Energy and Resource Management in Games

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ABSTRACT

This paper is a phenomenological research study of the serious game EnerCities and the entertainment game Plants vs. Zombies (PvZ) with focus on energy awareness and resource management. In order to gather knowledge about player behavior, a focus group was assembled consisting of a mixture of more experienced gamers and less experienced gamers. By observations and group discussion we acquired knowledge about the participants' experiences. We found that there are significant differences in how less experienced and more experienced gamers perceive the games. This difference means that more experienced gamers cannot be influenced by any underlying message or meaning. However, the less experienced gamers find simulations in serious games interesting as long as it does not get too complicated.

KEYWORDS

Serious games; entertaining games; resource metaphors; simulations; energy management.

1. INTRODUCTION

The term 'energy' will bring a humongous amount of different associations into different people's minds. In this research paper we are interested in focusing in 'energy consumption' and the fact that the world needs to save energy resources. For that to happen, people need to be aware of this fact, and everyone must do their part in the global energy savings. There are several different initiatives working towards this goal; one of them are serious games[12]. Serious games have in recent times been released in a great numbers. The idea behind serious games is to use games to teach people something[12]. There are different positions within this research area; one is that learning will be fun because it is fun to play games[13]; another is that it is unrealistic to make a serious game fun[11].

This research paper does not intend to evaluate these two poles, but instead take a closer look at a narrower subject within game research; resource management and energy awareness.

1.1 Purpose of Research

The purpose of this phenomenological[5] study is to discover how users perceive management of resources and energy in serious and entertainment games. Through game analysis and qualitative research, we investigate how users deal with serious games that employ a resource management simulation (EnerCities) compared to an entertainment game that uses resource management metaphors as an integral part of its gameplay (Plant vs. Zombies). The goal is to investigate and understand how users react on simulations in serious games and how it may differentiate from the way they react to resource management metaphors in entertainment games. We believe that users in general think that entertainment games are more fun than serious games, and that people will play games for the sake of having fun and not because of its purpose. Besides, we also assume that the more experienced gamers will relate to other games, while the less experienced gamers will relate more to their everyday life.

1.2 Research Question

How do users deal with serious game resource management simulations compared to resource metaphors in entertainment games?

1.2.1 Sub-questions

- What is the general attitude towards the two different games?
- How does the gameplay differ in the games?
- How do users understand and reflect upon the energy simulations/metaphors?
- How do users understand and reflect upon resource management?
- What kind of overall reactions do these games have on people?
- Is it possible that these games might affect people's awareness about energy management in real life?

1.3 Introduction to the Games

For our comparison and game analysis we have looked at two different game genres, both chosen because they deal with energy and resource management. Both games have different purposes; PvZ is an entertainment game, and EnerCities is a serious game. With their relatively easy approach, we are able to work with them within our time limit, and make a proper analysis.

Figure 1: PvZ screenshot

PvZ is a game about saving your house from being overrun by zombies, representing a classical tower defense game in the sense that the player has to tactically place defenses to survive as long as possible against incoming threats. The player takes the role of a housekeeper who has to stop the zombies from overrunning the house while occasionally getting advice from the neighbor Crazy Dave on how to do this most successfully. For defenses the player has to plant plants with different abilities to stop the zombies from getting across your yard. The first plant introduced is the sunflower. The sunflower represents the energy source, producing sun for which you need to built the plants including the sunflower itself. The game is then about tactically managing your resources and juggling between building defending plants against the zombies, and planting sunflowers to increase your energy resources. The only goal is to survive the zombie attacks, but by changing the conditions as going from day to night and zombies with different abilities, allows for different tactics and challenges throughout the game.

Figure 2: EnerCities screenshot

EnerCities is a game about building the most well functioning city until the point where the city reaches 200 inhabitants. To do this the player has to manage the energy balance, cash reserve, natural resources and population. It is a game stuffed with variable resources, and they are not easy to manage. The key mechanic is the Fossil Fuels; oil. The task is to balance your economy and energy without running dry of oil. You start with 900 and that is it. There is no way to generate new oil. The player has to create a

healthy environment the most cost efficient way to make the inhabitants happy.It is a strategic game like PvZ. The player is evaluated by an overall high score, which is reflected through an economy score, an environmental score and a well-being score.

2. METHODOLOGY AND THEORY

With general theory[1, 3, 10] about games and game research we have been able to understanding how a game is structured and the functions within it. By reading theory about serious games[4, 9, 12] we can relate the use of game mechanics[2], simulations[7,8] and metaphors[6] in entertainment games compared to serious games. Björk and Lundgren[2] defines game mechanics like this: "A game mechanic is simply any part of the rule system of the game that covers one, and only one, possible kind of interaction that takes place during the game, be it general or specific"[2]. We will use this definition throughout the paper when referring to mechanics.

Some of the mechanics that have a major role in our research are the concepts of simulations and metaphors. There are some fundamental differences in the use of simulations and the use of metaphors. Frasca[7] defines simulations like this: "to simulate is to model a (source) system through a different system which maintains (for somebody) some of the behaviors of the original system"[7]. An important point about simulations in games is that they create an environment for experimentation – not only representation[7]. We chose PvZ as our example of metaphors in games, since the energy metaphors here are not intended for the user to experiment with. However, that is the case with EnerCities, which is a good example on the use of experimental simulations.

To achieve a better understanding of the two games we read Lars Konzack's 'Computer Game Criticism'[10]. We used Konzack's method to analyze computer games and applied it to our research, to understand the deeper meaning of the games before doing any further research. Konzack's method consist of seven layers to dissect video games, which are: Hardware, Program code, Functionality, Gameplay, Meaning, Referentiality and Socio culture[10]. We applied Konzack's seven-layer method to our games both to find similarities and differences. For example when we looked at the "Functionality" of the two games we learned that both games are very similar in the way they function despite being two very different game experiences. From a functional point of view both games are very simple as they both only use the mouse to control the game, and at the same time the games are both textonic dynamic because in both games new items (buildings in EnerCities and plants in PvZ) is unlocked for you to play around with and approach the game differently. This means that even though the games seem almost identical, the small mechanical differences can create significant changes in the gameplay and game experience.

To investigate this comparative research we chose a focus group as method to be able to differentiate and compare some of the key aspects that affect computer gaming and learning. We wanted to explore how the users deal with these kind of games, but we also wanted to see if there were differences in the experience for gamers with diverse gaming backgrounds. Therefore, we decided to mix the target group with less experienced gamers and more experienced gamers to find out about differences and similarities in people's line of thought when playing the games. The focus group was divided into two parts. In the first part the participants, after a short introduction to the two games, played each game for 20 minutes. The second part was a group

discussion, where we conducted the interview according to Yakonich, Cannon and Ternan[14].

3. RESULTS

"I thought Plant vs. Zombies were very cute and funny, but also very slow and easy, so much that I found myself making endless amount of sunflowers just to have something to do" - Peter, more experienced gamer

PvZ is a mechanically simple game that is easy to understand from the beginning, whereas EnerCities is much more complicated because of the many variables and rules that play an important role in the mechanics from the beginning of the game. Because of this, there were a split in opinion of preferred game, the more experienced gamers preferred the harder game EnerCities, while the less experienced preferred PvZ.

In our results of the focus group, a clear issue was that more experienced gamers were focusing more on the objects, goals and core mechanics of the game and not so much on the visuals and deeper meaning. In a question about in how the informants build their strategy in PvZ two informants answered the following:

"That picture you see out in the nature, the more sun, the more the flowers can grow, they only missed the rain, but that is what I think, you take your experience from real life and use it in the game." - Mie, less experienced gamer

"For me, I only see it as a game, and not really any sort of metaphor like Mie, I have played strategy games before, and there it is natural to build a robust economy from start" - Tim, more experienced gamer

The meaning was less important than the object of completing the goal. Both in PvZ and EnerCities the more experienced gamers made no mental connection with real world issues or problems regarding energy issues, and primarily saw the game as a collection of variables and goals to complete.

However, our less experienced gamers meant that EnerCities definitely had more energy awareness, and PvZ was totally perceived as a fun game, a time-waster, and nothing more, and the management of the sun resource was extremely easy to understand.

4. DISCUSSION

To fully understand how mechanics and the deeper understanding are perceived in games, it is relevant to include the discussion between ludologists and narratologists about how games are perceived. Ludologists argue that games are based on rules and that elements like story and visual elements get ignored. Narratologists argue the opposite, that a story can include stories by having a lot of narrative elements.

Is this paper an example of a new way of perceiving computer games in the sense that the elements of games are perceived according to the player's gaming experience and aim in the specific game?

The point that experienced gamers tend to ignore deeper meanings and visuals and the less experienced gamers take personal experiences and use these to enhance their gameplay is interesting according to this discussion. It seems that the more experience, the more focused the players are on rules and how it is possible to use these to achieve the best possible outcome. When having less experience the players had a more mixed approach to the rules,

one of the participants with no experience even exploited the rules by keep using money without having anymore left. This is a clear example of how the amount of experience affects the approach to the rules and the way the game is played. The less experienced player used her knowledge of economy in real life to exploit the rules in the game by keep loaning money and thereby getting a better score than the experienced players who were much more focused on the rules and not on the bond between the game and real life. The people in the focus group both the experience and non-experienced gamers thought that even though they knew the serious game (EnerCities) had a decent message, they were too old and was already aware about the problem, and felt that the game could not change their views on the subject. This means that even though these serious game might have a bigger potential to influence the non-experienced gamers, you have to consider how old they are as the older they get the more aware the probably already are of the subject in the game, and the less likely it is to change their view.

5. CONCLUSION

Throughout this research paper we have sought out to investigate how two different kinds of users deal with serious game resource management simulations compared to resource metaphors in entertainment games.

One of our two user groups is the experienced gamers. These gamers tend to generally focus less on the meaning of a game and more on the goals and mechanics in the game. Therefore, it is difficult to determine whether these gamers deal differently with serious games resource management simulations compared to resource metaphors in entertainment games.

The other user group was the less experienced gamers. Since these users are not used to playing games like these, they focus a lot on the meaning in the game. As discussed earlier they experienced the metaphors in the entertainment game as very easy to understand, but the game seemed too simple and 'time-wasting'. However, in the serious game, they found the mechanics too difficult and almost distracting from the meaning of the simulations. Although they found it very difficult, they still thought the meaning and message in the serious game was clear. The factor of being a less experienced gamer vs. a more experienced gamer has huge impact on how you perceive these games. As mentioned before experienced gamers mostly ignore the meaning of the game and focus on the game's objectives and goals, where the less experienced gamers tend to take the whole picture in when playing these games.

Based on this it can be said that these games have a bigger potential to impact less experienced gamers with their message, as they are more open to the message than the experienced gamers, who often ignore the message instead to pursue the goals of the game.

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