Video Game Making & Modding in the Wild: A Review of Recent Research

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Abstract: The purpose of this paper is to provide an overview of current literature on video game making and modding (modification) in fan communities and other informal settings. The paper also identifies new game making tools and communities that have the potential to broaden participation and expand the nature of game making practices. A final section addresses key issues and directions for future research.

Introduction

Academic interest in video gaming has exploded over the last few decades, and scholars have approached the study of gaming from fields as diverse as cognitive psychology, medicine, economics, sociology, law, computer science, and education. Much scholarship has focused on video game *play*; that is, who plays what kinds of games, how playing games affects cognitive, emotional, social or physiological capacities or dispositions, the social interactions associated with game play, and so forth. More limited scholarly attention has been devoted to *making* games as a practice in its own right. Making video games encompasses all aspects of creating a game, from the more technical aspects of writing software code or graphic design to the more conceptual tasks of identifying engaging game goals, actions, and themes. Game making has been popularized through the availability of simplified game design tools that can be readily used by aspiring game makers of all ages and backgrounds.

There is a growing literature on game-making in educational settings, including both in school and afterschool programs. Another line of investigation has focused on understanding game making, or in particular game modification (modding), as a fan practice. Game modding, and to some extent, game making, is a popular leisure pursuit among game players, and there are many fan communities devoted to sharing player-created games, mods, advice, tutorials, and tools.

Game making and modding among fans takes many forms, and can include: (a) the use of existing commercial games (or game "engines") to create new, stand alone games, (b) the use of software tools to modify existing games by creating an "add-on" or new content that changes a part of an existing game, and (c) the use of other software to make new games. This includes software created specifically for game design as well as software designed for a wider range of applications but adopted for game design. In this paper we primarily discuss key literature on video game modding, or (b) above. We found few empirical studies of total game conversions or the use of game-making software outside of school or after-school educational settings. We have included those few studies in our discussion below. We also limited our review to literature published within the last decade (2004-2014).

Buckingham and Burn (2007) point out that games problematize any clear distinction between production and consumption of digital media. "Sandbox" games like *Minecraft* provide players with the freedom and tools to design objects or environments, while other games give players a more limited ability to customize avatars or edit game maps or levels. What "counts" as game making or modding is a question that we struggled with as we conducted our review and that we will return to in the concluding sections.

Gaming Making and Modding Among Fans

Game making as a fan practice often takes the form of modding existing games designed for entertainment, typically as an extension of game play. Players have modded games practically since the first computer games were created (Unger, 2012), and game modding has grown in diversity and sophistication along with games themselves. Some commercial game designers encourage game modding by releasing software tools that allow players to modify game content; in addition, players have created their own modding tools. Fans share such tools, tutorials and completed mods, as well as discuss modding, through online fan communities, some devoted exclusively to sharing knowledge and strategies for game modding. As one example, Mod DataBase (www.moddb.com) was launched in 2002 with the goal of serving as a clearinghouse of sorts for all types of game mods, add-ons, and user-generated content. As of February 2015, the site had almost 39,000 files available and more than 137 million downloads. ModDB is organized by game platform, and in addition to game content, has videos, news, tutorials, groups, and forums, among other features. The site has a page with some basic information about mods for newcomers ("Anyone who complains 'nothing good in life is free' needs to be shown a few mods"), including discussion of the "mod-friendliness" of various games.

A variety of tools available for game making, often with supportive online communities, are used independently by fans. *Scratch* and *Gamestar Mechanic*, for example, while designed with educational goals, also are used by players outside of any educational setting. Other tools are designed for players with more professional aspirations, such as *GameMaker* (https://www.yoyogames.com/studio). Blurring the lines still further, *Little Big Planet* is a game primarily designed for entertainment in which players can not only play the game, but also create their own games with its level editor (Rafalow & Tekinbas, 2014).

While there have been numerous studies of game-related fan practices and communities in general, scholarly discussions or empirical studies of game modding and making outside of educational settings are relatively few. Most research focuses on modding practices and modders in relation to online communities, rather than, for example, studying individual game modders. In the following section, we discuss key ideas from the limited scholarly literature on game modding. Next, we discuss game *making* as a fan practice, and identify some new game making tools that have yet to be studied.

Scholarship on Game Modding

Scholarly work on fan game modding has focused on several key topics. One focus has been identifying the various practices that might be associated with game modding "in the wild." Another focus has been understanding the game modders themselves, creating demographic profiles and identifying motivations for engaging in modding practices. One issue is how definitions of what counts as modding contributes to different perceptions of who is and isn't engaged in modding, in particular, the underrepresentation of women. A third major focus has been on the social contexts of modding, including the nature and ethos of modding communities or affinity spaces, as well as the collaborative processes and forms of teaching and learning involved in modding. We briefly discuss each topic below.

Modding Practices

One challenge confronting researchers is the great diversity in the kinds of practices associated with game modding. There have been a few attempts to categorize mods, typically based on their scope and complexity. Sotamaa (2010), in a study of the game *Operation Flashpoint (OFP)*, identified three major types of modding practices: the creation of missions, add-ons, and mods. Unger (2012) proposes a general typology of game modding practices that included mutators/tweaks, add-ons, mods, and total conversions. Unger also suggests a means of analyzing mods by differentiating among "layers" of games that might be modded, including the narrative, audible, visual, interface, and rule system layers. These and other analytic frameworks tend to emphasize the technical features of mods. As Unger suggests, mods also may be understood in more qualitative terms, by identifying how mods change game play or narrative. Game mods might be characterized as an adjustment to the game, as an extension of game play or story, or as invention of a new story or form of game play.

Game Modders

The sheer number of game mods and the size of game modding communities suggest that game modding is a widespread practice, but the proportion of game players who also mod is small (Hayes, 2008). Given the distribution of game modding across different games and game communities, obtaining representative data about demographics, motivations, or other attributes of modders is understandably difficult, if not impossible. Several studies investigated attributes of game modders in modding communities using non-representative samples. For example, Sotamaa (2010) collected information from 23 participants in the *OFP* modding forum along with 6 members of a local *OFP* modding team; Poor (2014) distributed a questionnaire across a variety of game sites and modding forums, yielding 111 respondents; Owens (2011) collected survey data from 83 participants in the RPG Maker online community. These small scale studies make it clear, as Sotamaa (2010, p 239) wrote, "there is no such thing as an average computer game modder." Respondents in these studies ranged from high school age to senior citizens, and their levels of educational attainment were equally as diverse, though some college completion seemed predominant. Women comprised a small percentage of modders, however.

Participants in these studies report varied motivations for modding. Sotamaa, for example, identified five major motivations that are similar to the findings of other studies: (a) playing, or improving game play, (b) hacking, or understanding and manipulating the game code, (c) researching, or gathering information about content relevant to the game mod, (d) artistic expression, and (e) cooperation with other modders. He also found some modders who hoped to use modding as a stepping stone to employment in the game design industry (also see Postigo, 2007).

Wirman (2014) argues that the association of modding with a "discourse of hackerism" (p. 79) has led to the marginalization or exclusion of certain practices from what counts as modding. This discourse emphasizes modding

as a technical activity that gives modders higher status based on their technological sophistication. This type of modding also carries an aura of illicitness, as modders operate outside the normal boundaries of what game developers intend. She contrasts this with the ethos of *The Sims* modding communities, in which practices like graphics-focused "skinning" (changing the appearance of objects or people) are popular and valued, yet do not alter the underlying game code, and are encouraged by the game company. Wirman claims that the exclusion of skinning and similar practices from most discussions of modding, as well as the association of modding with first person shooter games, devalues the participation of women modders in games like *The Sims*, and contributes to a larger discourse that values a limited range of "intellectual" skills and knowledge in gaming. Gee & Hayes (2009) propose that "soft modding" skills, such as translating a book into a game or understanding how to engage players, should be given just as much value as technical modding skills, though they are typically overlooked in discussions of modding.

Very little attention has been given to how this discourse of hackerism might marginalize or be unappealing to particular groups of male gamers. Betsy DiSalvo and her colleagues' research into the orientations of African-American adolescent boys towards games and game modding is one exception. These boys tended to engage in social and competitive game play, and equated digital games with "real life" sports, where rules were not to be violated. Game modding and the hacker ideology conflicted with their views of sportsmanship and how the boys used competitive game play to increase their social status among their peers (DiSalvo, Crowley, & Norwood, 2008; DiSalvo & Bruckman, 2010).

Modding Community and Culture

The culture and community aspects of modding have been examined from different perspectives. Complex modding projects can require collaboration among a team of contributors, who have expertise in different areas, such as animation, scripting, interface design, and modeling, and some studies have examined this collaborative process (e.g., Steinkuehler & Johnson, 2009). Sotamaa (2010) found that although modding team members are formally assigned to different roles, their actual engagement with modding tasks is fluid, with members assisting each other on different aspects of a mod as needed. Collaboration also takes place through modding forums, where mod makers may ask for technical advice or share beta versions for debugging. Popular mods and modders can develop a fan base of their own, with fans even making requests for new design features (ibid).

Given the often communal nature of mod development, ownership and intellectual property rights have become topics of interest to researchers. Many mod communities promote an open source model, in which mods are made available freely for use by the community at large (Sotamaa, 2010; Unger, 2012). While requiring payment for mods is often frowned upon in mod communities, modders may request donations for mods that require considerable time and effort to produce. However, ownership of mods, or more specifically attribution rights, can be strictly enforced in these communities (Kow & Nardi, 2010).

Tensions can arise between modders and game design companies. Modding is both encouraged and viewed as subversive by game companies, and choices made by the game developer can greatly affect the ‘‘moddability’’ of a game. From one point of view, modding is a form of unpaid labor that benefits game companies by extending a game's playability and keeping fans engaged. From another perspective, modding might be viewed as an effort to hack the game rules, cheat or otherwise disrupt the game experience, or as an infringement of IP rights if copyrighted art or graphics are modified or "stolen." Game companies deal with this issue in two primary ways (Kow and Nardi, 2010): (a) through restrictions on the software platform or alternatively, by providing modding tools or development kits that allow players to make modifications while implicitly controlling what can be produced (Unger, 2012), and (b) through legal enforcement, spelling out the terms and conditions of game content use in legal documents such as end-user license agreements. Typically these documents give companies ownership rights to any user-created content uploaded to a game site or online game, and the right to restrict distribution they consider inappropriate or in violation of copyright agreements.

There has been little study of how modders and companies mutually negotiate their potentially competing interests: corporate profits on the one hand and a perceived common good on the other. In one analysis, Kow and Nardi (2010) discuss a conflict between the *World of Warcraft* modding community and Blizzard Entertainment that highlighted the negative repercussions of a company's use of legal mandates — in this case, banning modders from seeking donations or charging players for use of a mod — on modders' commitment to modding and their sense of ownership over their creations. They suggest that companies can manage, for example, the use of mods with undesirable effects, by changes in the game software: "… mods and the software changes are a concrete form of negotiation, in programming terms, between the company and the modders, as each develops code that suggests a new path forward to the other. Mutually exclusive values in different concrete situations can thus, in a way, be reconciled, (n.p.).

How the culture of game modding communities supports mutual teaching and learning has also received some attention from scholars. A volume edited by Hayes and Duncan (2012) includes several studies of the teaching and learning dynamics of game modding communities. Researchers have applied various forms of discourse analysis to understand how modders collectively build knowledge about modding practices and tools, as well as about broader issues related to games and their content. Hayes and Lee (2012), for example, analyzed a *Sims* modding forum to understand how participants learn the "language" of modding, a crucial step in newcomers' ability to request appropriate help and to experienced members' ability to provide assistance. Owens (2010), in a close analysis of a forum thread devoted to modding *Civilization III*, illustrates how participants' desire to increase the historical accuracy of the game led them to complex discussions of the role of science and technology in society.

New Game Making Tools & Communities

Stand-alone game making tools have been available to aspiring game designers for decades. A variety of game-making software tools were created in the 1990s for novice programmers, such as *Game Maker*, *RPG Maker*, and *Adventure Game Studio* (Hayes & Games, 2008). Updated versions of these and other game-making tools are available today and typically have active user communities. Many new game-making tools recently have been released (see Table 1). The marketing for these tools tends to emphasize their ease of use and how quickly games can be created. Several are intended for the design of mobile games. Some tools are aimed at children as well as older users, and offer information for parents and teachers about the educational value of game making. Some allow users to export their games to stores such as the iOS App Store or the Android Market. Others host the games on their sites. In addition to these new tools, each of the major game consoles has or will have game making software. There is *Project Spark* for the Xbox One; in 2014 *GameMaker: Studio* was released for the Playstation4, and Nintendo plans to release *Mario Maker* for the Wii U in September 2015.

Other new software tools also have been adopted for game-making by users. *Twine*, an open source tool for creating interactive stories, is perhaps the most widely known of such tools, due to the Gamergate controversy over *Depression Quest*, a game created with *Twine* (Lee, 2014). *Twine*, its games and community provide a contrast to more mainstream tools and communities. As Harvey (2014) points out, *Twine* games are "often both quick to make and to play " (p. 99), addressing topics that are personal and unusual for mainstream games.

These tools and their respective communities represent intriguing new directions for game making, in both formal and informal settings. They hold exciting but somewhat different potential for creativity, for introducing a broader audience to game making, and for cultivating a more varied ethos around game making. Some of these tools let users create and tinker with game design principles within a constrained, structured space. *Sploder*, for example, offers game creation tools for different genres, such as arcade and platform games. Some, like *Stencyl*, aim to attract users who want to make money by selling their games through online stores like Steam. *Twine* has been celebrated for serving as a hub for a women-focused game making community (Ellison, 2013). We found little published research on the use or impact of these tools, perhaps because they are still relatively new.

	Site	Platform	Export	Education Support?	Target Audience
GameSalad Creator	http://gamesalad.com/	Standalone Program	iOS, Android, HTML5	A curriculum and education licenses are offered for purchase	Commercial game developers
Stencyl	http://www.stencyl.com/	Standalone program	iOS, Android, Flash	Free curriculum, no license fee	Commercial game developers
Flow Lab	http://flowlab.io/	Browser-based	Hosted on site, iOS	Teacher license available, no curriculum offered	Informal learners, classrooms
Gamefroot	http://gamefroot.com/	Browser-based	Hosted on site, HTML5	Free and open source curriculum, student blogging platform in development, no license fees	Commercial game developers, informal learners, teachers
Sploder	http://www.sploder.com/	Browser-based	Hosted on site	None, but the site is focused on young learners	Children and adolescents
Construct 2	https://www.scirra.com/construct2	Standalone program	Web, Standalone Mac or PC Applications, iOS or Android (need additional support)	Education licence fees, no curriculum	Commercial game developers, informal learners, classrooms

Table 1: New game making tools.

Discussion & Directions for Future Research

One of the more prominent issues evident in our review is that of inclusiveness, in terms of who participates in game making or modding, and in what sort of skills and designs are valued. Up to recently, the most prominent modders and modding communities have been heavily dominated by white men, and have over-valued technical prowess. The growing number of game making or modding tools available for popular use is already giving a wider audience the tools to participate in game making. However, even communities tied to widely appealing games with level editors like *Little Big Planet* seem to have, for example, small proportions of female modders (Rafalow & Tekinbas, 2014). Educational game making programs in afterschool contexts also tend to attract a far larger proportion of boys than girls (Webb, Repenning, & Koh, 2012). The reasons for these ongoing disparities are complex, involving both perceptions of games and game modding, and features of particular communities that are overtly or implicitly exclusive, and they merit further attention.

In general, we were surprised by the relatively small number of empirical studies of game making or modding in fan communities or other non-educational settings. There is a larger body of research on the dynamics of game fan communities, in which game modding is sometimes mentioned, and game modding also appears in some discussions of young people's out-of-school digital media practices more broadly (e.g., Ito et al., 2009). Building on this literature, we think there are several approaches to the study of informal game modding that are necessary and useful. First are descriptive studies devoted specifically to game modding practices and communities. We need

studies of a much wider range of games and communities, to identify common elements as well as differences. A second approach is to focus on the modders themselves and build a better understanding of the role of modding in the context of their lives and broader trajectories of engagement with digital media (see, for example, Gee & Hayes, 2010; Durga, 2012; Rafalow & Tekinbas, 2014). A third approach is to locate game modding in the larger context of game play, devoting more attention, for example, to understanding how modding might be prompted by particular kinds of play, or even how the boundaries of play and modding are becoming intentionally blurred, in games like *Little Big Planet* or *Gamestar Mechanic*. How do play and modding mutually inform each other, and each make a contribution to what users gain from the experience? How do deliberate attempts on the part of game publishers to encourage game making, by providing level editors or modding tools, both encourage wider participation and potentially limit what users can do and create? The hacker ethos that pervaded earlier modding communities is hard to sustain when game making or modding is simplified and officially sanctioned. How such tools encourage new forms of culture and community is an empirical question worthy of investigation.

In addition to descriptive studies, ethnographic interventions might be implemented in fan communities to identify ways to promote learning, enhance participation, or promote new ways of collaboration and communication. While the thought of researchers "intervening" in fan communities might seem inappropriate or unethical, we draw on ideas of intervention that inform community art installations, where artists identify issues and ideas from intensive studies of local communities, and then create artwork that is intended to communicate these ideas and issues back to the community, with the goal of prompting new perspectives, dialogue, and community-driven change (Mounajjed, Peng, & Walker, 2007).

There are many challenges facing researchers in this area, and indeed in any research on digital media. The biggest challenge is how rapidly game making tools are evolving, reflecting both the evolution of computer technology as well as the evolution of games and game platforms. Tools and programs come and go rapidly; many of the game making tools and programs currently available were not in existence a decade ago, and if they were, their features have been modified considerably. The rise in popularity of gaming on mobile devices like cell phones and tablets makes it likely that game design for apps will become much more common. A challenge for researchers is identifying core questions and topics that transcend the features of individual tools and platforms. There is a similar flux in game modding communities; communities can expand, shrink or disappear along with the popularity of particular games. There are long-lasting game communities, but they are organic and evolving. While this poses a challenge, we also see an opportunity, for little research has investigated how these communities change (for exceptions, see Lammers, 2011; Lee, 2012). Overall, game making and modding "in the wild" represent a vibrant and contested arena that deserve much more attention.

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