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# Game-based learning: cognitive load, motivation and learning

***Game-based learning is a teaching method that allows the user to visualize their progress and feel satisfied, motivating them to engage further and continue learning. In eLearning these aspects are fundamental.***

In a recent study published on Frontiers in Education, two German researchers, Klaus Dieter Stiller and Silke Schworm, examined learning based on typical logics of video games (game-based learning) as an effective, motivating and engaging teaching method for students.
In the field of e-learning it is essential to ensure that students are involved in the learning process and game-based learning is based on the use of playful and multimedia elements to keep users involved and make the content interactive. It would therefore seem desirable to include such an approach in e-learning courses, in order to offer students a more interactive, engaging and motivating experience.

Researchers focused on three research areas:

- the motivation,
- cognitive load (ie the activity and mental effort needed to understand a topic),
- the acquisition of new knowledge.

Stiller and Schworm submitted a sample of 39 students to their experiment with the aim of learning how cells work through an educational game. The aim of the game was to keep a living cell on another planet alive by reducing the spread of potentially harmful or deadly viruses. At the same time, the researchers gave the same content to a second group of students to learn with a methodology based instead on hypertext.

The researchers observed and demonstrated that students in the group committed to game-based learning have shown a higher level of motivation and interest than the second group. Regarding the cognitive load, the students of the first group initially reported relatively low levels of cognitive load. However, after 15 minutes of play, this increased and then stabilized after 30 minutes. The second group, on the other hand, reported a high initial cognitive load which then, however, dropped to almost the same level as the first group. With respect to the level of understanding and assimilation of concepts, both groups have improved their knowledge of cellular functions, however the hypertext group has achieved superior results compared to that of the players.

So is the game-based learning approach sufficient to guarantee a complete training of the subject? Based on the results of this research, probably not. Stiller and Schworm's champion are very small to draw general conclusions, however it is possible to conclude that, in addition to stimulating motivation, game-based learning is able to increase the level of user involvement. However, if the playful context becomes too stressful, the required cognitive load could worsen the understanding and learning experience, just as happens in traditional learning contexts.

Nevertheless, the hypertext group, a tool that is modeled based on the choices made by the user and that allows to quickly find specific information and to choose an appropriate level of in-depth content, has achieved better results in terms of acquiring knowledge.
If it is true that the video game stimulates motivation and is able to increase the level of involvement of users who can view their progress incrementally, developing feelings of gratification for their own improvement and thus demonstrating continuity, commitment and the ability to take risks, attention to detail and problem solving skills, essential skills both in traditional and e-learning based training, since in this way new information and skills are continuously acquired, making discoveries, it is equally true that something, at the cognitive level, it is certainly put into the background.
Even Steven Johnson, author of "Everything that hurts you is good for you. Because television, video games and cinema make us smarter", certainly deployable among enthusiasts and supporters of game-based learning, stresses this risk: "Complex and sequential arguments, in which each part is built on the previous one, and in which an idea may need to be developed for an

entire chapter, are not very suitable for living on a computer screen ». In this way it becomes difficult to convey an overall vision.