

Contents lists available at [ScienceDirect](#)

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Video games can develop graduate skills in higher education students: A randomised trial



Matthew Barr

School of Humanities, University of Glasgow, Glasgow G12 8QQ, Scotland, UK

ARTICLE INFO

Article history:

Received 15 June 2016

Received in revised form 14 May 2017

Accepted 25 May 2017

Available online 26 May 2017

Keywords:

Adult learning

Cooperative/collaborative learning

Interactive learning environments

Media in education

Post-secondary education

ABSTRACT

This study measured the effects of playing commercial video games on the development of the desirable skills and competences sometimes referred to as 'graduate attributes'. Undergraduate students in the Arts and Humanities were randomly assigned to either an intervention or a control group. Previously validated, self-report instruments to measure adaptability, resourcefulness and communication skill were administered to both groups. The intervention group played specified video games under controlled conditions over an eight week period. A large effect size was observed with mean score change 1.1, 1.15, and 0.9 standard deviations more positive in the intervention group than the control on the communication, adaptability, and resourcefulness scales respectively ($p = 0.004$, $p = 0.002$, and $p = 0.013$ for differences in groups by unpaired t -test). The large effect size and statistical significance of these results support the hypothesis that playing video games can improve self-reported graduate skills. The findings suggest that such game-based learning interventions have a role to play in higher education.

Crown Copyright © 2017 Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Graduate attributes are those generic skills such as problem solving, communication, resourcefulness or adaptability which are considered desirable in graduates, particularly where employability is concerned (Barrie, 2006, 2007; Hughes & Barrie, 2010). However, it may be argued that most higher education courses are not explicitly designed to teach or develop graduate attributes. Many commercial video games, on the other hand, require players to exercise a range of such skills and competences in order to progress (Barr, 2013). Advocates of the learning experience afforded by modern video games include Thomas and Brown (2011), who describe a new "disposition" towards learning that games exemplify, requiring players to be both adaptable ("thrive on change") and resourceful ("marshal all their available resources and experiment with them to find multiple ways of accomplishing a task"). Gee (2007) identifies a range of learning principles present in video game design that encourage, for example, critical thinking and reflective learning, which are also commonly cited as desirable attributes in graduates. However, while there are indications that playing video games may be associated with positive cognitive and social effects (Granic, Lobel, & Engels, 2014), there is little empirical evidence for the efficacy of using commercial video games to develop graduate skills. This work, therefore, was intended to measure the effects of playing commercial video games on the attainment of certain graduate attributes, testing the hypothesis that playing selected games can improve student scores on measures of graduate skills. This general hypothesis may be subdivided into hypotheses relating to each of the areas under investigation: communication, resourcefulness and adaptability. These hypotheses are evaluated by

E-mail address: Matthew.Barr@glasgow.ac.uk.

<http://dx.doi.org/10.1016/j.compedu.2017.05.016>

0360-1315/Crown Copyright © 2017 Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

comparing control and intervention group pre- and post-test scores on self-report measures. If these hypotheses are supported, then new opportunities for institutional skills development provision may be revealed, and there are important implications for how video games are perceived by the wider public.

The GAGA Project (“Using games technology to develop graduate attributes”) saw the development of a game to help prepare international students for study at the University of Abertay, by introducing that institution’s graduate attributes (Lloyd, 2011). However, no empirical evidence of the game’s efficacy has been published. Furthermore, this work involved the development of a game for the specific purpose of introducing certain graduate attributes: the study reported here is concerned with the use of existing commercial video games. Adachi and Willoughby (2013), however, demonstrated by means of a four-year longitudinal study that playing strategy and role-playing games predicted self-reported problem solving skills among a sample of 1492 high school-aged participants. Adachi & Willoughby also noted that the empirical evidence for the relationship between playing video games and the development of problem solving skills was limited. Subsequently, Shute, Ventura, and Ke (2015) have shown statistically significant gains in problem solving, spatial skills and persistence in a group of participants asked to play *Portal 2* – one of the titles used in this study – for 8 h, compared with a group asked to play a suite of 2D puzzle games purported to improve such skills.

The Scottish institution at which the study was carried out identifies ten graduate attributes: Investigative, Effective Communicators, Independent and Critical Thinkers, Adaptable, Resourceful and Responsible, Confident, Experienced Collaborators, Subject Specialists, Reflective Learners, Ethically and Socially Aware. As noted by Nicol (2010), the development of graduate attributes in Scotland has drawn heavily on work carried out by Barrie (2006; 2007) in Sydney and Melbourne and, as a result, the attributes extolled by this institution are broadly comparable to those identified by other universities, internationally. Furthermore, it is evident that skills relating to communication, adaptability, and resourcefulness are sought by employers the world over, regardless of the umbrella terms used to describe them.

Since the host institution already purports to develop this list of skills and competencies in its students, this study was designed to determine whether video games offer any advantages for attribute development over-and-above existing university provision. A pilot project indicated that of the attributes listed, effective communication, adaptability and resourcefulness were the most promising candidates for further study, and identified suitable instruments for their measurement.

2. Games

The games used in the pilot project were selected with assistance from colleagues in industry and academia, who were asked to suggest titles that might relate to the list of graduate attributes provided. These suggestions were necessarily mediated by the financial and technical limitations of the study, which dictated that games must run on very modestly-specified Windows PCs and be relatively inexpensive. An additional consideration was the quality of the games. A poor quality game is of little utility here: well-received titles are more likely to be representative of those which players would choose to play on their own time, and a particularly poor game is likely to impact negatively on the participants’ willingness to engage in the study. While game quality is somewhat subjective, review scores aggregated by sites such as Metacritic (Metacritic - Movie Reviews, TV Reviews, Game Reviews, and Music Reviews, 2016) are used by industry and consumers alike to determine a game’s excellence (Graft, 2011). Metacritic scores are recognized as imperfect (Dring, 2010) but they undoubtedly provide an easily quantifiable means of determining the relative merits of a game. For the purposes of this study, no game with a Metacritic score of less than 80 out of 100 was considered, with scores ranging from 82 (*Lara Croft and the Guardian of Light*) to 95 (*Portal 2*). All of the games, with the exception of *Gone Home* and *Papers, Please*, include a substantial multiplayer component.

The games used in the study were all commercial titles, designed for entertainment purposes rather than with the intention of developing particular skills in players. The brief descriptions below describe the games in general terms while highlighting some of the features most relevant to this study.

Borderlands 2 (Borderlands 2-Gearbox Software, 2016) is a co-operative role-playing first-person shooter game developed by Gearbox Software. Players work together to obtain loot and weaponry while defeating a range of foes against a colourful, if violent, cartoonish backdrop and attendant story. A variety of play styles are supported through the choice of character classes presented to the player, ranging from a tank-like “Gunzerker” to a stealthier assassin. The game allows for local area network (LAN) multiplayer, meaning the co-operative elements functioned within the university infrastructure and did not require an internet connection. *Borderlands 2* also permits players to drop in and drop out as required – a participant who arrived after others had already embarked on a mission could straightforwardly join the team without being forced to wait for the beginning of the next mission, or requiring the others to start again from the beginning.

Minecraft (Minecraft, 2016) is a procedurally-generated sandbox game with construction, exploration and survival elements. In single player mode, players are free to explore the world and collect (‘mine’) resources such as stone, wood and metal to create (‘craft’) a range of buildings, tools and weapons. Multiplayer mode is similarly non-prescriptive in terms of what it permits (or requires) players to do: the main difference is that the world is shared, so players may choose to work together.

Valve’s *Portal 2* (Official Portal 2 Website, 2016) is described by the developer as “a hilariously mind-bending adventure that challenges you to use wits over weaponry in a funhouse of diabolical science”. The game features a robust co-operative mode, and the co-operative portion of the game allows for split-screen play, meaning two people can play together on the same machine. Participants were asked to play *Portal 2* in pairs and provided with printed instructions on how to host or

Download English Version:

<https://daneshyari.com/en/article/4936747>

Download Persian Version:

<https://daneshyari.com/article/4936747>

[Daneshyari.com](https://daneshyari.com)