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# Enhancing Collaborative Science Learning through Multiplayer Online Videogames

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**Abstract.** We designed and implemented SAIR – A multiplayer online RPG with educational content in the context of this PhD research, concerning the application of educational content in a multiplayer game, in order to determine and explore factors such as cooperation, and the general framework considering Serious Games. We tested SAIR with a team of professional educators and we keep improving it. Further research will elaborate on the game's design document as it could provide useful guidelines in the design and development of educational MRPGs. Another interesting parameter is the assessment with students of the collaborative gameplay with students in science learning.

## SAIR – Designing, implementing and testing a multiplayer serious game as a research tool.

Multiplayer games additionally offer the element of collaboration or competition with real people (classmates or teachers in our case) as shown in the civilization experiment by Squire in 2003 which have a positive effect on the player's/student's performance, which in turn leads to better educational results, and enhances immersion. A central element in multiplayer games is that the interaction enables players to communicate and collaborate in the game sessions (Manninen, 2003). It seems that multiplayer games have obvious learning potential, and studies have focused on which types of learning these games support (Herz, 2001; Steinkuehler, 2004). Basic design principles e.g. scenario, immersion, interactivity, constructive trial and error process, or collaboration could make a successful educational videogame (Chorianopoulos, Giannakos, 2014). Especially, collaboration could improve the pupils' ability to learn since they learn from interaction with other group members and by reaching consensus. Since group members depend on each other, they help one another and assume responsibility for common success or failure (Jong et al 2006). Following the plan proposed in the PhD proposal, we started by making an extensive bibliographic research in the field of serious games. This led to participating in a doctoral consortium of FDG 2018 with the article [https://www.researchgate.net/publication/327112337\\_Enhancing\\_Collaborative\\_STEM\\_Learning\\_through\\_Multiplayer\\_Online\\_Videogames](https://www.researchgate.net/publication/327112337_Enhancing_Collaborative_STEM_Learning_through_Multiplayer_Online_Videogames).

Following that, we started research on the field of game engines, in order to find the appropriate tool to realize our game. The research started with the use of Unreal Engine, and while the results seemed promising at the start, the design of the game we had decided to implement, drew us to the RPG Maker MV, of the RPG Maker Series. Due to this particular game designing environment having Javascript as its language, it was much easier to include the multiplayer parameter, as well as keep the inclusion of the educational content to a high degree.

SAIR – MasterS of AIR, was designed and implemented in the course of the following months, featuring three chapters of the chemistry book, for the fifth grade, and the possibility for up to three players simultaneously. At the same time, and after finishing the design and implementation of the game an article was published titled: Game mechanics of a Character Progression Multiplayer Role-Playing Game with Science Content. - [https://www.researchgate.net/publication/347304131\\_Game\\_Mechanics\\_of\\_a\\_Character\\_Progression\\_Multiplayer\\_Role-Playing\\_Game\\_with\\_Science\\_Content](https://www.researchgate.net/publication/347304131_Game_Mechanics_of_a_Character_Progression_Multiplayer_Role-Playing_Game_with_Science_Content)

Current game-based learning designs incorporate the multiplayer component as delegation of tasks, with the meaning that individuals accept the game rules, interact with each other, but they do not necessarily share the same goals. We employed gameplay mechanics of the Multiplayer Role-Playing Games (MRPGs), such as character's progression and a turn-based battle system to encapsulate multiple aspects of science learning and to provide students with a tighter collaborative learning experience. SAIR is a chemistry MRPG that can be played with up to 3 people. Further research should evaluate with students the influence of collaborative gameplay in science learning. Therefore what I would like to see is if there would be possible to move to some evaluation regarding alternative implementations – or should I move to mapping the theoretical framework, including SAIR as well?

## Statement

As I would like to join the academic community by posting results of my work in scientific magazines in order to have a fruitful dialogue with the community I would like to attain some quality feedback from outside reviewers before submitting my own articles.

## Biography

Konstantinos Patiniotis, has a BSc in Libraries and Archive Science, and an MSc in informatics. He has worked in various Academic Institutions in Greece, as a librarian. He is currently working on getting his PhD from Ionian University, department of Informatics working on intergrating educational content on digital games, where he assists in the teaching of the subject of Human-Computer Interaction.

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