

Learning geographic concepts through Minecraft

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Abstract:

Minecraft is a game where location plays a main role in its game mechanics. The game procedurally generates a landscape based on blocks (cubes) which represent 1m³ in a real scale. The blocks are organised on a x, y and z coordinates system, where x corresponds to longitudes, y is height, and z to latitude. In that way, the player can identify the specific location of a block by looking up the properties of their location. This location corresponds to the player's position in the 3D virtual environment. The exploration is one of the key activities that players must perform to thrive in the survival mode, which is supported by many different resources in the game. Among the examples of resources are blank map, compass and the cartography table (version 1.14), which enables the change of scale of a map by joining a blank map to a written map tile. The compass, though, points to where the player first spawned in the virtual world.

Released more than one decade ago, the game is one of the most sold in the history of video games. Minecraft has had an impact on its community, more than a hundred million digital native players since then. This context formed what James Paul Gee (2018) calls as affinity space, which consists of teaching and learning processes that happen beyond the formal institutions. In the case of Minecraft, these spaces are formed by a community of players that interact through online forums, Minecraft public and private servers, as well as in schools which adopt Minecraft Educational Edition. The context of interaction in these spaces "people are fully engaged in helping each other to learn, act, and produce, regardless of their age, place of origin, formal credentials, or level of expertise (Gee, 2018, p. 9).

It reflected on the many examples of applications where the game is used for educational purposes in many different topics. There are several studies that assessed the potentialities and characteristics of formal teaching through Minecraft (Callaghan, 2016; Mavoa et al., 2018; Thorsteinsson & Niculescu, 2016). One way to increase the game's potential for teaching is by using geospatial data as an input, making it possible to create Minecraft worlds that represent real world features (de Sena et al., 2021). It can be done in many different scales, depending on data availability and limitations in the game's structure. In the literature there are many examples of this approach being used for urban planning and heritage subjects (de Andrade et al., 2016, de Andrade et al., 2020; Isgc et al., 2021; Lecordix et al., 2018; Scholten et al., 2017). Educational uses of Minecraft for geography teaching have been less documented though.

In this sense, we aim to discuss how the simplified way of visualisation in Minecraft can be useful for developing learning strategies in complex geography topics (e.g. climate zones), taking advantage of the game's aesthetics, spatial arrangement and mechanics. In this paper we present one example of a prototype made to address a geographical topic that uses basic principles in the game. Blocks were used as textures to represent simplified world climate zones in a WGS 84 projection scaled model (Fig. 1 right). The model was created by using a digital elevation model along with a vector layer of five general climate zones based on Köppen climate classification. They were represented by blocks with associative textures and properties related to the target zones. An interactive legend bar was created for the player to teleport to the biome which represents the selected climate zone, depending on the texture that it represents on the wall map (Fig 1 left). The proposed scenario invites the players to explore the game's virtual environment in a way to link the map representation and block textures to specific environmental aspects of the visited climate zone.

We believe that, considering Minecraft's affinity space, the game can be relevant in translating complex geographic concepts to a contextualised setting for students. Future developments of this study will focus on designing various scenarios for the cartography and geography subjects covering different topics. Using Minecraft as a learning medium will be evaluated in the means of efficiency of this kind of application in a formal learning setting, by testing prototypes with secondary school students.



Figure 1: Interactive legend panel using block's textures which indicate the climate zones in the map (left), and the representation of a wet tropical climate zone (right) to which players are teleported after interacting with the panel (pressing first button from the left).

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