer is shown respectively. When the user taps either on the first button or on the second button they will be transferred to next question. This procedure will continue until the quiz is finished. When the quiz is finished, a view with result will be showed (figure 2).



2. “Take the quiz” window (left) and Quiz Results (right)

## Writing The Code

As we mentioned above in order to write and execute the code we used the Titanium Platform. Bellow we will give you a first taste of what should be used in order to create a window, a button, and a label (which are the most common objects that we used).

- a. Create a window: `Ti.UI.createWindow({})`
- b. Create a label: `Ti.UI.createLabel({})`
- c. Create a view: `Ti.UI.createView({})`
- d. Create a button: `Ti.UI.createButton({})`

It is noticeable that inside the brackets we add different properties for each object such as position properties (top, left, right).

## Build The Application

Once we wrote the code we need to build the application and see the final results. The screenshots below will give you an insight of the application.



3. Main window (left) and “Learn the signs window” (right)



4. “Take a quiz” window (left) and “Quiz results” (right)

## DISSEMINATION OF THE GAME

The Highway Code game will be uploaded in the Apple store as it is an application for iPhone devices. This application will be free of charge. That means that this application could attract more people to download it than if it would cost some money. Moreover, in order to achieve a bigger dissemination of the game we should focus on it is wise to focus on schools. If teachers could understand the importance of that application it should be easier to persuade the children to download the application. Highway Code is something important for our everyday life. Thus it would be good if people be taught that from their early ages. Another group of people that we should target is the parents group. We could reach that group via social networks. We could create for instance a group on Facebook or Twitter where we will describe the main aspects of the application. That will be helpful for parents because they are always concern about their children. This application is a tool that could reduce their concern. As we mentioned before children generally have limited attention span so it would be easier to learn the signs through that application than to read a book for example.

## FUTURE WORK

For future work we need to think out of the box. We

should be focused on how children perceive reality and add some characteristics that improve their social skills. For instance we could design a community that children can talk with other children. The latter seems of high importance, especially considering that nowadays children are used to play at home, more often than not alone, thus not interacting with one another. Another perspective for our game is to design more intelligent and adaptive tools. Those tools will give the opportunity to children with special needs to use that application as well. For instance, children who are blind or have a percentage of blindness will not be able to read the quiz questions. Thus, we should create a system that tackles that problem.

## CONCLUSION

In this paper an attempt to decipher how aspects of serious gaming can achieve better results in educating children in a much more efficient way than the traditional learning methods. Children are in a lot of ways pretty different from adults. Therefore, it is only reasonable to make some adaptations in order optimum results to be achieved. This paper has given some insight about serious games and some ideas on how an educational game aiming at children wanting to learn about Highway Code can be implemented. However, a lot more can be done, but that could be the subject of further research.

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