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Interactive comment on "Volcanoes in video games: The portrayal of volcanoes in Commercial-Off-The-Shelf (COTS) video games and their learning potential" *by* Edward George McGowan and Jazmin Paris Scarlett

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Review of McGowan & Scarlett video game paper:

Firstly I would commend the authors on the paper, certainly current public, especially those under 30, will have grown up with computer gaming, and thus will be already familiar with the learning environment, and thus will have the capacity to learn within it.

I have made specific comments on an annotated PDF, general ones are below:

1) The introduction gives plenty of knowledge of relevant games, Im wondering whether you are missing a section on other educational egames in STEM? A couple here for you for info but there will be others: Pringle, J.K., Bracegirdle, L. & Potter, J. 2017. Educational forensic e-gaming as effective learning environments for HE students. In: Williams, A., Cassella, J.P. & Maskell, P.D. (eds.); Forensic Science Education & Training, Wiley Press. ISBN: 978-1-118-68923-3. Pringle, J.K. 2014. Educational egaming: the future for geoscience virtual learners? Geology Today, 30(4), 145-148. http://doi.org/10.1111/gto.12058 2) Are all of these games solo linear story ones? Or multi-threaded or even open world ones? Im unsure as not familiar with all the games. As peer-to-peer learning is surely important as well with group-based games as other pedagogic articles point out. 3) You have gone through the main aspects of volcano hazards well, with illustrations (and I like the supplementary video, would it be too much work to have more supplemental videos of all the key volcanic hazards do you think? Particularly as all the games are all 3D.. 4) Im also wondering if a summary table matrix would be of use to include in your paper, summarising (in sequential columns) the different key volcanic hazards, games which cover them well, and then which cover them badly? And anything else you deem relevant? That would be of real use to the reader and bring together your key findings of this paper I think? I hope the other reviewer is a volcanologist by the way who may note a key one which you have missed as Im not!

Hope helpful, Best regards, Jamie.

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Volcanoes in video games: The portrayal of volcanoes in Commercial-Off-The-Shelf (COTS) video games and their learning potential

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Abstract

Volcanoes are a very common staple in mainstream video games. Particularly within the action/adventure genres, entire missions (e.g. *Monster Hunter: Generation Ultimate,* 2018) or even full storylines (e.g. *Spyro: The Reignited Trilogy,* 2018) can require players to traverse an active volcano. With modern advancements in video game capabilities and graphics, many of these volcanic regions contain a lot of detail. Most video games nowadays have gameplay times in excess of 50 hours. *The Legend of Zelda: Breath of the Wild* (2017) for example brags a minimum of 60 hours to complete. Therefore, players can spend a substantial amount of time immersed within the detailed graphics, and unknowingly learn about volcanic traits while playing. If these details are factually accurate to what is observed in real world volcanic systems, then video games can prove to be a powerful learning tool. However, inaccurate representations could instil a false understanding in thousands of players worldwide. Therefore, it is important to assess the accuracies of volcanology portrayed in mainstream video games and consider whether they can have an educational impact on the general public playing such games. Or, whether these volcanic details are overlooked by players as they focus solely on the entertainment factor provided. We have therefore reviewed several popular commercial video games that contain volcanic aspects and evaluated how realistic said aspects are when compared to real-world examples. It was found that all the games reviewed had a combination of accurate and inaccurate volcanic features and each would vary from game to game. The visual aesthetics of these features are usually very realistic, including lava, ash-fall and lahars. However, the inaccuracies or lack of representation of hazards that come with such features, such as ash-related breathing problems or severe burns from contact with molten lava, could have great negative impacts on a player's understanding of these deadly events. With further investigations assessing the direct impact on the general public, there is the opportunity to correctly assess how to incorporate the use of mainstream video games in educational systems and outreach.

1. Introduction

1.1. Commercial Off-the-Shelf vs Educational Video Games

Video games can be categorised into different groups, based on playable design, graphic style or genre. The focus of this investigation will be on mainstream, or Commercial Off-the-Shelf (COTS) video games as opposed to educational games. Educational games have been intentionally designed to teach the player about particular topics. They are often developed with input from teachers to ensure the information included is factually correct, and sufficiently covers the topic of interest. While the use of educational games has been heavily researched (e.g. Oblinger, 2004; Kerawalla and Crook, 2005; Squire, 2005; Van Eck, 2006; Squire et al., 2008; Charsky, 2010; Wiklund and Mozelius, 2013; Lehnd, 2014; Chen, Yeh and Chang, 2015; Rath, 2015; Mozelius et al., 2017), most conclude that players, particularly children, tend to lose focus or enthusiasm to such games, nulling the educational benefits they could provide (Kerawalla and Crook, 2005; Van Eck, 2006; Charsky, 2010; Floyd and Portnow,

Fig. 1. reviewers comments on PDF