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STRATEGIES FOR MOTIVATING THE PLAYERS IN VIDEO GAMES AND THEIR APPLICABILITY TO EDUCATIONAL GAMES

Assoc. Prof. Aneliya Ivanova, PhD
Department of Computing,
University of Ruse, Bulgaria
Phone: +359 82 888 827
E-mail: aivanova@uni-ruse.bg

Ivaylo Borisov, MSc
Department of Computing,
University of Ruse, Bulgaria
E-mail: i_business@abv.bg

Abstract: *In the midst of the digital revolution, the massive digitalization of all areas of human activity and the advancement of digital technologies, video games in all their formats and genres are a leading entertainment industry. As a form of entertainment, especially among the younger generation, they are already displacing not only television, cinema, and music, but also social networks. According to the latest data, the gaming industry globally reaches a value of over $ 300 billion, and the new formation of users seeking social communication in the gaming space drives it to expand to a new level. And while video games are becoming more and more immersive, engaging, and motivating, educational games are still looking for a successful strategy to transform the learning process into an engaging experience for the students. Among the reasons for the poor success of educational games is the inability to be provided sufficient funding to create an attractive, highly interactive environment, competitive with video games. Another reason is the lack of symbiosis between educational and gaming components in the game, and exploiting the game element as a form of reward after the completion of the training part, which places the latter still in the area of boring activities. In the majority of educational games there is no storyline with characters and avatars, which generally helps to build a personal connection with the game. Another reason that can be pointed out is the poorly designed reward system in educational games, which is, as discussed below, a major factor in motivating, engaging and holding the attention and interest. In a successful educational game, the learning material must be woven into the most intriguing parts of the game and presented as a valuable asset to the player. This requires analysing the way players perceive video games, what attracts, challenges, encourages and engages them in a game to continue the interaction with it. The paper examines the motivation and engagement in the context of Self-Determination Theory, focusing on extrinsic and intrinsic motivation and how they intertwine to drive a person to develop and upgrade their skills and competences. The strategies for engaging and holding the interest of the players in video games and their influence on the motivation are considered in the same context. Based on the performed analysis and taking into account the general specifics of the educational game, a framework of a reward system is proposed, which would provoke and encourage more active and intrinsic motivated interaction.*

Keywords: *Educational Games, Video Games, Motivation, Engagement, Reward System.*

INTRODUCTION

In the midst of the digital revolution, the massive digitalization of all areas of human activity and the advancement of digital technologies, video games in all their formats and genres are a leading entertainment industry. As a form of entertainment, especially among the younger generation, they are already displacing not only television, cinema and music, but also social networks. According to the latest data, the gaming industry globally reaches a value of over $300 billion, and the new formation of users seeking social communication in the gaming space drives it to expand to a new level. And while video games are becoming more and more immersive, engaging, and motivating, educational games are still looking for a successful strategy to transform the learning process into an engaging experience for the students.

The first reason for the poor success of educational games is the fact that such games are often designed by professionals who do not understand the subculture of entertainment games,

which, like all cultures, has its uniqueness, ideology, conventions, attitudes and specific jargon (King, D., Delfabbro, P. & Griffiths, M., 2009).

Another reason is the inability to be provided sufficient funding to create an attractive highly interactive environment, competitive with video games. Next reason is the lack of symbiosis between educational and gaming components in the game, and exploiting the game component as a form of reward after the completion of the training part, which places the latter still in the area of boring activities. In the majority of educational games there is no storyline with characters and avatars, which generally helps to build a personal connection with the game. Another reason that can be pointed out is the poorly designed reward system in educational games, which is, as discussed below, a major factor in motivating, engaging and holding the attention and interest of gamers. In a successful educational game, the learning material must be woven into the most intriguing parts of the game and presented as a valuable asset to the player. This requires analysing the way players perceive video games, what attracts, challenges, encourages and engages them in a game to continue the interaction with it. The paper examines the motivation and engagement in the context of Self-Determination Theory, focusing on extrinsic and intrinsic motivation and how they combine to drive a person to develop and upgrade his skills and competences. The strategies for engaging and holding the interest of the players in video games and their influence on the motivation are considered in the same context. Based on the performed analysis and taking into account the general specifics of the educational game, a framework of a reward system is proposed, which would provoke and encourage more active and intrinsic motivated interaction.

EXPOSITION

Motivation of video game players

The motivation is related to energy, focus and persistence - the main aspects of activity and intention and is highly valued for one of its main properties: it produces (Ryan, R. M., & Deci, E. L., 2000).

The *intrinsic motivation* refers to behavior in the absence of external stimuli, which is associated with interesting and enjoyable experiences and it defines the natural urge to seek novelties and challenges, to expand and refine skills, to explore and learn. (Niemiec, C. P., & Ryan, R. M., 2009). When the individual is intrinsically motivated, he plays, explores, has fun, and engages in challenges. Intrinsic motivation satisfies three basic human needs: the need for competence, the need for autonomy, and the need for connectivity.

The *extrinsic motivation* refers to the behavior that pursues a result that is distinguishable from the activity itself. Four types of extrinsic motivation are defined, the least autonomous among them being the external regulation, where behavior aims to obtain a reward or avoid a punishment. This motivation cannot be maintained for a long period of time after the controlling factor is removed and it is exactly the motivation typical for the traditional educational process. It is important to note that the factors which can improve the external motivation, such as rewards, pressure, or grades, usually undermine the intrinsic motivation, and this makes it even more interesting how video games, despite providing many rewards, still manage to keep both the intrinsic and extrinsic motivation of its players for years.

In (Przybylski, A. K., Rigby, C. S. & Ryan, R. M., 2010) a motivational model of video games is derived in the context of the above definitions of intrinsic and extrinsic motivation. The model covers the following aspects: (1) *competence*: the balance between the player's skills and the challenges of the game remains a major concern in video games industry and plays a key role in meeting the need for competence; (2) *autonomy*: the modern video games manage to provide the players with a balance between their boundless curiosity and the limited set of resources and skills by generating new content, and maintaining sufficient opportunities and choices for each player; (3) *connectivity*: the modern MMORPGs (Massively Multiplayer Online Role-Playing Game) provide to the players an access to a virtual world in which they have the opportunity for both competitive and cooperative group play in small temporary groups or in permanent large clans or guilds, using the communication tools in the game; (4) *mastering the control*: the modern

console and desktop video games place the player in a virtual world, rich in visual interaction, in which all the actions of the avatar are performed using specific controls. The players have to take their time to learn to operate in this virtual environment and to master the game mechanics. Mastering the control plays an important role in players' motivation as one of the necessary conditions for achieving a satisfying game.

Strategies for engaging the players in video games

The growth of the gaming industry and the strong motivational appeal of video games' digital worlds encourage more careful research in this area and search for useful engagement strategies to apply in the design and development of next-generation learning environments, (Rigby, S. C. & Przybylski, A. K., 2009), in particular educational games. The more realistic video games become, the more the question of motivation comes hand-in-hand with the question: "What exactly is a good gaming experience?" It is already well known that players seek in a video game a fantasy experience, a kind of escape from the stress of everyday life and socialization in the context of the virtual world of the game. Whatever the specific reason is, there is no doubt that in order to be successful, the video games must provide a fascinating experience through which the players can immerse themselves in the virtual world. This requires an emotional connection, which is built through strong visceral reactions to game events (astonishment for the landscape, surprise from a sudden attack, intense battle with a powerful enemy) or through long-term emotions (empathy for the characters in the game and their story). In (Nogueira, P., Rodrigues, R., Oliveira, E. C. & Nacke, L. E., 2013) the following definition is given for the establishment of these connections: "*A process through which users' emotional responses are induced by a set of carefully chosen stimuli, aimed at eliciting a certain emotional state or pattern over time.*"

When the immersion is discussed, (Leino, O., Wirman, H. & Fernandez, A., 2008) distinguish four types of it: *spatial immersion* representing the shift of the player's attention to the game spaces, *ludic immersion*, which occurs when the abilities of the player and the level of challenge of the game are balanced, *narrative immersion* dealing with the future development of the story and *social immersion*, which is related to the social space in the game.

According to (Dickey, M.D., 2005) the engagement strategies in video games include three main factors: *player positioning*, *narrative*, and *interactive choice*. With the advancement of technology, along with the improvement of virtual worlds in games, it had become possible for the player to move from an observational position to a *first-person experience* position. The new *positioning* allows players to become part of the game world while revealing information, encountering events and performing actions, moving through the graphical environment. The *narrative* (story) in video games can be realized by two approaches: *plot-oriented* and *role-oriented*. The first approach relies on complex scenarios with many active characters, with the dominant focus set to plot development through the actions of the characters. The second approach relies on the development of complex characters, as the player identifies with a specific character and the actions in the game gravitate towards him, as usually the avatar undertakes a mission or journey and the plot develops around them. The narrative consists of two components - a *backstory*, which underlies the story developed in the game and aims to give a dramatic context of the action, and *excerpts*, representing separate elements of the development of the story, which are revealed in the course of the game and could be distinguished as episodes from a video story, chapters from a book, or dialogues with NPC (non-player characters). The purpose of the excerpts is to move the plot by creating and keeping the appropriate mood of the players, and hence the emotional connection with the game. The more opportunities the player has through his choice to participate in the creation and development of characters and the course of the story, the more successful the narration. And here is the place of the next factor - the *interactive choice*. Even the most basic video game from the very beginning allows the player to create a character (avatar) in an interactive mode, and successful games provide a variety of options to choose from, so that the player can develop a character, who they not only sympathize with, but also whose role the player is ready to take on. The interaction with each game is based on rules. In addition to defining

permissible and impermissible actions, they also set the conditions for winning or losing a competition, or for completing or failing a mission or challenge. In the course of the game, the choices the player makes relate to actions, resources, tactics, strategies and time. It can be concluded that the commitment to the game environment is achieved by interweaving several aspects: *time* (epoch, seasons, change of day and night), *setting and environment* (geography, environment, architecture, cultural aspects), *emotional* and *ethical*.

(Schoenau-Fog H., 2012) proposes a four-component framework modelling the player's engagement process. Each component embraces several categories, which give a detailed specification of the user experience in a certain aspect. The components of the framework include *Objectives* (*extrinsic* and *intrinsic*), *Activities* (*solving, sensing, interfacing, exploration, experimentation, creation, destruction, experiencing the story, experiencing the characters* and *socializing*), *Accomplishments* (*achievements*, *progression* and *completion*) and *Affects* (*positive, negative* and *absorption*).

Another natural question is: "Which are the stimuli that most affect players?" In (Van Dooren, M., Visch, V. & Spijkerman, R., 2019) an experiment is discussed with adolescents who participated in a math game with three types of prizes - monetary, virtual points, and social rewards – praises for good achievement. The results showed a dominant interest and a positive attitude towards the monetary prize. It is no coincidence that in all video games the basic rewards are given necessarily in a form of coins from the currency of the game. The same source also draws attention to the risk of acclimatization of the player to the rewards, which requires application of dynamics in the reward system. The dynamics of the rewards could be achieved by giving random additional surprise rewards for each completed task, progressive increase of rewards with the player's progress, rewards of type "Surprise box", submission of unexpected prizes during the game session, etc.

Classification of reward systems in video games

Although the games themselves are seen as a rewarding experience, the types of rewards they provide to the player are still poorly understood, and a better understanding of them would benefit the *gamification* (application of game elements in major areas of human activity) (Phillips, C., Johnson, D. & Wyeth, P., 2013). The empirical research to classify reward systems in video games is very limited and still no unified model of such a system could be identified. However, the different perspectives in which researchers discuss these systems provide certain basis for analysis. In (Hallford, N. & Hallford, J., 2001) a reward taxonomy is introduced, that focuses on the nature of the rewards without taking into account the mechanics of the game. This classification is built in the context of role-playing games and distinguish four conceptually different types of rewards:

• *Rewards of Access* – unlock the access to new levels, places, or resources, which have been previously unavailable.

• *Rewards of Facility* – allow the player's avatar to perform actions, which were impossible for him before or improve existing skills in some way (in all games with a level system).

• *Rewards of Sustenance* – maintenance rewards are given to the player in order to maintain his status quo or are an option to keep his assets for a longer period of time. Such rewards are extra lives or extra energy.

• *Rewards of Glory* – such prizes that do not directly contribute to the player's dominance in the gameplay, but rather embrace a range of different reward systems such as collection points, titles for defeating a difficult opponent and other challenges and achievements which raise the player's expertise and rating in the gaming community.

(Wang, H. & Sun, C. T., 2012) in turn, while seeking an answer to the question of how rewards and reward mechanisms affect the different types of players, give a classification, which takes into account the mechanics of the game. They define eight categories of rewards and four characteristics for each of them. Categories include:

• *Score System* – reflects the performance of the player, does not affect the gameplay and serves rather as a self-assessment and comparison to other players. It can be considered as a reward of glory.

• *Experience Points* – such points are won during the gameplay and contribute to level up. They can be associated with the rewards of facility as they lead to improved avatar skills or the strengthening of an attribute.

• *Virtual Items* – reward in the form of virtual objects used by the player's avatar (clothes, weapons, transportation). It can be recognized as a reward of glory and facility. Such rewards encourage the player to actively explore the virtual world and are considered highly supportive.

• *Resources* – valuables collected and used to improve the gameplay (ores, wood, plants, stones). Resource gathering is one of the sustenance rewards and often dominates the game sessions.

• *Achievements* – special points and/or titles awarded to the player or avatar when performing tricky and time-consuming tasks, often on a higher difficulty. This type of reward is seen as a reward of glory.

• *Feedback* in the form of animations, video, audio and text messages – to provide a direct praise in the game.

• *Unlocking Mechanisms* – access to game content after certain conditions are fulfilled. Associated with the rewards of access. When it comes to increasing interest, one of the most important characteristics of the game, provoking the intrinsic motivation, is the submission of partial information or limited access to places and resources. The gradually unlocking of content and reaching the desired places, resources and items is the reward which the player earns by completing tasks and missions in the game.

A framework of a reward system in an educational game

After a thorough analysis of research in the field (Dickey, MD, 2005), argues that video game strategies can be integrated into different types of educational environments and activities as long as they correspond to the active learning paradigm in which the student plays a central role in constructing of his knowledge. Such are the problem-based learning, project-based learning, case solving and educational games and simulations.

Video games in the educational process can not only intrigue and retain students' interest in the subject taught, but, properly selected, they can also help to increase the attention and concentration. (Ramos, D.K. & Melo, H.M., 2019). Games with such an effect are, for example, tangrams, Tetris, quick detection of objects on the screen, memorizing and pointing to the correct sequence of colours, shapes or sounds, solving a riddle, solving a jig-saw puzzle, memory cards, etc. The inclusion of such "small" games as a mission "solve the mystery" in the main game and linking them to special rewards will increase the motivation while improving attention, concentration, memory and visual-motor coordination.

The prerequisites for the concept of the framework are as follows: the educational game has a story with at least one main character and a set of NPCs. Each player has the opportunity to create an avatar and choose its backstory from several options. There are mini-games embedded in the game, as well as hidden objects and side missions.

The proposed framework of a reward system in an educational game is based on a step-climbing model of improvement (Fig. 1), the main purpose of which is to ensure the acquisition and mastering of knowledge while keeping the balance between resources, efforts, skills, abilities and rewards in the game.

The following categories of rewards are distinguished:

• Virtual Resources;

• Virtual Items;

• Rewards of Access – unlocked story episodes and learning items (experience points);

- Reward Keys (unlocking mechanisms);
- Rewards of Knowledge (experience points);
- Rewards of Achievements (achievements);
- Rewards of Mastery (achievements).

On Fig. 2 is shown a framework of a reward system in an educational game. In this initial version of it the focus is set to the learning part of the game, assuming that the presented organization of knowledge acquisition and refinement happens in a context of a storyline. Initially the player has an unlocked access to the first learning resource, but at first, the resource has to be found and then assimilated. After the completion of the resource (proven by a simple test) the system provides the key to the next resource. The sequence of learning resources, forming a separate module of learning content, ends with a test, the successful completion of which is prized with a reward of knowledge.

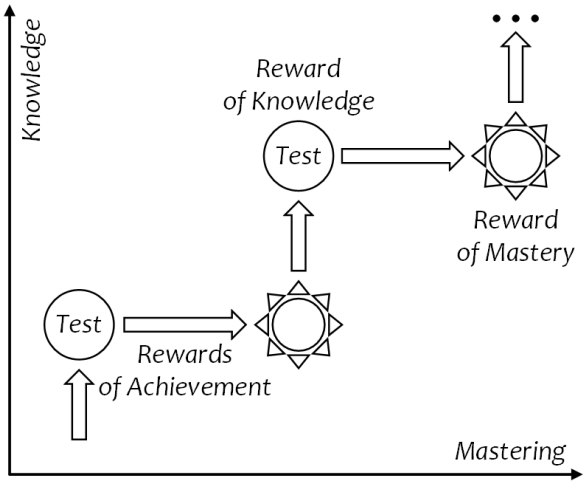

Fig. 1. A step-climbing model of improvement

The next stage is dedicated to mastering – the player is given several tasks with increasing difficulty, each of them giving an achievement reward upon successful completion. When all the rewards of achievement are gained, associated to current module, the player receives a reward of mastery. Every 10 masteries, a special prize is awarded to the player. This reward has an influence to the real educational process – for example, it could give an excellent grade to the student, or neutralize a poor one.

The player is not allowed to go to the mastering mode while the module's test is not completed with sufficient success. The same goes for the achievement tasks – if the first of them is not successfully solved, the player will not go to the next level. The mastering of knowledge for this player will reach only the first level of achievement scale and no mastery reward will be gained.

During the course of unlocking the learning resources, the game will offer side activities – playing small games, helping NPCs to solve a riddle, and finding hidden objects, which will give the player virtual items and virtual resources. These rewards will provide some benefits – for example, clues to the places where learning resources are hidden, additional score points, hints to help solve the achievement tasks, etc.

A score system is also included as a basic level of reward and each activity in the game assigns points, depending on the player's performance. The score system enables more precise players' ranking in the game.

Surprise rewards, being given spontaneously during the gameplay give a positive attitude and keep the motivation even when a difficult task is executed. The surprise rewards have greater value when the player goes through the mastering mode.

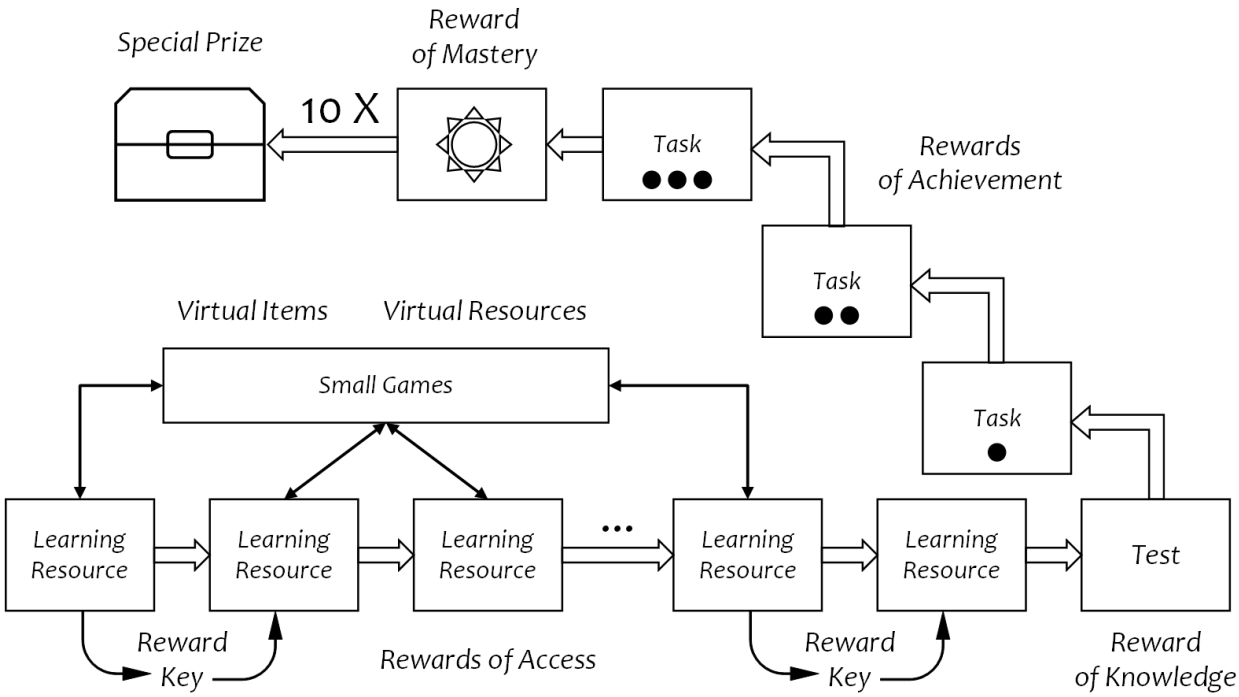

Fig.2. A framework of a reward system in an educational game

CONCLUSION

The research of the reward systems in video games is still making its first steps, and when it comes to the reward systems in educational games, they are a research area that has yet to be developed.

Embedding a story in the educational game with main characters and NPCs, giving the player the opportunity to create his own avatar and choose the avatar's backstory help to build an emotional connection with the game and active involvement in all experiences in it. This emotional connection and the empathy for the story and the characters will provide the intrinsic motivation of the players, and the interweaving of the reward system in the course of the storyline will combine the intrinsic and extrinsic motivation, which is the optimal solution for maintaining the engagement and activity in the educational game.

Binding the reward strategy to the step-climbing model of improvement will ensure a mastering of knowledge while keeping a balance between effort, skills, challenges and rewards in the educational game. Achieving such a balance, in turn, will provide the extrinsic motivation of the player to interact with the game.

The rewards provided by the side missions in the game will give the players benefits which will help them overcome the difficult parts of the game, thus avoiding the overload and disappointment.

The strategy of surprise rewards ensures a positive attitude of the players and keeps their motivation even when a difficult task is executed.

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