The central role of learning in videogaming

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In the 21st century, being a parent means having to deal with buying, monitoring, and negotiating about video games. A common question parents have is whether children can learn anything positive or of educational value by playing video games? The answer is "Yes!" **Children can learn valuable skills by playing video games.**

Over the past several years, video games have been the subject of heated discussions and debates in public and academic arenas. Due to some very popular titles featuring violent stories, video games are usually considered a bad influence, contributing to the aggressiveness that children and youth are manifesting. Certainly, there are video games that portray acts of violence and show aggressive models that may influence children and adolescents' aggressive tendencies. However, a closer look at video games reveals a huge diversity among types, contents, and genres of this form of entertainment. **Maze games**, **adventure games**, **sports games**, **strategic games**, and **simulation games** are good examples of game genres containing non-violent content. Happily, non-violent games such as **music and fitness games** have dramatically increased in popularity in recent years.

Video games and learning
For a long time, simulations have been used for educational purposes. Some of the first education-oriented simulations were aimed at supporting training in the **military**. Thereafter, their use has been broadly extended to other fields such as **medicine** and **business**. In these domains, simulations provide remarkable **contexts that combine learning with practice and experimentation**, allowing the acquisition of knowledge and the development of skills required by real-world scenarios.
However, while simulations have been more accepted as educational tools, video games have suffered rejection and resistance by the school community, due to their reputation as being violent and/or purely entertainment-oriented products.

What do we learn from games?
Video games are not only fun; people learn from games. They have an extraordinary educational value that has been underestimated for many years. Research over the past 20 years has shown that games can be used to support learning. Children and adults acquire and **develop new skills and knowledge** when playing digital games. The development of **strategic thinking**, **problem solving**, **planning**, **adaptation** to changing contexts, and **flexibility** are some of the positive effects associated with playing video games.

Why we learn through games
Gaming implies learning, independent of specific game content and educational purposes. During game-playing, the player is constantly dealing with a **dynamic gaming world**, whose status changes in response to the player's actions or due to the behavior of digital creatures endowed with artificial "intelligence." Thus, step after step, the **player has to understand what needs to be done**, make decisions about how to **employ the available resources**, and **carry out the planned actions**. All this is constantly done, until the player suspends activity or he/she wins or loses the game.

Learning is pushed even further through the interaction with objects and creatures in the virtual world. These are called **game mechanics**, and must be analyzed and understood by the player in order to be adequately dealt with. At first, the player has to learn the inner workings of specific mechanics he/she wants to use, independent of external goals. The player then has to learn how to use the mechanics in

order **to achieve a specific goal**. Finally, many games allow players to be quite **creative** by using unorthodox mechanics in **extra-ordinary situations**. Digital games are motivating learning environments by their own nature. Players are prone to learn whatever the specific game content requires whether it be positive skills or violent behaviors.

A concrete case: Guitar Hero
A good example of the potential of video games as learning environments is represented by the game *Guitar Hero*. These games require players to **play famous songs** and progress in their career as musicians. Players must play key parts of each song using a guitar-shaped controller, with the song's backtrack playing in the background. Learning the mechanics of *Guitar Hero* implies learning how to identify the notes that must be played and when and how to play them. As for the identification of the notes, players rely on visual cues displayed on the screen. Such cues move vertically from the top to the bottom of the screen. When a specific note reaches the bottom of the screen, the player has to play the note by "strumming" it on the guitar-shaped controller. The displacement of each cue is synchronized with the backtrack so that notes must be played according to the rhythm of the song. Hence, in order to play the right note at the right time, **the player must first collect and analyze the information provided by the aural and visual game mechanics (the musical backtrack and the animated cues, respectively), understand what note to play, decide when to strike the note, and finally, to learn how to do it by using the controller**. Thus, accomplishing the game goals in *Guitar Hero* requires learning processes that imply the development of both **eye-hand coordination and rhythm skills**.

Thus far, our findings indicate a relationship between the timing skills required to play the game and general musical skills. Past research in the music domain has shown the importance that tonal and rhythm pattern recognition has on music learning. Music learning consists of the recognition and learning of patterns and the structures and relationships among elements that constitute mental representations. As it happens with language, the exposure to a variety of repeating tonal and rhythm patterns develops a better music vocabulary. Therefore, playing *Guitar Hero* on a regular basis could help build the supports for understanding music.

Suggested Readings

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