Learning Technology Games

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Abstract: *The introduction of new technology into society has created a need for interactive content that can maximise the potential of technical advancements. Serious games, often known as educational games, are examples of such content: they are video games or interactive programmes whose primary objective is to give not only enjoyment but also training in areas such as health, marketing, education, and so on. This study examines many situations of effective serious games and their impact on the learning process, analyses tutoring as the key to leading the learning process via serious games, and explores what types of abilities and talents may be gained through such games. Citizens must be prepared to face future difficulties in this time of financial, economic, and social catastrophe, and each citizen's particular values must be respected. connected to those of society as a whole. Serious games are the ideal instrument for attaining these goals and effectively transferring information and ideals.*

Keywords: Tutoring, Serious Games, and Game-Based Learning.

I. INTRODUCTION

1.1 The Emergence of Serious Games

A. Their Potential

There is no universal definition of serious games, however they are commonly defined as games used for training, advertising, simulation, or teaching. Other meanings include the use of gaming concepts, technology, and ideas in non-entertainment uses. In 1970, Clark Act was the first author to utilise this word. Serious games, he believes, are good teaching and training tools for students of all ages in a variety of scenarios because they are highly motivating and effectively transmit the principles and facts of many disciplines. They provide us with a fertile ground for risk-free active study of critical intellectual and social issues (Act, 1970). Serious games are simulations of real-world events or processes that are meant to solve a problem (Sawyer, 2002). Although serious games may be enjoyable, their primary function is to instruct or educate users; however, they may also serve other functions such as marketing or advertising. A game is a physical or mental contest governed by particular rules, with the objective of entertaining or rewarding the player. A video game is a mental contest played with a computer under specific rules for amusement, recreation, or winning a stake, whereas a serious game is "a mental contest played with a computer under specific rules that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives" (Zyda, 2005).

The restoration of fun has given rise to the notion of edutainment (Prensky 2001; Gee 2007). The generally held belief is that the joy and wealth of experience obtained throughout the game will improve learners' interest in the subject. In general, they are meant to balance the subject matter with the game play and the player's capacity to recall and apply that subject matter in the real world. Video games are not the enemy; rather, they represent the biggest chance we have to involve our children in a meaningful learning process (Prensky 2003). Michel et al. (2009) splits the history of serious games into four periods: first, with the introduction of learning machines and Pressey's Drum Tutor in 1924, learners got interested in serious games. They are accountable for their own education. Then, in 1946, the MIT Whirlwind project introduced simulation, allowing military airline pilots to train in a controlled environment. Learning was then accomplished by trial and error in a methodical manner. As a result, the condition of flow (Cskszentmihályi, 1990) and immersion increased. Simulators were available to the general public with the democratisation of video games. Michel et al. (2009) ends their research by claiming that simulation games have steadily grown professionalised since the early 2000s:

Games are being employed in professional training again, but this time in a broader sense and not just for the learning of technical abilities. Serious games might thus be defined as technologies and video game platforms with goals other

than mere enjoyment (Michael & Chen, 2006; Vorderer & Ritterfeld, 2009). The linked virtual experience appears to be designed to re-engage trainees. On the other hand, the potential of video games as learning vectors was recognised from the beginning (Malone and Lepper, 1987). Several institutional investigations (Federation of American Scientists, 2006; Project Tomorrow, 2008) verified the premise that video games could give players with abilities that were beneficial on a degree course and could also be applied to the commercial sector. Some experts, however, argue that the fundamental usefulness of games as a tool of teaching should be moderated (de Freitas, 2006; Pivec & Pivec, 2009). There are two basic reasons for this: on the one hand, the use of serious games in education is relatively new. On the other hand, because little is known about the usage of serious games in education, data collecting is a priority (Ulicsak & Wright, 2010).

Moreover, certain projects were carried out; for example, in 2002, the "Woodrow Wilson International Centre" for Scholars in Washington D.C. developed a "Woodrow Wilson International Centre" for Scholars "terrific Games Initiative "to stimulate the creation of games that address policy and management challenges. In its 2008 report, Project Tomorrow stated that educational games allow today's kids to be well equipped to be tomorrow's innovators, leaders, and involved citizens of the globe (Project Tomorrow, 2008). As a result, there is a lot of interest these days in serious games for formal education, professional training, healthcare, advertising, public policy, and social change. Furthermore, games have evolved into a new sort of interactive material, and game play provides an interactive, collaborative learning platform: Computer games that enable collaborative learning generate new ideas while exchanging knowledge, simplifying issues, and resolving tasks (Pivec & Pivec, 2011).

Serious games' potential is also obvious in the fact that they can be simply modified to any technical format and utilised on desktop equipment or mobile devices of various types, such as iPads and tablets. However, before they are implemented, several considerations must be made: who the target audience is, how much time is available for the games, and what skills and competencies are to be fostered. Based on these considerations, it must be determined which platforms are most suitable for their implementation. All platforms are referred to as "multiplatform." sorts of digital content. The introduction of programming tools like as HTML5 (at the Internet browser level) and UNITY for downloaded applications on mobile devices allows serious games to be built on several platforms at the same time.

B. The Relevancy of Tutoring

One of the most important characteristics of successful educational games is their ability to keep an individual learner motivated and interested by adapting the individual learning. and gaming experience to the requirements, interests, objectives, and skills of individual learner (Kickmeier-Rust et al 2011). The function of the tutor is critical in doing this, and various scholars are researching in this field. The concept stems from the field of adaptive/intelligent tutoring in traditional technology-supported teaching and learning, which was inspired by Benjamin Bloom, who stated in 1984 that students who received one-on-one tutoring performed on par with the top two percent of those receiving classroom instruction. Since then, psychologists, educators, and technicians have worked to create technology capable of acting as a private teacher and intelligently offering personalised instruction. Students who receive appropriate tutoring. The range of methodologies, methods, frameworks, and applications available is highly diverse (De Bra, 2008; Kinshuk, Lin, & Patel, 2006). Tutoring and dynamization are required for serious games; without them, the learning process is incomplete (Garris et al, 2002). This coaching allows any anomalous conduct on the user's side to be watched and aids in the prevention of improper behaviour, which is theoretically feasible but socially undesirable (Wainess, 2007). It also promotes the importance that serious games provide to the educational process (on-site or on-line learning processes). The project Participating in tutoring is essential for leading the learning process during serious games. Some studies (Reese, 2007; Kearney and Pivec, 2007 b) argue that serious games aid not just in learning but also in the user's training in the virtual environment in which the game is played. The tutor serves as an advisor in the educational process: he or she not only imparts information to a passive user, as in the conventional education system, but the user actively contributes. his/her past talents and expertise to the society. As a result, instructors and students must communicate and collaborate throughout the educational process (Pivec & Pivec, 2011). Following the implementation of each choice, the instructor solicits input. Serious games require two things: solid coaching and a dynamic atmosphere. Otherwise, the learning process will be halted (Garris et al, 2002). This teaching allows any odd conduct on the user's side to be watched and assists in avoiding improper behaviour that is feasible but socially undesirable (Wainess, 2007) It also

promotes the importance that serious games provide to the educational process (on-site or on-line learning processes). Tutoring is essential for directing the learning process in serious games, and it should include the following tasks.

- Certain essential points: Making a list of the goals to be sought in the serious games employed.
- Creating a teaching guide to establish which topics will be reinforced by the serious games and which competencies will be promoted.
- Defining a structure for the instructor to follow while also determining whether the objectives have been reached. In this regard, there must be continuous feedback to resolve any areas that may discourage the user (he/she is unable to continue the game; he/she is having difficulties or has started poorly).
- evaluating the engagement options supplied, how and when the game prompts moments of reflection in the user experience, and what assessment methods it can handle for assessing the user experience the learner's knowledge and comprehension (Michel et al, 2009).
- The use of serious games as a learning approach in early training must take into consideration the learner profiles, particularly their prior knowledge in the topic studied. This might be monitored with appropriate instruction.

C. Serious games that are simple to create and deploy

We will focus on "academic serious games" that are utilised for simulation in early training.

Panel

According to several study (Reese, 2007; Kearney and Pivec, 2007 b), serious games not only aid in the learning process but also expand players' understanding of the virtual world. The game's universe or virtual area in which it takes place. In this game, players must answer questions on five different themes at five different degrees of difficulty. The format of this game is question and answer. When a player on one team does not know the answer, the question might be answered by the next team. The rows represent the five themes, while the columns represent the five levels of difficulty. The goal is to get the greatest possible score. It is a television-formatted game featuring several environmental-related issues intended at various age groups. categories ranging from preschool to senior school. Serious games have also been utilised in vocational training centres, driving schools, and training programmes in private and public-sector enterprises to stimulate entrepreneurship and management. The "Panel" simulator, which is designed to reinforce curriculum and assist trainees in obtaining a truck driver's licence (called CAP in Spain), and the online Clio Cup driving simulator, which correctly reproduces many features of this automobile racing championship in Spain, are two examples. The driving school that utilised this game is pleased with the results: 85% of users passed their truck-driving exam (Figure 1). They are currently thinking about utilising another game to help folks who are preparing to take their driver's licence exam. This game was also utilised at the University of Salamanca in Spain to reinforce students' understanding of a marketing-related subject taught on the degree course in Economics and Management. The learner satisfaction rating was 7.8 out of 10. Students described the game's structure as exciting and stimulating. It piqued their interest and allowed them to study, compete, and play all at the same time.

Figure 1. Screen from the Panel game

D. Games for Learning Vocabulary and Numbers.

Tik Tak Hitzak and Tik Tak Zenbakiak are two games for kids aged six and up. The first is used to teach fundamental Basque, Spanish, and English vocabulary. The second example is utilised to enhance children's numeracy abilities in fundamental operations such as adds, subtractions, multiplications \sand divisions. It has a character named Punttu who assumes the shape of a punctuation mark and looks after the language. The goal is for players to assist him in guessing the phrase or number that should appear beneath each photo in order to achieve the highest possible score. During these games, images come on the screen, and the main character must fill in the gaps with the aid of the learner. In this snapshot, the main character "Punttu" (the blue dot in the centre of the screen) is dealing with bulls that arrive out of nowhere and try to prevent him from completing the level. These activities have been employed in various Basque primary schools, and all of the instructors engaged report that the experience was quite positive: pupils learned new vocabulary simply and entertainingly.

Figure 2. Example of Tik tak hitzak

These activities have been implemented in various Basque primary schools, and all of the instructors engaged report that the experience was quite positive: pupils learned new terms. Furthermore, when teachers used these activities in class, all students showed a better degree of attentiveness. "Punttu" must cope with birds that try to distract him in this game. Both games are highly beneficial in helping young children acquire fundamental language and basic arithmetic processes, according to 82.35% of parents who have gamed with their children. As a result, they regard them as useful instruments for increasing children's learning.

E. Games based on Trivial Pursuit and the Goose Game

These are tabletop games. Users must respond to questions divided into five categories relating to various themes. In education, this sort of game is used to generate questions and responses. The questions are organised into courses and areas that are connected to the curriculum of a given educational stage. Such games (America's Army, Triage Trainer) are now being utilised in adult education with topics such as sustainability, environmental issues, and management. Goose is also known as Snakes and Ladders in certain places (Great Britain or USA). The game "A Day on the Trail," for example, is undeniably active and enjoyable. This game teaches youngsters about green pathways in a fun, interesting, and unique way. It comprises of a virtual board that resembles a green path, complete with tunnels, bridges, stations, and plants. as well as animals. This game was created for the Fundación de los Ferrocarriles Espaoles to raise awareness of the former railway lines that have been converted into walking paths. The players move along the green route while answering questions on the trail's geography, environment, cultural history, environmental issues such as sustainability, health, and road safety, and so on. It's an educational game for kids aged 8 to 12, and there are two levels to pick from.

Figure 3. Sample of the game "A Day on The Trail"

Because of the wide range of subjects and issues covered, not only the children but also their parents learned a lot from this game. It has been utilised in Spanish elementary and secondary schools to concentrate on human and environmental assets. Teachers appreciate its simplicity and the way it stimulates youngsters. They like its blend of fun and instruction, which allows them to engage youngsters in their own learning.

II. COMPLEX SERIOUS GAMES FOR WORKING ON CONTENTS, CAPACITIES AND COMPETENCES: GAMES FOR RAISING COMPETENCES AND SKILLS: THE "ISLAND" GAME

2.1 Development of the Game

These kinds of games are used to encourage creativity among engineering students at universities and vocational training centres. Sustainability, cooperation, solidarity, invention, creativity, problem-solving, continuous improvement, energy efficiency, mathematical precision, initiative, goal attainment, result orientation, adaptability, and working with the environment are typical qualities and talents that these games foster. The player is the mayor of the island, and his or her goal is to maximise the wellbeing of the population (by making the greatest use of natural resources, R&D, and infrastructure). He or she must manage the island's economy in order to create the best sustainable balance. Users on this island have access to a variety of non-renewable energy sources, including oil, natural gas, and uranium. They also have renewable energy sources, such as water, sunlight, and wind.

Figure 4. Screenshot of the "Island" Game

Furthermore, because they reside on an island, they are required to handle the little space provided in a nutshell, the player is elected mayor of the island, and his or her duty is to make the best use of the resources available. The strategies employed must take into account the applicable framework of limits, precisely as it does in reality in public resource management, i.e., a budget consisting of revenue and spending, as well as any new difficulties that may arise as a result of the decisions made and the actions taken. There is a lot of room involved.

2.2 Abilities and Skills that can be worked on in the "Island" Game

Sustainability: According to the platform, the environment to be managed is extremely fragile, and only very cautious management that considers the environment as a whole is possible. The valued asset will allow the goals to be met. The spirit of invention: The key to progress in the game is for the player to see innovation as an essential distinguishing aspect that functions as a competitiveness driver. This mindset is especially important when it becomes evident that strategic expenditures in R&D&i are nearly always required if appropriate development is to be made [it is hard to produce excellent outcomes without investing in research]. In any case, the programme allows the user to demonstrate his or her spirit of creativity by applying innovative solutions to challenges that may be handled in a short period of time. Initiative and entrepreneurship: Because the game does not designate a course to be followed, but rather gives several possibilities directly or indirectly, it is up to the user, as the manager of the island, to make the various decisions. Users are rewarded for taking the initiative to anticipate potential difficulties. Furthermore, the programme is tied to entrepreneurial processes in that the user assumes control of an island that will see significant demographic expansion in relative terms. Problem-solving: As users administer the island, unexpected occurrences may develop that must be dealt with as effectively as possible. Budget constraints will force management to make difficult decisions. Difficulties that must be resolved by evaluating what is best for the citizens. Users cannot foresee everything that will happen in the upcoming seasons with confidence. Climate, river levels, population flows, and so on can be anticipated but not proven. Taking chances may yield positive benefits, but the public will not forget any mistakes made. Whether or not risks are taken will be determined by each user's profile, his or her proclivity to take chances, and his or her ability to appropriately appraise the scenarios that may develop. Continuous improvement: The game is all about always bettering oneself. The population will continue to increase and transfer between ancient and new cities, resulting in the manager's challenges will get increasingly challenging. Quality orientation: The alternatives in the game that provide the best overall outcomes are seldom the cheapest, but rather those that add quality aspects to the island. In certain cases, the cheapest methods may serve as solutions, but in the long run, research, investment in telecommunications, renewable energy sources, and so on are the greatest ways to achieve success. The importance of work: It requires effort to achieve the goal of making progress season after season. Mathematical abilities: Many of the judgements that must be taken need the capacity to perform mathematical calculations, estimate the possibility of one event or another occurring, and identify which points of equilibrium permit the best outcomes. outcomes to be reached. Mathematical abilities must also be employed to extract information from the application, the current environment, and previous experiences. Analytical abilities: When it comes to making judgements, the capacity to assess all available information is unquestionably important. It is critical that users meticulously document all of the information that they can possibly locate in each season for reference in later assessments. Capability for planning and organisation: This refers to the ability to successfully establish the ends, objectives, aims, and priorities of the tasks to be completed; to organise activities, and so on. their timeliness and the resources required, as well as to monitor the procedures implemented. The game's time-frame is broad enough [many virtual years] that adequate planning skills are necessary. Strategy skills: On numerous situations, some objectives must be abandoned and resources saved: Current goals must be set aside in order to gain bigger advantages in the future. Technological competence: judgements must be made with the knowledge that advanced technologies are being used. Capabilities in information management refer to the capacity to seek, choose, arrange, relate, analyse, and value information from various sources. Independent learning: The capacity to direct one's own learning with increasing independence, creating initiative and responsibility from one's own learning. The application's manual is merely the tip of the iceberg: when its explanations are insufficient, it is up to the user to draw inferences and identify which courses of action may provide the best outcomes (even if such actions were not included in the explanations offered to him/her). Adaptability to various environments: This refers to the ability to

adjust to various settings. The game's time-frame is broad enough [many virtual years] that adequate planning skills are necessary.

Strategy skills: On many situations, some objectives must be abandoned and resources must be saved: Present goals must be sacrificed in order to reap bigger rewards in the future. Technological competence: judgements must be made with the knowledge that advanced technologies are being used. Capabilities in information management refer to the capacity to seek, choose, arrange, relate, analyse, and value information from various sources.

Independent learning: The capacity to direct one's own learning with increasing independence, creating initiative and responsibility from one's own learning. The instruction manual for the Only the application is the tip of the iceberg: When its explanations are insufficient, it is up to the user to draw inferences and choose which courses of action may provide the greatest outcomes (even if such activities were not included in the explanations provided).

Adaptability to various environments: This refers to the ability to adjust to various settings. The randomization of the game, danger, the diversity of the flows across seasons, and so on may place the player in quite diverse gameplay settings from one season to the next. Creativity is the capacity to come up with novel solutions to old problems and circumstances. The platform suggests certain norms of engagement with an environment. and an operating system, but they may be controlled in very different ways, and thinking outside the box may provide positive outcomes.

Accuracy: The capacity to be precise and pay attention to every aspect of the judgements to be made. The burden of managing an entire island and all of its resources is enormous. No area should be overlooked, and only excellent, all-around management can optimise one's chances of advancing season after season.

Resource management: The manager has only limited resources to strive to achieve the goals set: a budget that should ideally avoid a high tax burden, oil reserves that are depleting, and even limited physical space. Because we are on an island. Success in the game is dependent on prudent resource management, the ability to save, and the ability to invest in the correct assets at the right moment.

2.3 The Outcomes of Playing the "Island" Game

For the past two years, the Provincial Council of Vizcaya in the Basque Country has held a tournament featuring the serious game of the Island. Participants include 300 students from universities and vocational schools. The competition's goal is to teach and cultivate in young people skills and talents in innovation, entrepreneurship, sustainability, public-sector economics, natural resource management, initiative, client orientation, and public awareness. An examination of the findings indicates the following: 70% of users received a high enough citizen rating to pass the first case set and go to the second. 80% of participants were pursuing technical degrees or vocational training modules. 85% of users rated the game as "very good" or "good" for teaching how to run a public-sector economy with its natural resources and public services. infrastructures so as to promote the wellbeing of inhabitants, while 15% regarded it as "fair" or "unsuitable". 90% of the teaching staff who support the students in question believe that the game contributes significantly to their learning and provides them with practical experience in how public institutions manage natural resources and public infrastructures in order to achieve a sustainable balance and increase societal welfare. This project provides a dynamic manner of imparting and cultivating a culture of innovation, competencies, and skills for the Provincial Council of Vizcaya in the Basque Country. among the young people who will be the future administrators of the province, focused towards excellent public administration of \resources with a view to insuring greater social and economic \development. In order to set up the energy and water infrastructures used in the game, technical experts from the Basque Government-dependent organisation Ente Vasco de Energy ["Basque Energy Organization"] and civil engineering consultants from the Water Directorate at the Regional Government of Cantabria's Department of the Environment were enlisted. For the serious game, mathematical methods were developed to serve as the foundation for a mathematical model that links the findings collected from the many endogenous variables derived through the data entered in the exogenous variables that form part of the complete model. The ordinary least squares (OLS) or linear least squares model was utilised in this investigation. It is a technique for estimating unknown parameters in a linear regression model. The sum of squared vertical distances between the observed answers in the dataset and the expected responses by the linear approximation is minimised by this technique. In the case of a single regressor on the right side, the resultant estimator may be stated by a simple formula (Greene, 2002)

2.4 Variables to Consider

After estimating the model, we concluded that three factors were not very important in explaining the appraisal of increased abilities after playing the game. These factors were the gentle, the age, and the studies, thus they were left out of the model. The gentle is irrelevant for studying the acquired abilities and the age.

In the sample, we choose a certain age range of students between the ages of 18 and 26. Because both types of students (university and vocational training students) have the same technical profile, this variable has no meaningful impact. As a result, the final model is displayed below.

III. MULTIPLE EXPLANATORY VARIABLES OLS REGRESSION

	Coefficient	Deviance	t-Statistic	P-value	Significance
const	11.2976	1.60391	7.0438	<0.00001	***
Aim	6.99099	1.24073	5.6346	<0.00001	***
Games_Score	1.0398	0.341108	3.0483	0.00251	***
Eva__Previous_Skills	0.728603	0.0387086	18.8228	<0.00001	***
Hours_Of_Work	0.850597	0.130969	6.4947	<0.00001	***

After we have excluded the no significant variables, the generated model indicates that the remaining variables are individually significant, with t-statistics greater than two.

F-statistics $F_{(4,295)} = 635.438$ (p-value less than 0.000001).

Analysing the computed regression coefficients reveals that, as expected, independent factors have a positive impact on the dependent variable. This is due to the association that exists between one of each independent variable and the evaluation of acquired abilities after playing the game. On the other hand, we achieve a satisfactory statistical alignment because 89% of the volatility in the dependent variable has been corrected. As a result, we can infer that this model is adequate for considering the impact of utilising this game to increase the student's skills after using the game.

IV. CONCLUSION

Because of the numerous instances of effective serious games investigated in this research, we may infer that serious games have a high potential for training. Users' learning processes are improved as a result. This is because they draw users in a simple, dynamic manner and transform them into protagonists of their own learning processes. Serious games strive to be more than just entertainment: they want to be a system that reinforces learning in a dynamic, interactive, motivating, and enjoyable way. Serious games are adaptable enough to work on any device, including PCs, Macs, mobile phones, iPad, and tablets. HTML 5 and Unity are the ideal technologies for them. Tutoring is essential in serious games for two reasons: first, it enhances the learning process; second, tutoring aids users in achieving their goals while playing the game; and third, tutoring is fun. Third, it provides a monitoring tool to deter users from engaging in improper activity. If serious games are employed as a learning approach in early training, the learner profiles, particularly their prior expertise in the area studied, must be considered. Good tutoring can help with this. Gamification (the use of game thinking and game mechanics in a non-game setting to engage people and solve issues) can be used in serious games to give a solution in any training process in any theme area. In the framework of our society, it must be emphasised that in these tough times of financial, economic, and social crises, citizens must be prepared to face the consequences. future difficulties, and each citizen's particular ideals must be combined with those of society as a whole. Serious games are the ideal tool for achieving these goals, for attractively and efficiently transmitting content and values, and for improving abilities and skills such as sustainability, strategic capabilities, information management capabilities, creativity, accuracy, responsibility and planning, and organisational capabilities. According to the Game of Island and an ordinary least squares model, we may conclude that most students improved their grades after playing the games. Sustainability, cooperation, solidarity, invention, creativity, problem-solving, continuous improvement, energy efficiency, mathematical precision, initiative, goal attainment, result orientation, adaptability, and working with the environment are all qualities that are required. This is because the game has a favourable impact on the learning process, as the findings of the econometric model reveal.

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