THEORETICAL BACKGROUND OF EDUCATIONAL GAMES: DEFINITIONS AND ADVANTAGES

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Abstract: Educational games are games used in the classroom to enhance learning, often to supplement traditional instruction. Educational games are often used in a teaching approach known as game-based learning, which uses game frameworks in learning to communicate and reinforce concepts and build learners' skills in various areas. The most basic educational games definition in the classroom is that the instructor introduces a game, and the learners play the game as part of the learning process. Games and game-based learning are used because they have many benefits; notably, games and play are strongly connected to children's cognitive development and help develop many cross-curricular skills as a result. Educational games have many more benefits, and the increased presence of technology in the classroom has expanded the possibilities for the types of educational games available and the subjects that can make use of them. Learners of all ages can benefit from educational games in a variety of formats and modalities.

Keywords: *off-the-shelf games, digital games, progress of understanding, game-based learning.*

Games and play have had a role in educational theory and philosophy since at least the times of the Ancient Greeks. In Laws, the Greek philosopher Plato suggested that play was a necessary initial step on the way to building true knowledge. During the Renaissance, educational philosophers reintroduced and reinforced the role of games and play in learning, expanding on Plato's views in Laws and crediting the Ancient Egyptians with the early use of games to teach mathematics. In the 1600s, the philosopher John Amos Comenius put forth his belief that games were the highest possible form of learning. In Comenius' view, the best way to educate was to integrate game-like concepts into the overall educational approach. Other philosophers discussed incorporating games like chess, mancala, and others to teach logic and strategy and build classroom collaboration.

Educational games are games explicitly designed with educational purposes, or which have incidental or secondary educational value. All types of games may be used in an educational environment, however educational games are games that are designed to help people learn about certain subjects, expand concepts, reinforce development,

understand a historical event or culture, or assist them in learning a skill as they play. Game types include board card, and video games.

As educators, governments, and parents realize the psychological need and benefits that gaming has on learning, this educational tool has become mainstream. Games are interactive play that teach goals, rules, adaptation, problem solving, interaction, all represented as a story. They satisfy a fundamental need to learn by providing enjoyment, passionate involvement, structure, motivation, ego gratification, adrenaline, creativity, social interaction and emotion in the game itself while the learning takes place.

According to Richard N. Van Eck, there are three main approaches to creating software that stimulates cognitive growth in the gamer. These three approaches are: building games from scratch created by educators and programmers; integrate commercial off-the-shelf; and creating games from scratch by the students. The most time- and cost-effective approach to designing these educational games is to incorporate commercial off-the-shelf games into the classroom with the understanding of the learning outcomes the instructor has for the course.[1] This requires the teacher to buy into the positive results of using digital games for education. It also requires teachers to have adequate self-efficacy concerning the use of these games and their technology. The students usually have high amounts of self-efficacy in usage of digital games, while the lack of confidence teachers have in incorporating the digital games usually results in less effective educational use of the games. However, Gerber and Price have found that teachers' inexperience with digital games does not preclude them from the desire to incorporate them in class instruction, but districts must have in place support through regular professional development, supportive learning communities with their colleagues, and adequate financial support to implement game-based learning in their class instruction.[2]

Games often have a fantasy element that engages players in a learning activity through narrative or storylines. Educational video games can motivate children and allow them to develop an awareness of consequentiality.[3] Children are allowed to express themselves as individuals while learning and engaging in social issues. Today's games are more social, with most teens playing games with others at least some of the time and can incorporate many aspects of civic and political life.

In classrooms, social game-based learning platforms are increasing in popularity, as they purport to enable students to reinforce knowledge and develop

[1] Van Eck, R. (2006). Digital game-based learning: It is not just the digital natives who are restless. Educates Review, 41,2, 1-16.
[2] Gerber, H. R. & Price, D. P. (2013): "Fighting baddies and collecting bananas: Teachers' perceptions of game-based learning Educational Media International. 49-53.
[3] Barab, Thomas, Dodge, Carteaux, Tuzun "Making Learning Fun: Quest Atlantis, A Game Without Guns" 2011-09-30 at the Wayback Machine. 98-102.

social and leadership skills. Games often have a fantasy element that engages players in a learning activity through narrative or storylines. Educational video games can motivate children and allow them to develop an awareness of consequentiality.

There are several advantages of educational games, including:

-Engagement and motivation: Educational games are interactive and fun, which can help to engage and motivate students to learn. This can lead to increased interest and excitement in the subject matter.

-Active learning: Educational games promote active learning, as students are required to participate, make decisions, and solve problems in order to progress in the game. This hands-on approach can enhance the learning experience and improve retention of information.

-Skill development: Educational games can help students develop a wide range of skills, such as problem solving, critical thinking, decision-making, and communication skills. These skills are essential for academic success and can also be valuable in real-world situations.

-Personalized learning: Educational games can be tailored to individual student needs and abilities, allowing for personalized learning experiences. This can help to ensure that each student is challenged at an appropriate level and can progress at their own pace.

-Immediate feedback: Educational games often provide immediate feedback on student performance, allowing students to quickly identify areas for improvement and make corrections. This can help to reinforce learning and support ongoing growth and development.

-Collaboration and teamwork: Many educational games involve collaboration and teamwork, which can help to foster social skills and promote communication and cooperation among students. This can be particularly beneficial for students who may struggle with social interactions in traditional classroom settings. Overall, educational games offer a dynamic and engaging way for students to learn and enhance their skills in a wide range of subjects. They can provide a fun and interactive learning experience that is both effective and enjoyable for students of all ages.

Children are allowed to express themselves as individuals while learning and engaging in social issues. In classrooms, social game-based learning platforms are increasing in popularity, as they purport to enable students to reinforce knowledge and develop social and leadership skills.[4] The built-in learning process of games is what makes a game enjoyable. The progress a player makes in a game is through learning. It is the process of the human mind grasping and coming to understand a new system. The progress of understanding a new concept through gaming makes an individual feel

[4] Bainbridge, W. S. (2007). "The Scientific Research Potential of Virtual Worlds". Science. 317 (5837): 472–476.

a sense of reward whether the game is considered entertainment or serious. Well-designed games that motivate players are what make them ideal learning environments. Real-world challenges are easier faced within a game containing effective, interactive experiences that actively engage people in the learning process. In a successful game-based learning environment, choosing actions, experiencing consequences, and working toward goals allows players to make mistakes through experimentation in a risk-free environment.

Games have rules, structure, and goals that inspire motivation. Games are interactive and provide outcomes and feedback. Most games also have problem solving situations that spark creativity.[5]

Identification with the character within the video game is an important factor in the learning potential of the gamer. Some of the electronic games allow the gamer to create an avatar that is designed and "owned" by the gamer. This character is an expression of the human creating the virtual character. This has opened a new set of scientific possibilities. The virtual world can be used as a laboratory. The relationships and space within the games can simulate complex societies and relationships without having to truly participate. This application of an avatar in not limited to simulation exercises. According to Bainbridge, interviews and ethnographic research could be conducted within the reality of the game space. This could include experiments in social psychology and cognitive science. The fact that game creators and gamers want new experiences within the games, the introduction of "experiments" could increase the level of play and engagement.[6]

Few would dispute that games are learning environments with characteristics that differ to such an extent from those of other genres that they should be classified as a genre of their own. Some advocates go even further and make the case that game-based learning involves processes that differ to such an extent from learning in other forms (such as classroom instruction) that they should be described as a unique model or theory of learning.

A review of existing games quickly confirms, however, that the uniqueness of game-based learning can hardly be defined at an epistemological level. Game designers use behaviorist elements, cognitivist elements, and constructivist elements, and often various combinations of them, in the design of games for learning.

The task itself (directing an object to a target location) is tedious and uninteresting, but the game elements used to implement the task as game mechanic,

[5] Shearer, James D. "Development of a Digital Game-based Learning Best Practices Checklist". Etd.ohiolink.edu. Retrieved 2013-05-02. 33-39.
[6] Bainbridge, W. S. (2007). "The Scientific Research Potential of Virtual Worlds". Science. 317 (5837): 472–476.

and the feedback provided, make this a very engaging game that has been played by millions.

Definitions of game-based learning mostly emphasize that it is a type of game play with defined learning outcomes. Usually it is assumed that the game is a digital game, but this is not always the case. A corollary to this definition is that the design process of games for learning involves balancing the need to cover the subject matter with the desire to prioritize game play.[7] This corollary points to the distinction of game-based learning and gamification. What exactly is meant by gamification varies widely, but one of its defining qualities is that it involves the use of game elements, such as incentive systems, to motivate players to engage in a task they otherwise would not find attractive. Similarly, there is an ongoing debate among scholars as to the exact definition of a game, and especially what is not a game. One definition defines a game as "a system in which players engage in an artificial conflict, defined by rules, those results in a quantifiable outcome".[8] Consider as an example the gamification of math homework, which may involve giving learners points and stars for the completion of existing activities that they consider boring. Game-based learning of the same math topic, on the other hand, even though it may also include points and stars, would involve redesigning the homework activities, using artificial conflict and rules of play, to make them more interesting and engaging. Even though the debate around how games are defined cannot be resolved here, this may not be a problem, as play the essential activity in games long been thought of as a critical element in human development.

When game-based learning is viewed from a motivational perspective, we emphasize the ability of games to engage and motivate players by providing experiences that they enjoy and want to continue. It is assumed that when playing an educational game, players' interactions with the game will motivate them and will foster cognitive processing of the game content, thereby improving learning although some researchers have suggested that the high level of engagement found with entertainment games is unlikely to transfer to educational contexts. Nonetheless, there have been several efforts to identify the specific elements that contribute to engagement and motivation in games, such as incentive systems, visual aesthetics, game mechanics, narrative/fantasy, and musical score, and to consider their use within educational games. However, in spite of the great interest in this area there have been few efforts to systematically apply motivational theories to understanding learning in games, even though the theoretical and empirical foundation of motivation in education is extensive.

[7] Plass, J. L., Perlin, K., & Nordlinger, J. (2010, March). The games for learning institute: Research on design patterns for effective educational games. Game Developers Conference, San Francisco, CA.5-10.
[8] Salen, K., & Zimmerman, E. (2004). Rules of play: Game design fundamentals. Cambridge, MA: MIT Press.23-27.

Initial explanations of the role of motivation in learning tended to come from a behaviorist tradition, with an emphasis on the drives, needs, and behaviors of learners.

Similarly, early attempts at explaining motivation in video games also utilized behaviorist constructs, such as mechanisms of reinforcement, to explain motivation and engagement in games. More theories that are recent take a broader perspective on what motivates students. Eccles, Wigfield, and Schiefele argued that contemporary theories of achievement motivation could be framed around three questions that students ask themselves when faced with a learning task: "Can I do this?" "Do I want to do this, and why?" and "What do I need to do in order to succeed?" Current motivational theories, including expectancy-value theory, self-determination theory, self-efficacy theory, attribution theory, orientation theory and interest theory, focus on different components of these questions with different emphases on how various factors shape motivation.[9]

Video games are, in many ways, well suited to address the three questions that frame student motivation. Games are designed to ensure players are able to achieve, providing an affirmative answer to first question, "Can I do this?" and to ensure that players know what to do in the game, providing an answer to the third question, "What do I need to do in order to succeed?" One way that this is done is by designing games to allow for graceful failure, in which failure to achieve a goal is an experience that allows players to learn from their mistakes and then enabling them to try again. Second, many games have training modes or introductory levels that introduce the game's features and functionality and allow players to practice them. A third way those games help players succeed is by being adaptive: If a player is struggling, most games will decrease difficulty and/or provide scaffolds to help out. Finally, many games have online communities that provide help and support for players, described in more detail next. We briefly review research on motivation that addresses each of these issues next and suggest some ways in which this research has or can be applied to educational games.

The theoretical background of educational games provides valuable insights into their definitions and advantages. Educational games offer a unique and effective way to engage students in learning by making the process fun, interactive, and personalized. They enhance critical thinking, problem-solving skills, collaboration, and creativity, while also providing immediate feedback and reinforcing learning concepts. With their accessibility and convenience, educational games have the potential to revolutionize the way we approach education and inspire a new generation of motivated and engaged learners.

[9] Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. Journal of Educational Psychology, 80, 260–267.

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