DESIGNING EDUCATIONAL GAMES TO TEACH PHILOSOPHY: CASE STUDY

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Abstract

Today, more and more attention is paid to video games as an effective learning tool due to the fact that "digital natives" (according to M. Prensky) are used to work with information in a different way, to communicate and learn, which in turn requires building new forms of presenting educational content that is more attractive for the present generation. Video games have a positive impact on the learning process, especially when it comes to motivation and engagement. For teaching philosophy it is possible to use commercial video games that are designed for entertainment, but at the same time represent philosophical ideas and encourage reflexion. Serious educational games with more specific content can be another tool for teaching philosophy. The problem of finding the balance between game playability and instructional design is pivotal in educational games production. As a case study that solves this problem, we propose the concept of an educational game for teaching philosophy, developed on the basis of the Aristotle's ontology and using procedural rhetoric.

Keywords: serious games, educational games, philosophy, Aristotle, ontology, myth.

1 INTRODUCTION

With ICT and mobile technologies the development of active pedagogy, adaptive learning, blended learning, video games are more and more treated as an effective means of learning. The study of the games educational potential takes place in various areas today: computer science, neuroscience, information science, psychology, education, health education, and so on. Therefore, in general, the research of educational games is characterized by various methodologies used by science, the interdisciplinary approach and many contexts of application.

Recent studies have shown the positive effects of playing video games related to motivation, behaviour, perception, cognition and learning [1]. The use of digital games in education provides more learner engagement and personalized learning opportunities, teach 21st century skills and provide an environment for authentic and relevant assessment [2]. Barr's study shows that playing video games can improve graduate skills in higher education, such as communication, resourcefulness, adaptivity [3]. For example, Minecraft, World of Warcraft and many MMORPGs are capable of developing communication skills [4].

Commercial video games, originally created for entertainment purposes, demonstrate significant potential in education, including teaching philosophy. Many popular video games can teach us ethics, logic, transmit famous philosophical concepts, or serve as the basis for philosophical reflextion. For instance, BioShock represents Ayn Rand's philosophy and theories of Aristotle, Plato, Leibniz, Marx etc. [5]. Conway's Game of Life allows students understand the concept of determinism and improve their understanding of free will topics [6].

Serious games are another learning tool. This term was proposed by Clark Abt in 1970, it became the basis for modern definitions of serious games [7]. Abt understands serious games as games that "have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement" [8]. Serious games are used for training, learning and professional development, advertising, scientific research in many spheres, such as healthcare, military, culture and arts, management, etc. A Collaborative Classification of Serious Games (serious.gameclassification.com) contains information about 3358 games with different goals and for different types of audience (March 2019). The variety and number of serious games is growing every year. Many studies confirm the positive influence of serious games on the learning process which is becoming more immersive and learner-oriented [9]. As an example we can mention serious educational games like CancerSpace, Real Lives 2010, Sim Venture [10]. However, practical use of serious games in real learning environment

remains limited [11]. It is still unclear how to design games that would be good for learning under the right conditions [12].

2 METHODOLOGY

Most generally, educational games are educational content packaged in a game form. But since the center is learning and not the game activity itself, the game language, as a rule, turns out to be simplistic and primitive, which makes games boring. No wonder the latest researches on serious games focused on the problem of balance between game playability and instructional design [9]. As Sara de Freitas notes, the key challenge for effective educational game design is to find "the balance between game playability, fun and solid learning design that aligns learning outcomes with assessments" [13].

Difficulties and failures in mapping the knowledge space to the content space in educational games [14] lead to the fact that many games turn into simply a version of popular video games familiar to us with added learning material. And thus, their own game language is practically not involved. Simply put, complex educational content fits into a game form that uses fairly simple game mechanics familiar to everyone. This severely limits the potential of the games, as they turn into an appendage to educational content that creators seek to convey through the game. Many educational games cannot properly translate the knowledge component into the language of the game and as a result, they are often neither engaging nor educational [15].

We believe that a successful educational game makes one ponder over the gameplay itself, game mechanics do not distract from training, but, on the contrary, help dealing with what game developers meant. I.e., it's not just about the message that is built on the game elements, but the fact that the game mechanics and procedures generate a whole series of interpretations of the game meanings and the player's thoughts. As we see it, procedural rhetoric can be an effective approach to the educational games design allowing game mechanics and procedures transmit educational content. Ian Bogost defines procedural rhetoric as "the art of persuasion through rule-based representations and interactions rather than the spoken word, writing, images, or moving pictures" [16, ix]. We will use procedural rhetoric as a method for developing an educational game for teaching philosophy. Basing on procedural rhetoric "game makes a rhetorical argument about how things are, rather than representing them directly" [17, p 339].

This is exceptionally important for philosophy. Serious games for studying philosophy are mainly either games in a visual environment, setting and atmosphere of a particular historical period a famous philosopher lived in, or games that tell about philosophers and their theories. However, this is rather strange, considering the great role that ontology plays in philosophy – the teaching about being, about what exists in general.

Gilles Deleuze stated that different branches of philosophy (e.g., the philosophy of Plato, Descartes or Kant) are, first of all, the world captured and seen in different ways. To understand the ideas of this or that philosopher means to be able to look at the world through his eyes making a cut between the important and the non-important, existing in reality and seemingly existing. The main thing in teaching philosophy is to teach how to look at the world from a different angle using different optics and ontological approaches.

We believe that educational games for philosophy can become truly philosophical if they are funded in ontologies, and not just retell the ideas of famous philosophers. At the same time, we believe that such an approach may turn out to work beyond the limits of philosophy games. As a matter of fact, game design is an ontology construction activity itself.

The purpose of this article is to discuss the concept of an educational game for teaching philosophy which is based on the ontology of Aristotle and procedural rhetoric. Such an approach will overcome the educational games design complexity explained by the need to transform educational content into a game form the best way to make it attractive to the modern generation of students.

3 RESULTS

The educational game, the concept of which we want to discuss, is built on ancient natural philosophy, namely on the physics of Aristotle. Of course, this is an anachronism nowadays, but a correct understanding of Aristotle's physics will contribute to the development of students' ability to look at the world differently than they are used to. The fact is that the physics of Aristotle (like many of his predecessors) is the physics of the elements: fire, water, air, and earth. Aristotle has the fifth substance

(*quinta essential*), which refers to his distinction between the sublunar and the superlunar world. This difference could be the starting point for creating a visual design of the setting outside of which we must observe the circular motion of celestial bodies we do not control (this is their ideality and inaccessibility).

An educational game can be built like a classic puzzle game in which it is necessary to match elements to each other. However, we offer a completely different model. The fact is that Aristotle's physics is physics without gravity. It is the gravitation theory that allowed Newton to remove the Aristotelian division into two worlds: under the moon and over the moon. So, for the optimal implementation of the Aristotle's ontology, we must abandon the most common convention that exists in puzzle games, starting from Tetris. This general convention is gravity that causes objects to fall from top to bottom.

Designing an educational game based on Aristotle's view of the world means creating completely different game physics. Instead of gravity Aristotle used a different principle of objects attraction. It's about the so-called concept of natural places that are the places where particular elements tend to move by nature. Heavy elements tend to be in the center, and the light ones – on the periphery. The heaviest element is earth, the lightest is fire.

What is the player's task, then? Here we turn to the common idea both for myth and logos – any order is formed from chaos. Mythologemes of chaos and cosmos are archaic; they form the basis of cosmogonic myths which narrate the birth of the world as the formation of an orderly cosmos from its chaotic initial state. In this kind of game, the player first deals with total confusion, and their task is to shape the chaos and become involved in the resulting order. That is the task for mythological deities. Creating cosmos from chaos means putting each element in its place, earth in the center, then water, air, and fire.

But what chaos will be at the very beginning? The fact is that Aristotle did not consider the elements as the elementary basis, since the elements themselves were composed of four basic states, namely, dry, moist, warm and cold. These are the objects that can be stirred by the player. They are randomly thrown onto the playing field and the player's task is to collect the ordered cosmos from them.

We assume mobile gaming platform to be used for educational game (mobile phones, tablet PCs, etc.) with Android Mobile Operating System.

The main action of a player is transformation of the initial states (wet, hot, dry, cold) into elements (air, fire, earth, water) and analysis of the resulting elements into states in case the player is in a hopeless situation. Elements can be both assembled and disassembled into individual components.

Elements formation principle is the following:

1 wet + hot = AIR + cold
2 hot + dry = FIRE + wet
3 dry + cold = EARTH + hot
4 cold + wet = WATER + dry
5 wet + cold = WATER + hot
6 cold + dry = EARTH + wet
7 dry + hot = FIRE + cold
8 hot + wet = AIR + dry

To disassemble an element player needs to tap the appropriate state that will then replace the element. This will automatically lead to the random appearance of a new element on the playing field, which will arise due to the connection of one of the states on the screen and the state that the player did not choose.

We need to realize that the appearance of fire leads to the fact that it begins to move to the periphery of the playing field (that is, up), and the appearance of the earth - to the fact that it automatically begins to move to the center of the playing field (that is, down). Water and air remain where they were created. Also the created elements make it difficult for the other elements to move. Fire is able to pass through earth and water, but is not able to pass through air. Earth is able to pass through fire and air, but is not able to pass through water. If water and air are close to each other, they change places so that air rises above water. Plus, any element can be connected to the same element: at the resulting place one of the states which is a part of the connected elements will randomly appear.

Fig.1-3 show the game interface. An educational game will look like this:

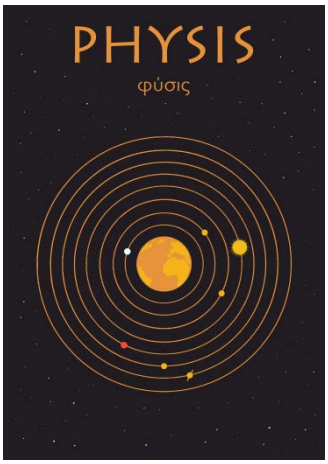

Fig. 1. The main screen, which depicts the ancient Greek view of the celestial bodies position in space (the Earth is in the center).

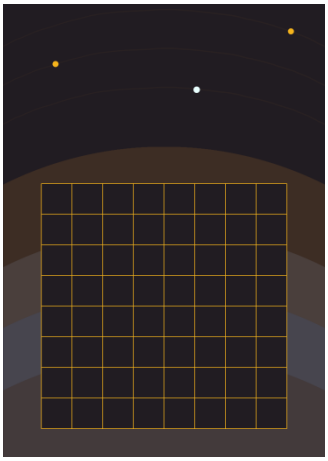

Fig. 2. Empty playing field (8x8 cells). In a video game the cells will be filled with elements and states.

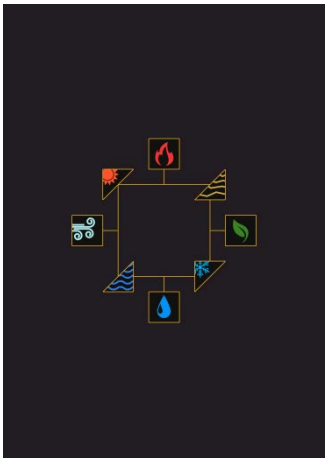

Fig. 3. Icons of states and elements indicating how exactly the elements are assembled.

We use the following visual solution here: the states are specially depicted in such a way that only seeing their visual representation the player can conclude what is combined with what.

How is the presented game going to help teach philosophy? At the beginning of the game we plan to launch a training mode in which the player will become familiar with the basic principles of Aristotle's physics. Learning outcome assessment will be based on the successful or unsuccessful completion of the game. The main task of the player is to build a certain cosmos of elements that should take their

natural places from a chaotic set of states. With the correct understanding of the Aristotle ontology the player will be able to build all the necessary elements correctly.

First we plan to launch a pilot level without time limit for solving the problem. In the future it is possible to supplement the level representing Aristotle's physics with a number of levels based on the ideas of other ancient philosophers and thus expand the video game to a series of levels that will consistently teach ancient Greek natural philosophy.

4 CONCLUSIONS

Thus, with due consideration of the ontological approach and procedural rhetoric in designing educational games for teaching philosophy, we can make a virtual world work, not just a specific thesis or an idea of a famous philosopher. While playing the proposed game students will be able to understand and visually feel firsthand how the ancient Greeks interpreted the nature of things and saw their place in the world. That will generally contribute to the development of philosophical thinking and the ability to look at reality through different perspectives. When developing such games on philosophy, it is necessary to proceed primarily not from the need to broadcast educational content, but from philosophical ontology and how it can be supported by the game's procedures.

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