ROLE OF EDUCATIONAL GAMES IMPROVES MEANINGFUL LEARNING

By

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ABSTRACT

A game is a set of activities involving one or more players. It has goals, constraints, payoffs, and consequences. A game is rule-guided and artificial in some respects. (Richard Wilson, 2010). According to Garris et al. (2002), define educational game play as "voluntary, nonproductive, and separate from the real world"; and they found that the fantasy, goals, sensory stimuli, challenge, mystery, and control are the six features that characterize games. Generally, a game an activity must include several basic characteristics. The activity is usually a contest of physical or mental skills and strengths, requiring the participant(s) to follow a specific set of rules in order to attain a goal. Gaming is defined as being separate from simulation and is defined, in a basic sense, as any overt instructional or learning format that involves competition and is rule-guided (Dempsey et al, 1994)

Three distinct styles can be formulated from the history of computer and video games. As an audiovisual style of games categorize into three styles viz., (i) photorealism, (ii) caricaturism and (iii) abstractionism and the first one has its subcategories of televisualism and illusionism.

With respect to thinking process in Games Play, the Students thinking processes is always related to achieve a focused improvement of solution by asking questions like what to change in games, why its changes and how to cause the change. Due to these questions they can achieve the following concepts of thinking processing skills by educational games. They are lateral thinking, reasoning, problem solving, information processing, a mental representation and higher-order learning.

This paper discusses the types of educational games, motivational games, objectives of educational games, and Research studies in Educational games, games and edutainment, how audiovisual styles used for the students and the pedagogical design with its challenges. This paper also deals with how audio visual learning occurs for the students while playing educational games with its six nutshell characteristics (Dimension, Point of perception; Visual outlook; Audiovisual Motifs; Soundscape and Senso-motorism).

This paper explains the future of educational games and Games which incorporate multimedia technologies may improve other aspects of higher order skills. If properly planned and tuned the games structure and the topic, the user can be achieved their goals.

Keywords: Educational Games, Game Based Learning, Edutainment.

INTRODUCTION

A game is a set of activities involving one or more players. It has goals, constraints, payoffs, and consequences. A game is rule-guided and artificial in some respects. (Wilson, R, 2010). According to Garris,R & Robert Ahlers (2002), define educational game play as "voluntary, nonproductive, and separate from the real world"; and they found that the fantasy, goals, sensory stimuli, challenge, mystery, and control are the six features that characterize games. Generally, a game an activity must include several basic characteristics. The activity is usually a contest of physical or mental skills and strengths, requiring the participant(s) to follow a specific set of rules in order to attain a goal.

Fantasy is a genre of fiction that commonly uses magic and other supernatural phenomena as a primary element

of plot, theme or setting; where as Simulation is the imitation of some real thing, state of affairs, or process. The act of simulating something generally entails representing certain key characteristics or behaviours of a selected physical or abstract system. (Dumpsey J.V; Karen Rasmussen & Barbara Lucassen. 1994). They also defined; a simulation is the process of forming an abstract model from a real situation in order to understand the impact of modifications and the effect of introducing various strategies on the situation.

Pierfy, D.A (1977) evaluated the results of 22 simulation-based training game effectiveness studies to determine patterns in training effectiveness across games. Twenty-one of the studies collected learning data that generally consisted of paper-and-pencil fact-and-principle knowledge tests.

Types of Computer Games

According to Jan G.Hogle (1996) Computer games can be categorized into seven different types such as., adventure, simulation, competition, cooperation, programming, puzzle and business management. Using fantasies, mental images and non-real situations in computer games can stimulate learners' behaviour. Computer games have the potential to motivate learners and be used as effective instructional tools (David Williamson Shaffer, 2010). According to Squire, K. (2005), Computer games can give the opportunity to learners to explore their imagination comfortably.

Games can collect large volumes of information on student behaviour as they solve problems, and organize that information in real time (David Williamson Shaffer, 2010). The current fantasy gaming world not only includes online games, but also table top role playing games, live-action role playing games, war games, board games and collectible card games. In Europe 60 % females and 40 % males are interested in mix of cultural games in their life role (Copier Marinka, 2005).

Educational Games

Good educational games are always fun and intrinsically motivating. They incorporate an optimal challenge, have an appropriate goal and to provide clear, constructive, encouraging feedback, and offer elements of curiosity.

In many offices, approved gaming in the workplace is limited to the receptionist's engagement in rounds of Minesweeper or Solitaire when the phone isn't ringing. A number of companies have found that using video games as a way to reward employees for reaching their goals or increasing their productivity as well as their job morale. The UK video games sector is not just important economically and culturally; the TIGA industry, especially through the use of serious educational video games, has the potential to enhance learning and training. (Wilson, R, 2010).

Video games presence and popularity have been ever-growing now days. They have become one of the most popular entertainment activities for people of all ages including children. In market, some of the games have educational content and promote learning, problem solving and help with the development of motor skills and coordination: others emphasize negative themes and promote killing, fighting, foul language, criminal behaviour and violence in general. Parents should take care about these video utilities while in educational purpose.

Motivational games

The motivational game-like features may increase students' attention and ultimately enhance teaching (Sandford, R.M. & Ulicsak, K & Facer, and Rudd, T. 2006). Concerning motivation, they indicate that adding game embellishments may increase students' motivation in the short term. However, in the long-term, it may have negative effects because when students are back to classroom work, they may find the subject matter boring; thus, their interest may decrease. From the other perspective, they discuss that these motivational features can have positive effects. Similarly, Garris, R. & Robert Ahlers (2002) reported that incorporating game features in instruction had increased motivation and consequently produced greater attention and retention.

Research in Educational Games

In 2005, the Digital Games Research Group (DGRG) at the University of Washington presented a model of engagement in games that was informed by diverse disciplines including game design theory, presence literature from virtual reality (VR) and simulations research, narrative immersion from literary theory, and motivation

literature from psychology and cognitive science (Mark G. Chen, 2009). Chen's study has demonstrated the positive effects of computer-based instructional games on motivation and learning. Chen found that, in applying traditional game theory to multiplayer computer games, not enough attention has been given to actual player practice in local settings.

The effects of educational video game usage study was done by University of Minnesota, University of Rochester, Massachusetts Institute of Technology (MIT), and Vanderbilt University researchers and the group began studying the physical and psychological benefits of playing video games (White,R.2008). They found that the educational Video games form a really natural environment where visual and motor skills are improves, and the repetitive use seems to be a way to gain these skills.

Copier Marinka, (2005) found out that, educational games are enhancing learning, because it increases children's enjoyment, attention, effort, and concentration skills. Digital games and Virtual worlds have the potential to be an important teaching tool because of interactive, engaging and immersive activities (Gee, J. & Shaffer, D. 2010). Games are used in education – informal and formal; Simulations can act as a safe introduction to various vocational careers (Squire, K. 2005).

Games are teaching and assess 21st century skills, such as problem solving, collaboration, negotiation etc. Currently games are more likely to be used if they can be seen to inspire, or there is a direct link to the curriculum. The criterion for using a game is often whether it will make the teacher's life easier or the game fits into existing lesson structures. In order to determine if the game will make life easier the teacher needs to assess whether the game will enhance their students' learning. This requires time to learn and comprehend the game. In 2006, Teaching with Games project was started in U.K. (Sandford, R.M. & Ulicsak, K & Facer, and Rudd, T 2006) and the teachers to select assess and blend games into current teaching practice.

Video games are based on good learning principles and they can create deep learning experiences that significantly develop student understanding. They also teach vital skills that counteract the short-sightedness of high-stakes tests. As a subject, History stands much to gain from the use of video games as they encourage strategic thinking through decision-making, weighing evidence, and assessing consequences (Chatfield,T. 2010). The Games for Learning institute (Gfli) was set up at New York University in 2008 to study what makes computer games engaging and educationally effective. In USA, simulations and games for higher education special interest group was started in the year 2006, in University of Wisconsin-Madison for professional practice.

Digital Games Research Association (DiGRA) is the association for academics and professionals who research digital games and associated phenomena in Finland, 2003. It encourages high-quality research on games, and promotes collaboration and dissemination of work by educationists. It aims to co-ordinate activities related to academic research of games in different disciplines, in different parts of the world. Games form only one part of teaching practice and should be used as part of a blended learning approach that is, as one method of conveying and assessing learning amongst others (de Freitas, S & Oliver, M., 2006)

In a 1980 study of pre-adolescent boys in Israel, Seginer attempted to compare gaming ability with traditional academic competence. Seginer's study suggested that gaming ability differs from academic ability in at least three respects: (i) successful gaming strategies may require the ability to perceive relationships rather than command language, (ii) cognitive processes involved in gaming may be more independent from self perceptions of confidence and control, and (iii) gaming is not directly affected by social background or status (Dempsey.J.V; Karen Rasmussen & Barbara Lucassen 1994 Seginer, R. (1980).

Objectives of Educational Games

The major objectives identified for any game outside the physical constraints (available machines, licenses etc) are; (i) The background of the player(s) (age, language, experience, prior knowledge, preferred learning styles, etc); (ii) The learning goals; (iii) The game content, that is, the factual knowledge contained, experiences, mechanics and activities, relate to the learning goals; (iv) Integral of the content to the game mechanics, processes, experience

of playing as well as the art assets or copy, and is its acquisition required in order to progress; (v) The game engage in the learners - is it immersive; (vi) The game have a learning curve (i.e., do the players improve through repeated play), appropriate feedback, clear progression etc; (vii) Level of fidelity is appropriate; (viii) Learning be transferred beyond the game context; (ix) Other practices and training; and (x) Retention rate, i.e., how long will the players remember the learning, will the game have.

If educational games are to become mainstream classroom tools teachers need support to; (i) identify what games are available that meet their learning objectives; (ii) how they can best be integrated into lessons given the context and (iii) how learning can be assessed. Such metrics need to be shared by teachers and developers so there is a common language to describe and use games.

The audiovisual styles

An audiovisual style of games categorized into three styles viz., (i) photorealism, (ii) caricaturism and (iii) abstractionism and the first one has its subcategories of televisualism and illusionism.

Photorealism

The game contains a deep-focus shot of an actual object, scenery, etc. For example, adventure games (1a) Televisualism: The game contains the instant replay and multiple camera view features. For example, sports games and (1b) Illusionism: The game contains fantastic and imaginary science fictions. The imaginary things are represented with photorealistic life-likeness, and the result is an illusion of unreal worlds, things and beings actually existing. For example, aliens games.

Caricaturism

The game refers to caricaturist depictions of characters and objects found in comics and cartoons. In a caricature, the representation of a character or an object is simplified down to its most characteristic features of non-photographic one; for example, final fantasy games.

Abstractionism

The game does not simulate characters or easily recognizable places; it is about pure forms. As we have noted, games simulate at least an environment, if nothing else. Abstractionism not very suitable for creating narrative contexts to accompany the game play, as often happens nowadays, such as natural picture games

Pedagogical design & Challenges

The teachers who were frustrated by how student can easily memorize the names and abilities of more number of cartoon pictures; but hate learning the same information about real animals. Actually the majority of students play video games easily, but the majority of teachers do not. Games are powerful contexts for learning because they make it possible to create virtual worlds, and because acting in such worlds makes it possible to develop the situated understandings, effective social practices, powerful identities, shared values, and ways of thinking of important communities of practice.

Doctors know how to create more doctors; lawyers know how to create more lawyers; the same is true for a host of other socially-valued communities of practice. Thus we can imagine a range of epistemic games in which players learn biology by working as a surgeon, history by writing as a journalist, mathematics by designing buildings as an architect, geography by fighting as a soldier and Chemistry by opening a laboratory.

Video games are used to build an educational system in which students learn to work (and thus to think) imaginarily as doctors, lawyers, architects, engineers, journalists, and other important members of the community. The animated frames provides students with an opportunity to see the world in a variety of ways that are fundamentally grounded in meaningful activity and well aligned with the core skills, habits, and understandings of a post-industrial society (David Williamson Shaffer, 2010).

Thinking process in Games Play

Computer games are designed to measure player performance and progress. Students play these games because they enjoy solving problems in the games. The students thinking processes is always related to achieve a focused improvement of solution by asking questions like what to change in games, why its changes and how to cause the change. Due to these questions, students can achieve the following concepts of thinking processing skills by educational games. Lateral thinking is solving problems

through an indirect and creative approach, using reasoning that is not immediately obvious and involving ideas that may not be obtainable by using only traditional step-by-step logic. For example, puzzle on throwing balls.

Reasoning is closely identified with the ability to self-consciously change beliefs, attitudes and therefore with the capacity for freedom and self-determination such as mind- challenging games. Problem solving is a mental process and is part of the larger problem process that includes problem finding and problem shaping. For example games on leadership. Information processing is the change (processing) of information in any manner detectable by an observer such as avatar games. A mental representation, in philosophy of mind, cognitive psychology, neuroscience, and cognitive science is a hypothetical internal cognitive symbol that represents external reality. For example space involvement games. Higher-order learning is required for more cognitive processing than others, but also has more generalized benefits such as skills involving analysis games.

Audio Visual Leaning in Educational games

Through Educational Games, the students should develop the four audio visual learning process skills viz.,

- *Vision Perception skills:* The students need to understand, analyze, and interpret what they see are called visual perception.

- *Tracking skills:* These skills allow students to follow a line of print without losing their place. It is an Oculomotor Cranial nerves (maintains an open eyelid) system that lets us accurately direct their eye movements.

- *Focusing skills:* These skills allow students to see clearly, especially up-close. At the close ranges required for reading, this is the visual skill needed to maintain clear sharp images for extended periods of time and

- *Eye-teaming skills:* The ability to use both eyes as a "team," or a single functioning pair, is what allows the students brain to fuse the two separate pictures coming in from each eye into a single image.

The audiovisual appearance of a game is born in similar fashion as with buildings. Three elements can be discerned from all computer and video games viz., (i) space/environment

(football field); (ii) different objects (characters, things etc.); and (iii) symbols (point counters, health meters, descriptions, help texts etc.).

According to Jarvinen, A (2002), the audio visual environments of a game are built in the following:
Dimension

It affects strongly the experience the sense of environment, i.e. being in another place. Environment is a keyword when discussing games at a general level. (3D-adventures)

Point of perception

It is the position from which the player perceives, i.e. both sees and hears, what goes on in the game environment such as a map route. Visual outlook: It happens with so-called textures and polygons. If the game characters and environments are a result of fictional settings, the visual outlook is the result of graphic design. For example, sports stadiums view.

Audiovisual Motifs

Characters and environments are synchronized and with audio visual materials such as War games effects.

Soundscape

The two different types of sounds viz., (i) Diegetic (style of representation in fiction) sound is a form of sound that originates from the source game environment. (Bird singing) and (ii) Non-diegetic sound equals the musical soundtrack that changes according to the events in the game and it coming from the source outside space. For example, shoot sound effects.

Senso-motorism

It accounts for the player's haptic senses to interact with the information s/he gets through eyes and ears. (Flying objects effects).

Future of Educational Games

Our students will learn from Educational games. The questions are; who will create these games and will they be based on sound theories of learning and socially conscious educational practices? We need to understand how game players develop effective social practices and skills in navigating complex systems, and how those skills can support learning in other complex domains. And most of

all, we need to influence these understandings to build games that develop for players the epistemic frames of scientists, engineers, lawyers, and other valued communities of practice-as well as games that can help transform those practices for experienced professionals.

Games are tools, they can help us explore and understand issues, and train for various circumstances. Yet they rely on how they are interpreted, by the player or by support for the player, in order to change behaviour. There are many advocates for using games in their leisure to enhance learning. (Gee, J.P, 2005). Moreover, the number of educational games with a research basis, that is, designed to address an educational need using theory, is increasing. The potential of digital games as learning tools will increase given the improving underlying technology, availability of kit, increasing interaction techniques, software's ability to process data, and the increase in gamers. (Joint Information Systems Committee, 2007).

Teacher-based constraints include identifying an appropriate game, finding time to learn it, identifying what learning the student can gain, integrating it amongst the other learning tools within the lesson plans along with developing assessment techniques (Squire, K. 2005; Sandford, R.M. & Ulicsak, K & Facer, and Rudd, T 2006). As discussed, although games have been described as ideal assessment engines (Gee & Shaffer 2010) there is still a need to agree what needs to be assessed. The incorporation of assessment needs to be integral to the task - be it learning factual knowledge, social skills or procedures.

However there is little research data on how games are used and how successfully they are integrated into teaching practice. There is no data about what subjects currently benefit from games, or how they are used by teachers. Furthermore, such data could highlight to other teachers what is available and along with case studies illustrate possible usage. Secondly, teachers need to become more aware of what is available and how they can best be integrated and assessed. Finally, teachers and developers need to work together to agree not only subject topics but also in learning goals and its assessment; So that teachers are confident learning has occurred when a

game has been used. The first challenge is games, perhaps for their anti-authoritarian aesthetics and inherently anti-puritanical values, can be seen as challenging to institutional education. The next challenge for game and school designers alike is to understand how to shape learning in terms of games, and how to integrate games and game based learning environments into the predominant arena for learning schools.

Games and Edutainment

Realistically, the complexity of video games makes it hard to see a place for them in contemporary schools, where depth of understanding is overwhelmed by breadth of content coverage, and students are often used to narrow, easy success. A heavily standardized school system designed to provide shallow content coverage would need to shift to a flexible school system based on deep individual learning experiences.

Teachers are expressing increasing interest in the educational benefits of video games and they are searching for professional development in how to use video games effectively in the classroom. While video games are now commonly accepted as having educational potential, research is needed into how this might translate into classroom practice.

Educational video games are considered a type of serious game, as these games have a strong purpose other than pure entertainment. Some people call these types of games edutainment because they combine education and entertainment. An educational computer game can be defined as an electronic medium with all the characteristics of a gaming environment that have intended educational outcomes targeted at specific groups of learners. Educational simulations use rigorously structured scenarios with a highly refined set of rules, challenges, and strategies which are carefully designed to develop specific competencies that can be directly transferred into the real world.

Marc Prensky (2001) believes that we are on the verge of video games becoming much more realistic, experiential, and immersive. However the successful take up of video games in schools will rely on much more than significant improvement in the quality of educational video games.

Gee, J.P (2005) points out one of the major impediments of translating videogame principles into classroom practices. Research suggests that gaming in its various forms can motivate and interest learners increase retention of subject material (Dempsey.J.V; Karen Rasmussen & Barbara Lucassen, 1994; Pierfy, D.A 1977), and improve reasoning skills and higher order thinking (Michael Zyda, 2005).

When designing games to provide practice, developers should consider results found when comparing behaviorism and cognitive framework designs. Game designers operating under principles of behaviorism usually create almost error-proof practice, anticipating that total success would be most effective and motivating.

Games are fun engaging activities usually used purely for entertainment, but they may also allow people to gain exposure to a particular set of motions, or ideas. Without the inclusion of learning goals (pedagogy) the games are merely simulation games. If there is no simulation the results are edutainment games, often with a simplistic format. The mode of game types are:

- Educational Stimulations (Flight Simulators, war games)
- Educational Games (Class Games, Challenge & Serious Games)
- Highly Interactive Virtual Environments (Virtual Classrooms)

Any educational game software can be installed directly on the local computer or the school server and it shared online via Internet. With the development of computers and increasing their accessibility for children, youth and adults were started to explore computer games. It has been shown that action video game players have better hand – eye coordination and visual –motor skills, such as their resistance to distraction, their sensitivity to information in the peripheral vision and their ability to count briefly presented objects, than non-player. (Green, C. Shawn, Bavelier, Daphne, 2003)

Game Based Learning

Games which incorporate multimedia technologies may improve other aspects of higher order skills. Multimedia is yet a relatively unexplored area, touted as a many-faceted contributor to the development of cognitive skills.

Educational games have the potential to change the landscape of education as we know it. We will make it possible to use educational games to move our system of education towards a new model of learning through meaningful activity in virtual worlds as preparation for meaningful activity in technology-rich, real world. The Universities and NCERT like higher bodies can conduct workshops and seminars with instructional designers, game developers and teachers to identify areas that would benefit from instruction via games. In future, while development and the application of educational games, we must take care in the concepts of directions in design, changing phenomenon in learning, trends in curriculum contexts, emergence of collective culture, develop gaming literacy etc.

Educational games may offer a wide variety of benefits; It Increases in interest and motivation, as well as improvement of retention and higher order thinking skills. The studies have shown to the benefits of effective utility of Games Based Learning (GBL) are in particular learners who enjoy learning with games (de Freitas, S & Oliver, M., 2006) and therefore its most effective use may need to be differentiated accordingly to learners' specific requirements (For example, their learning level, required competencies and skills).

Educational – games are opening up new potential for learning in formal situations and in innovative ways. The emergence of Game based learning (Joint Information Systems Committee , 2007) is offering the learning and teaching communities new opportunities to reach and motivate hard-to engage learner groups, support differentiated and personalized learning, address vocational and training-based course materials and provide new tools for teaching basic and key skills, science and mathematics education.

Conclusion

Many research studies emphasize the potential negative influences of violent games on students' increased level of aggression (Subrahmanyam, K., Greenfield, P., Kraut, R. & Gross, E. (2001). Uhlmann,E & Swanson,J (2004) underline the risks of violence theme in games and suggest that children may learn aggressive behaviors automatically by

playing violent computer games. Quake-like games are preferred mostly by children to play and are regarded as quite enjoyable ones; therefore they may be used to increase motivation and to enhance the students' mouse-keyboard usage skills. However, violent content that they include may cause more serious problems.

Educational games are played using the Internet, computer or television can help children learn about spelling, math, reading and also other subjects. They may also increase students' interest in schools. But even though educational games are helpful, it can also have some disadvantages, affecting students both mentally and physically by its violence depths. It's important for our child to interact with the world around him and spend time with his friends and family. We can set time limits for playing educational games, to prevent him from wasting time and to improve their study. Parents and teachers are explained to their wards / students about the games are only fantasy, not a real life.

To sum up, the authors have found that suitable computer games may be used by teachers in learning /teaching process. However, teachers have a responsibility to decide on the class level and the part of the curriculum to which the game fits most. In addition, the themes that the games include should be investigated carefully to prevent negative influences surpass the positive ones. Even though some of the negative attitudes are developed from computer games and video games; it is also be enhanced the students innovative knowledge in scientific learning environments. Teachers and teacher trainees must be motivated to make use of the Educational games in their teaching learning strategies and to develop an innovative process in their future.

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