

MAPPING GAMES AND GAMING STYLE WITH LEARNING GOALS AND STYLE

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Abstract: In the era of e-services such as e-learning, e-government, e-business, etc. enhancing such services and adapting them to one's personal needs is a very promising way for the user to benefit even further from them. As a step forward in the development of adaptive learning systems with integrated game elements it is first necessary to review different types of games and their characteristics. Moreover, it is important to take into account gaming styles as well as to summarize the processes of learning and playing by mapping learning styles corresponding to different gaming styles. This paper attempts to investigate and describe different gaming issues as a first step toward building a software framework for the integration of game elements utilized in e-learning.

1 INTRODUCTION

In the era of e-services in the fields of education (e-learning), government (e-government), business (e-business) and many others, the enrichment of such services with adaptation according personal needs is both promising and challenging. E-learning services are especially important tools that can expand learning opportunities. Thus, the development of modern learning systems that are adaptable to one's own learning characteristics is often oriented toward the integration of game elements and their application in ways that take into account the learner's unique learning style (Vassileva, 2009). How to make education more effective, while increasing the learner's involvement, are very important issues. Using educational games or so-called game elements in learning is one possible approach to achieving that goal. An educational game can be defined as an instructional method that can provide students with real-time response, thus enabling them to gauge how well they retain the main concepts presented in the instruction session (Virvou, 2008). Then it is necessary to create the framework for evaluation of the game and game elements and helping to understand how to use these

elements in e-learning.

This paper discusses the main problem of how to choose appropriate games and how to apply them to achieve the learning objectives best suited to the learner as a gamer. To achieve this aim it is first necessary to answer two main questions:

- How should a game or activity be chosen that will address the learning objectives?
- What are the existing different gaming styles and how can these styles be adapted to the style of user as a learner?

Next section gives a literature review of the current state of the art of educational games and related game elements. The third section of the paper we define games and gaming styles which we will need in achieving our goal - to map game elements and gamer style to learner goals and learner style. Also, we separate games into several groups, i.e. in different categories, according to the literature being reviewed. The last section points out conclusions and outlines future work, as this paper is a starting, nevertheless important step toward further design and development of a software framework for successfully incorporating games and game elements into e-learning with possibility to be adapted to the learner according to his or her needs.

2 LITERATURE REVIEW OF GAME ELEMENTS IN EDUCATION

Yacci, Haake, and Rozanskiv (Virvou, 2008) have identified three types of learning which are not necessarily usable and valuable outside the edutainment environment: *operations*, *strategy and instructional goals* and *outcomes*. Operations refers to the “legal” movements and actions that a player can make inside the game. Strategy learning refers to the overall plot or mission of the game. Finally, instructional goals and outcomes refer to educational goals and outcomes that have value beyond the game itself. That separation is useful and we use these three elements as starting point for integration of games with educational environment.

Another six structural elements of games (Prensky, 2001) which we can use in addition are: *rules*, *goals*, *outcomes and feedback*, *competition or challenge*, *interaction* and *representation or story*.

Furthermore, Finneran and Zhang (Kiili, 2005) have proposed a *person-artifact-task* (PAT) model that conceptualizes the major components of a person working on a computer-related activity. According to the model, the likelihood of experience flow is dependent on the interplay between the person, the task and the artefact and all these three components should be taken into account when designing educational games.

One important type of educational game is the Alternate Reality Game (ARG), proposed by (Whitton, 2009). It consists of three elements: *an underlying narrative or story*, *a series of challenges or puzzles* and *a collaborative community*. While all three elements were facilitated online, many challenges took place in the real world and some were designed to be individual, while others were collaborative - see the classifications in Figure 1 below. He also proposes ten characteristics of games: *competition*, *challenge*, *exploration*, *fantasy*, *goals*, *interaction*, *outcomes*, *people*, *rules* and *safety*.

As shown in the diagram, the main elements of games can be used in evaluating the software used to create successful educational games. These elements are separated both according to individual vs. group elements and the separation between online (virtual) worlds vs. real (in-person) worlds.

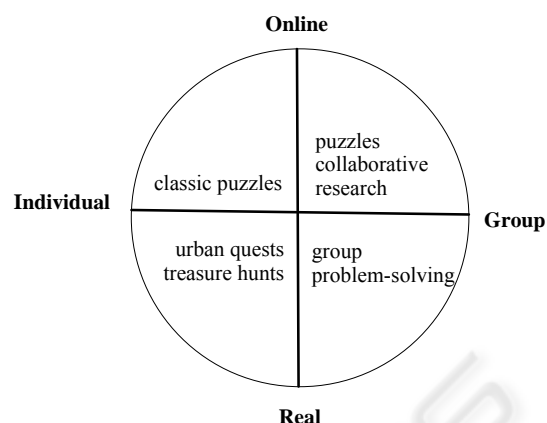


Figure 1: Games classifications according group work and the real world.

In the next section the literature review goes into more details about some different types of games.

3 GAME TYPES AND GAMING STYLE

Four different types of games are defined in (Caillois, 1961):

- those that involve competition;
- those that involve chance;
- those that involve simulation; and
- those that involve what he terms vertigo, such as fairground rides.

According to (Kiili, 2005) five other learning activities commonly associated with games – *simulations*, *virtual worlds*, *role play*, *puzzles* and *stories* – were also discussed and according to us are important in relation to this inclusive definition.

There are several types of games: adventure, platform, puzzle, role play, shooter, sports and strategy.

The *adventure games* involve the player undertaking a series of tasks or sub-tasks in which they must interact with the virtual world. The player performs different actions, as talking to characters and manipulating objects in order to achieve the objectives of the game or solve some mystery and complete a quest.

Platform games involve the movement of the player character through a landscape and jumping up and down between platforms. The player avoids obstacles and enemies and picks up treasure, usually with some overall goal in mind and often in the context of a narrative.

Puzzle games primarily involve problem-solving and can take many forms, including words, logic,

and mathematics.

Role play games involve the player *taking on the role* of a character in *another world*, for example fantasy-based world. The player can undertake a *range of activities* including solving quests, fighting, hunting and interacting with other characters.

Shooter games are another genre in which multi-player games are common. They are generally played from a *first person viewpoint* and are *played in real time*. These games have the primary aim of using weapons to defeat opponents, although the action is often embedded within a wider narrative context. They involve a combination of strategy and dexterity, exploring virtual worlds and defeating enemies and targets.

Sports games allow the player to simulate taking part in a sporting event or tournament and are generally based on physical dexterity and interaction with the gaming interface.

Strategy games involve the player making strategic decisions within a scenario in order to meet the goal of the game, which is usually completing a level or solving a particular problem.

Another type of game, the so-called quiz game, is based on short-answer questions. Such games include hangman, crosswords and to be millionaire.

As a result of scientific research and according to the review we summarized the following main gaming styles:

- *Logician* – likes logic and used spatial awareness, verbal skills, numeracy skills and spelling.
- *Competitor/Shooter* – a person who enjoys action and shooting and focussed on the competition itself. This gaming style uses not only shooting but also various instruments in a sports game.
- *Strategist* – a person who likes resolving complex problems within a game.
- *Dreamer* – a person who likes playing roles and thrives in the fantasy world of avatars.

4 MAPPING GAMES AND LEARNING GOALS RELATIVE TO GAMING STYLE

Using games as instructional tools can help learners to make a connection between theory and taught skills. Additionally, gamers use their own playing style in the role of learners; therefore, we can divide different games into groups according to their type as shown in Figure 2 below.

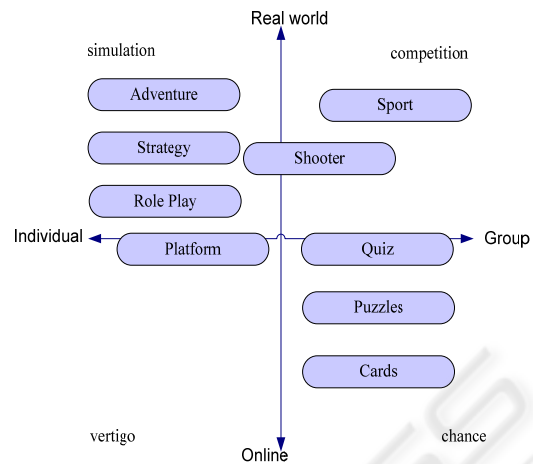


Figure 2: Games classifications according group work and relation to the real world.

Gaming style, learning activity and possible games are given below according to style and activities as outlined in Table 1.

Table 1: Gamer style, learning activity and possible game types.

Gamer style	Learning activity	Possible games
<i>Logician</i>	logic, spatial awareness, verbal skills, numeracy skills, and spelling	<i>puzzle, quiz</i>
<i>Dreamer</i>	problem-solving and lateral thinking, collaborative skills, social interaction, negotiation, management of complex systems, strategy and working through scenarios	<i>role-playing games, adventure games</i>
<i>Competitor</i>	hand-eye coordination, planning and strategizing, problem-solving, teamwork and the ability to think quickly	<i>sports, platform, shooter</i>
<i>Strategist</i>	Strategy games can be used to teach planning, decision-making, testing hypotheses, strategic thinking, management skills and seeing the consequences of actions taken.	<i>strategy games</i>

Classification of gamers' style, which we relate to learning activities in the table is mapped by us to the four learning styles: Reflector, Theorist, Pragmatist, and Activist (Honey and Mumford,

2000). According to the research we can point out following important conclusions:

1. Learning style, which characterizes the *activist learner* can be mapped and used with *competitor or shooter style* of gamer. Typical for gamers with that style are that they are open minded for new ideas and tend to experiment. They also like teamwork and prefer to be active.

2. On the opposite of activist is *theorist learning style*. That learning style can be mapped in higher degree to *logician style of gamer*. In that case is valid logical thinking and step-by-step solution of the problems.

3. Third learning style is known as *reflector*. That style can be mapped to *gamers' style* named *dreamer* in the classification above. Usually that style of gamer prefers to stay aside and to analyse problem from different birth-eye views.

4. Last learning style we used is *pragmatist*. That style can be mapped to *strategy games* and corresponding gamers' style of strategist. Pragmatists tend to describe and conceptualize the things which can be applied to their work.

5 CONCLUSION, LIMITATIONS AND FUTURE WORK

So call serious games are already well proven mean for effective learning the entire life cycle of products and processes. Research in the area of gaming styles has been and continues to be undertaken in order to understand the relationship between a person's gaming style and his or her preferred method of learning.

As result in paper we achieved merging of learning style and gaming style through learning activities. The analysis and research will be used in two directions:

- to choose appropriated game according learning style and
- to adapt and transform learning content into game content.

The limitation of this paper is that a complete user model that takes into account also learner preferences have not been built yet. Nevertheless, this research is a very important step toward building such a model.

In our future work we will use this model to develop an application platform designed to create and run certain types of educational games focused on adaptive e-learning (Bontchev, 2010). Such games can help for example gaining practical

experience in strategic manufacturing through intensive and fascinating gaming and e-learning.

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REFERENCES

- Bontchev, B., Vassileva, D., 2010. *Modelling educational quizzes as board games*, to appear in proc. of IADIS e-Society'2010 Int. Conf., 18-20 March, Porto, Portugal.
- Caillois, Roger., 1961. *Man, Play and Games*, trans. Meyer Barash. New York: Free Press.
- Clark, Donald., 2006, „*Games and e-learning*”, Caspian Learning.
- Kiili K., 2005. *Digital game-based learning: Towards an experiential gaming model*, Internet and Higher Education 8.
- Honey, P. and Mumford, A., 2000, *The Learning Styles Questionnaire*. ,Maidenhead: Peter Honey Publications.
- Moreno-Ger, P., D. Burgos, I. Martinez-Ortiz, J. Luis Sierra, B. Fernandez-Manjon, 2008, „*Educational game design for online education*”, Elsevier Ltd.
- Prensky, M., 2001. *Digital game-based learning*. New York, NY: McGraw-Hill.
- Vassileva D., Bontchev, B., 2009. *Management of storyboard graphs for adaptive courseware construction*, Proc. of 3rd Int. Conf. on Communication and Inf. Technology (CIT'09), Athens, Greece, ISBN: 978-960-474-146-5, pp. 39-44.
- Virvou, M., G. Katsionis, 2008. *On the usability and likeability of virtual reality games for education: The case of VR-ENGAGE*, Computers & Education 50.
- Whitton N., 2009. *Alternate Reality Games for Orientation - Final report*, Manchester Metropolitan University.