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## **DEEPER LEARNING APPROACHES INTEGRATED IN SERIOUS GAMES**

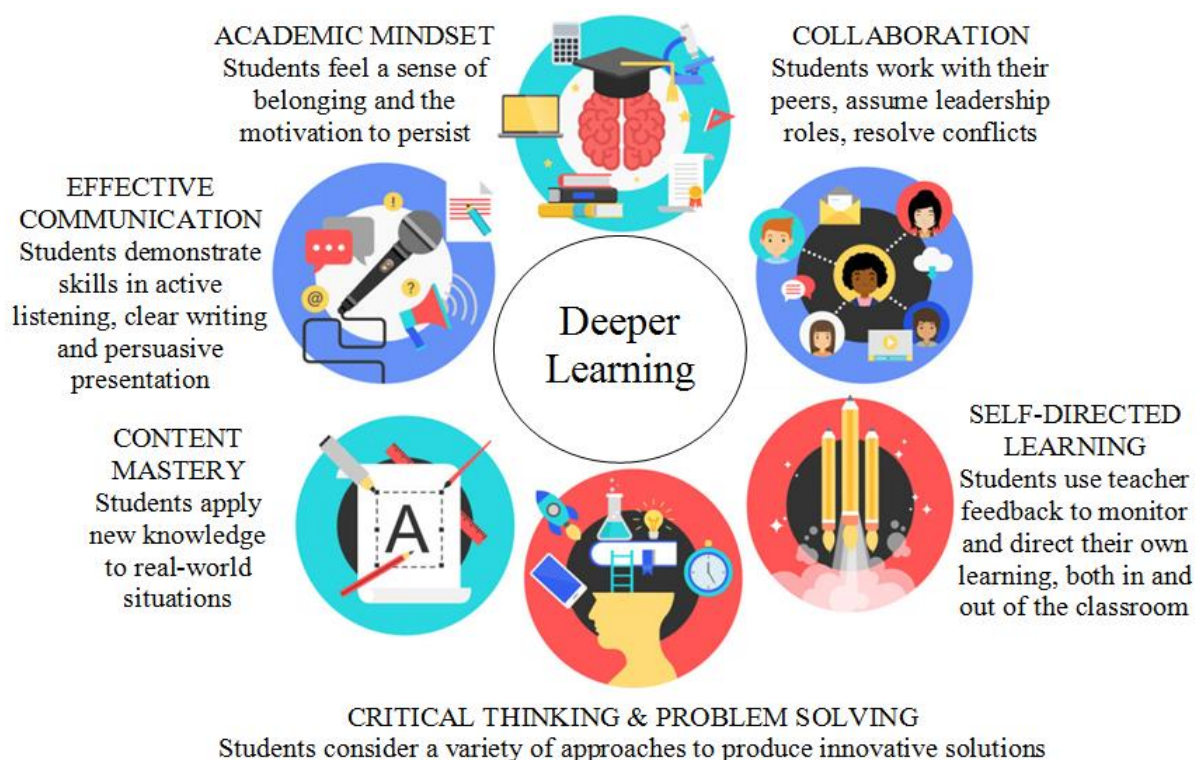
*The paper considers principles of Deeper Learning Approaches (action learning, critical thinking, flipped learning, learning from failure) and learning principles of computer games. Connections between those two groups of principles are proposed and ways of combining them together so that they can benefit one from another are presented.*

**Key words:** *game-based learning, deeper learning, gamification*

**Problem statement and purpose of work.** Game-based learning has been recognized as an important alternative or supplement to traditional in-class, face-to-face teaching [1]. During past several years a new concept for enhancing education was proposed – an approach called “Deeper Learning”. It is a set of six interrelated competencies as presented in Figure 1: mastering rigorous academic content, learning how to think critically and solve problems, working collaboratively, communicating effectively, directing one’s own learning, and developing an academic mindset [2]. To fulfill these competences many principles like “Critical Thinking” framework, “Active Learning” methods, “Flipped Learning” and “Learning from Failure” are used. For video games sector another 36 learning principles were proposed [3]. To the Authors’ best knowledge papers showing fundamental connections between the principles of Deeper Learning and learning based on computer games are scarce. Combination of these two approaches may become the basis for a method of selecting principles as tools in Deeper Learning. Hence, this work contributes with pilot attempt for establishing fundamental connections between Deeper Learning and computer game based education.

**Results of research.** The structure of analysis was based on:

- 1) “Critical Thinking” framework (generate purposes, raise questions, use information, utilize concepts, make inferences, make assumptions, generate implications, embody a point of view);
- 2) “Flipped Learning” approaches (peer instruction, flipped mastery learning, gamification, cooperative/collaboration learning, challenge-based learning);
- 3) components of “Action Learning” (problem, team, questioning and reflection, action, learning, action learning coach).



*Figure 1 - “Deeper Learning” as set of six interrelated competencies*

Using semantic links in the descriptions links between groups of principles were created:

- 1) links for “Flipped Learning”: Self-Knowledge Principle, Committed Learning Principle, Identity Principle, Incremental Principle, “Regime of Competence” Principle, Multimodal Principle, Subset Principle, Discovery Principle, Transfer Principle, Insider Principle, Achievement Principle, Ongoing Learning Principle, Probing Principle, Intuitive Knowledge Principle;
- 2) links for “Active Learning”: Practice Principle, “Material Intelligence”

Principle, Distributed Principle, Concentrated Sample Principle, Incremental Principle, Bottom-up Basic Skills Principle, Explicit Information On-Demand and Just-in-Time Principle, Cultural Models about Learning Principle, Cultural Models about Semiotic Domains Principle;

3) links for “Action learning”: Semiotic Domains Principle, Active, Critical Learning Principle, Distributed Principle, Affinity Group Principle;

4) links for “Critical thinking and problem solving”: Semiotic Principle, Metalevel Thinking about Semiotic Domains Principle, Multiple Routes Principle, Situated Meaning Principle, Text Principle, Intertextual Principle, Cultural Models about the World Principle;

5) links for “Learning from Failure” in “Psychosocial Moratorium” Principle.

The proposed links were used in the seminar for ONPU teachers “Computer Game Design as the Form of Active Student Learning“ to assess the learning potential of games.

**Conclusions.** The connections between groups of components are proposed and ways of combining them together so that they can benefit one from another are presented. These links can also be used in teaching students for project management of computer game development. The results of this work will be used for the European Commission project Erasmus+KA2 “GameHub: university-enterprise cooperation in the gaming industry in Ukraine” [4]. Of course, the core of the described principles is the concept of the question: the ability to ask a question and the ability to hear the answer to it. Good example of such system of questions is result of work [5], in which the author proposes to consider his own game from many different perspectives, or lenses. 107 lenses can generate in a designer’s mind more than 4 hundreds of insightful questions to ask yourself or another designer about computer game. Therefore, in the future there are plans to establish links with these questionable lenses.

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