DESIGNING A DIGITAL ROLEPLAYING GAME TO FOSTER AWARENESS OF HIDDEN DISABILITIES

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On Fighting Shadows (OFS) is a two-dimensional roleplaying game that tells the story of Marvin, a young adult that experiences hidden disabilities, focusing on hydrocephalus and its possible mental health implications, such as anxiety and depression. Developed with the goal of being both informational and engaging, OFS aims to increase awareness and foster discussions not only about hidden disabilities as medical conditions, but also as phenomena that are experienced in society. The objective of this design case is to describe the development process, including the design dilemmas, of the prototype of OFS, as well as to discuss future directions of this project. Both in the prototype design phase and in usability testing, the tension between learning and entertainment was observed, aligning with reflections from previous studies (Prestopnik, 2016). Playing OFS was also observed to engage users in experiencing symptoms of hydrocephalus and understanding the character's feelings. Possible directions to improve the experience for different user profiles involve adaptation of game conditions for players that would like to prioritize educational information over fun, and vice-versa.

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INTRODUCTION

In *Valiant Hearts: The Great War* (Ubisoft Montpellier, 2014), an unlikely band of heroes struggle for survival and hang on to hope during World War I. These four characters, who wanted nothing more than the fighting to end, were accompanied by a faithful dog who followed and helped them in their adventures. They are, in fact, the playable protagonists in a puzzle video game developed by Ubisoft Montpellier, inspired by letters sent to loved ones during the Great War. *Valiant Hearts* is an incredibly emotional journey, one that can even lead players to cry and relate to the sadness being portrayed on the screen. This example demonstrates the capacity of video games, a medium that has had its storytelling possibilities refined and expanded since their conception (Holmes, 2012), to place players in the shoes of individuals that they would otherwise not know about or relate to (Gee, 2011; Schell, 2005), and make people feel what these characters feel. This is only one instance of a growing trend of video games that have emotional appeal as a top priority.

However, in our technologically-mediated world, people are growing increasingly lonelier and sharing fewer discussions about topics of social and historical relevance (Turkle, 2016). Games like *Valiant Hearts*, where players fill in the shoes of an Other and make emotional choices, can be the starting point to discuss the awareness of one's own understanding of specific themes and promote empathy. Story-rich games can also provide a window to, and foster discussions about, cultures that players would not be likely exposed to, such as the case of the Native Alaskan *Never Alone* (Upper One Games, 2014). It is inspired by these works of art that I ventured to develop the narrative-focused computer game prototype that I discuss in the present design case.

On Fighting Shadows (OFS) is a two-dimensional roleplaying game that tells the story of Marvin, a young adult that experiences hidden disabilities such as anxiety, depression, and hydrocephalus. Developed with the goal of being both informational and engaging, OFS aims to increase awareness and foster discussions not only about hidden disabilities as medical conditions, but also as phenomena that are experienced in society (Fitzgerald & Paterson, 1995); those

not easily discerned by others, present unique challenges to this reappraisal, both because they are hidden and because they can often be kept hidden. This paper draws on the narratives of two small groups of women with hidden disabilities -- women from Hawaii with Temporomandibular Joint Syndrome (TMJ), where misinformation and misunderstanding about the brain and mental illnesses are common. That said, my objective with this paper is to describe the development process, including the design dilemmas, of the prototype of OFS, as well as to discuss future directions of this project.

The paper is organized as follows: first, the theoretical foundations for the project, including a discussion about hidden disabilities, as well as game-based learning, are presented. The design process is then described in detail, considering the two iterations designed and tested. Feedback from usability testing sessions is also reported, along with a general discussion and suggestions of future directions for the game development process.

THEORETICAL FOUNDATIONS

Hidden Disabilities

Hidden disabilities are conditions that are not observable; they can be innate or acquired later in life (Couzens et al., 2015). Although such disabilities often do not affect one's physical appearance or ability, they have a direct impact on cognitive processes. Well-known hidden conditions are learning disabilities, such as autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD), as well as mental illnesses, including anxiety and depression. This article focuses on the latter category, in addition to hydrocephalus, a brain condition that leads to an increase in cerebrospinal fluid and can impair executive functions, including visuospatial skills (Lindquist et al., 2008).

The discussion of how these hidden disabilities are perceived and addressed in social and educational contexts is still scarce, however necessary, given the significant numbers of individuals that present such conditions in America and worldwide. The Anxiety and Depression Association of America (ADAA) reports that 18% of the country's population suffers from these disorders (ADAA, 2018); the number reaches over 300 million individuals worldwide when depression alone is considered (World Health Organization, 2018). Moreover, hydrocephalus is a less common condition, but it also affects one in every 1000 babies, and around one million people in America (Hydrocephalus Association, 2018). Given such significant numbers, it is necessary to expand awareness of the existence of such conditions (Couzens et al., 2015), addressing, for instance, medical skepticism and negative social perceptions (Fitzgerald & Paterson, 1995) those not easily discerned by others, present unique challenges to this reappraisal, both because they are hidden and

because they can often be kept hidden. This paper draws on the narratives of two small groups of women with hidden disabilities -- women from Hawaii with Temporomandibular Joint Syndrome (TMJ). Due to my own knowledge and experience of these conditions, the development of a game-based environment to discuss such issues was deemed adequate.

Playing, Experiencing, and Learning in Roleplaying Games

Game-based learning is an experience-oriented pedagogical approach. Both in informal and instructional contexts, people of all ages can, through gameplay, experience ways of being and thinking that do not always correspond to their own (Gee, 2011). Interacting in and with a simulated environment through an other's eyes can allow one to take other perspectives to life into consideration and experience emotional phenomena and situations that would be otherwise out of reach.

Within the broader category of digital games, roleplaying games (henceforth RPGs) are games in which players inhabit an avatar in a fictitious, designed world and are challenged in order to accomplish certain tasks and achieve an ultimate objective. In order to foster immersion and identification, RPGs aim to present compelling narratives and interesting playable and non-playable characters for players to interact with (see Gaydos & Squire, 2012; Radošinská, 2016). As such, these games benefit primarily from the conscious assimilation of a different, sometimes allegorical, identity, defined by Caillois (1961/2001) as *mimicry*. Players are expected to act as the characters while, at the same time, remaining aware that personal beliefs and personalities can have an influence on in-game decisions. As mentioned earlier, the benefit of such environments is the experiencing of situations that players are not able to live first-hand (Gee, 2011; Schell, 2005). The game discussed in this paper, *On Fighting Shadows*, benefits from such characteristic by allowing players to navigate a simulated world as an individual with hidden disabilities, interacting with the social environment and witnessing stigmas, complications, and misunderstandings related to these conditions. *Mimicry*, however, is not always positive. The corruption of *mimicry*, which occurs when players are not able to distance themselves from the imagined persona, is detrimental to one's mental state; the clear, conscious separation is often necessary so both identities can co-exist.

The distinction between real and imagined worlds also exists in structural levels. RPGs, like most video games, are designed spaces in which a finite number of actions can be executed. Ways of being (Gee, 2011) and choices are limited to the constraints of game design. Games occur in a *magic circle* (Salen & Zimmerman, 2004) that defines what is (or is not) possible. This space is, according to Salen & Zimmerman (2004), fragile in nature, requiring "constant maintenance

to keep it intact” (p. 77). Taking this discussion into account, game features such as compelling and user-friendly artistic styles, coherent narratives, intuitive and constant game mechanics, and musical scores with varying tones can be examples of effective systems that can contribute to the internal maintenance of such *magic circle*. For example, the lack of intuitive controls can generate frustration and decrease the value of the game experience.

Furthermore, differently from most of subjective, experienced social situations, video games operate on rule-based models (Bogost, 2008). The rule systems embedded in games allow the simulated environment to exist and to progress in an orderly manner. Furthermore, the recognition of rule-based patterns and video game conventions leads to the acquisition of *game literacy* (Bogost, 2008), aiding players in navigating future game-based environments.

Along similar lines, Bateman (2017) emphasizes that play is not an isolated act, but an experience that draws on prior knowledge and understanding of playful practices. The author argues for the existence of several “lineages of play” (p. 6) that provide certain frameworks for action in designed game environments. That said, it is possible to state that play, as an experience, is located on a continuum that uses players’ backgrounds, drawing upon chunks of knowledge and behaviors, and suggests future directions, developing what is already in place in their cognition. It is possible, then, to state that play includes a set of practices that benefit, for instance, individuals that are knowledgeable about a certain game genre, perspective, or play style. These internal systems raise concerns for the development of an educational game environment that is accessible to a wide variety of populations, regardless of their level of familiarity with the medium. Consequently, during the development process, making graphics and commands clear, consistent, and coherent is fundamental to facilitate the journey of all players, but most importantly, those with low to nonexistent gameplay experience.

These and other considerations about video games and their potential for promoting engagement and reflection have implications for using games for educational purposes. Gee (2005) describes the characteristics of video games that foster enjoyable learning, referred to as “good games” (p. 5). Relevant characteristics that apply to the present design case are as follows: (i) promote players’ (and students’) autonomy and agency; (ii) customization of play to aid different play styles; (iii) presentation of intriguing characters; (iv) interaction and “easy manipulation of the world’s objects” (Gee, 2005, p. 8); and (v) introduction of well-ordered problems that challenge players and provide foundational skills to solve further in-game missions. These characteristics do not relate exclusively to RPGs, but as games as a broader category.

It is based on the principles and considerations presented earlier that I set forth to develop OFS. In the next section, the design process of the roleplaying game will be described and discussed, considering the two completed prototype iterations in chronological order. These sections are followed by a general reflection.

DESIGN PROCESS

Development of Goals

The first idea for *On Fighting Shadows* emerged from personal experiences with the hidden disabilities discussed previously: hydrocephalus, depression, and anxiety. More specifically, the idea first emerged after I experienced a lack of understanding of hidden disabilities, mainly hydrocephalus, during and following personal difficulties that led me to a series of hydrocephalus shunt revisions. The lack of information available to the general public about this rather common condition generated personal interest in creating an interactive tool to inform people of a wide range of ages about this hidden disability. Furthermore, personal difficulties with anxiety and depression related to hydrocephalus symptoms were considered to be integral aspects of the game in developing the goals of the project.

My first instinct was to focus on these conditions from a social perspective, expressing personal views about how such illnesses are perceived and talked about at home and in school. I decided, however, to dive into research and become involved in communities dedicated to awareness of hidden disabilities, which led to discoveries about symptoms, situations, and perceptions that I had not experienced and/or was not aware of. As a result, my first concrete decision was to develop OFS as a vehicle of a variety of experiences related to these conditions, whether I had lived them myself or not. My personal voice and personality were to be maintained for the main character, but the range of experiences would be widened.

Within this broader objective of promoting awareness of hidden disabilities, the prototype was designed with the following goals in mind:

1. Introduce the issue of hydrocephalus, including its definition and symptoms;
2. Provide a narrative experience that is both engaging and informative.

First Iteration

Genre and Format

Educational game design inherently involves a struggle of balance between learning and play (Prestopnik, 2016). As an avid gamer and educator, my instinctive task was to find ways to integrate learning and engagement. This question led to decisions on game format and narrative; in the end,

I opted for the development of a 2D digital roleplaying game in which the player could navigate the environment and interact with a wide range of characters, solving puzzles as game challenges and learning opportunities. A two-dimension format was chosen to increase the ease of use for players that are not familiar with gameplay and/or roleplaying games, as 3D environments, although more immersive, can be harder to navigate for inexperienced users and increase cognitive load (Schrader & Bastiaens, 2012).

I decided to use the game creation software *RPG Maker MV* for the prototype due to my familiarity with the platform and adequacy of the tool for the intended game format; relatively simple games which convey and elicit strong emotions, such as *To the Moon* (Freebird Games, 2011), have been developed with this software (Nam et al., 2016), and can be used as an example of its possibilities. Although the core features of *RPG Maker* allowed for a facilitated development of the intended narrative experience, challenges were encountered in designing complex interactions and portraying hydrocephalus-related symptoms, such as blurry vision and disorientation. Furthermore, the design required the creation, as well as the acquisition of many visual and auditory resources for the game, as the core *RPG Maker* software prioritizes resources that aid the creation of medieval-inspired roleplaying games. As I have relevant artistic skills for this project, I was able to design the in-game characters; additional visual resources were acquired from the *RPG Maker* community. Finally, music was provided by an external volunteer.

The result of this development process was the first version of the game composed of three simple puzzles, or problem-solving challenges, that introduced the player to one of the conditions to be discussed in the full game, hydrocephalus. These puzzles relied on information that had been provided to the player, as well as visual cues. The following sections describe the game's narrative and interaction development.

Narrative

The puzzles that is, story-related, problem-solving scenarios resented in the prototype, expand on an introduction provided to the player about the nature of hydrocephalus. After describing the basic symptoms and origins of the condition in a visual presentation, the game moves on to introduce the main character, Marvin, and his social context.

FIGURE 1. OFS Introduction.

FIGURE 2. First game puzzle.

The first puzzle benefits from environmental storytelling (Fernández-Vara, 2011). Upon interacting with different objects around the house, the player can have a glimpse of the main character's general personality traits and hobbies, as well as the composition of his family unit. I hypothesized that such interactions would help users to understand the main character as an individual who is defined by more than just his brain condition.

The second puzzle aims at tapping into the entertainment value of roleplaying games, benefitting from tropes of the genre, such as dark dungeons and swords. Educational information, however, is also integrated in this scenario through a conversation with the puzzle's "monster": the presumed antagonist, represented by an octopus, has also experienced hydrocephalus and asks the player to be careful

FIGURE 3. Second game puzzle.

FIGURE 4. Third game puzzle.

FIGURE 5. Game instructions.

as to not hit its head. This interaction aims to keep the educational focus of the game while also providing the player with an opportunity to establish an emotional connection with a non-playable character and understand hydrocephalus from a different perspective.

Finally, in the last puzzle, the player's understanding of the condition is tested in a medical setting. When Marvin is taken to a hospital with symptoms of hydrocephalus VP shunt malfunction, namely headaches and blurry vision, the player is prompted to navigate the environment to point the medical doctor to an appropriate diagnosis by interacting with hydrocephalus-related artifacts. That said, it is necessary for the player to recall, for instance, that the condition originates in the brain.

Interactions

Actions in *On Fighting Shadows* are limited, in the prototype, to moving in the four cardinal directions, dialoguing with non-playable characters, and interacting with still objects. The basic commands to navigate the game are presented in full after the introduction and remain unchanged throughout the prototype. The possible commands were kept to a minimum to facilitate navigation for players who might not be familiar with game-based environments, thus potentially decreasing unnecessary or undesired mental effort (Ak & Kutlu, 2017).

After the first iteration of the game was developed, a testing session was carried out.

Testing the First Iteration

A usability testing session was conducted in an instructional environment with six graduate students and one instructor at a university in the southern United States. All participants had been familiarized with the objectives of the game prototype, namely raising awareness about hydrocephalus and its symptoms, prior to this session. This usability session aimed at identifying how the game could be used for educational purposes, as well as assess its potential entertainment value.

In order to foster discussion about game components in the testing phase, participants were encouraged to navigate the game environment and solve the puzzles in pairs. This strategy was observed to facilitate the

interaction of individuals who were not familiar with 2D game mechanics. Furthermore, the opportunity to discuss possible solutions for the problems posed in the game with a peer made the puzzle-solving process noticeably more efficient. The presence of individuals who were experienced in playing 2D games in specific pairs also led to faster puzzle solutions. In general, participants completed the game in approximately fifteen minutes.

During gameplay, participants raised the issue of specific ambiguous in-game instructions, which increased the difficulty of particular puzzles and contributed to generating frustration, rather than the intended enjoyment. In the first scenario, for instance, Marvin's mother directs the main character to simply "play" while dinner was not ready. Without further instructions, some players interacted with no success to a soccer ball and a computer present in the game environment before finally identifying a video game console. Another issue observed was the navigation of the game using the mouse; although this possibility was not made explicit in-game instructions, support for mouse navigation was possible in the prototype. This functionality, however, was problematic, as issues of interactivity with in-game characters and objects could be observed. In some cases, players could interact with certain objects by clicking even though an interaction was supposed to be present.

Following gameplay, I received feedback from participants. Comments about game content, including narrative, visuals, and learning components, were mainly positive. Players indicated, for instance, the effectiveness of the game narrative in maintaining player engagement and providing enough just-in-time information. Additionally, the game art was considered satisfactory and relatively clear. Feedback also specified further areas for improvement; game components that did not directly contribute to learning outcomes were addressed, such as a rather lengthy interaction in the second puzzle.

All in all, this testing session was of significant relevance to suggest directions to the continued development of the game. Through participant observation and feedback, navigation issues provided valuable insights into aspects of design that need to be improved so that players can have a more efficient and comfortable learning process.

Second Iteration

After the first iteration and testing phase, modifications were made to the prototype. New ideas based on user feedback and the literature on play (e.g., Bogost, 2008; Gee, 2005; Salen & Zimmerman, 2004), discussed in the

theoretical foundation section, were incorporated into the game idea. This second iteration of *OFS* was, then, tested with new users. The next sections detail this process and its outcomes.

Modifications

In the second iteration, issues indicated by testers in the first usability testing session were addressed. Changes were made throughout the prototype to increase the visibility of interactions, facilitating navigation, and aiming for the promotion of a more effective play and learning experience. Even though challenges were encountered in the first iteration when using *RPG Maker MV*, I deemed adequate to continue using this same software for this next step as I had acquired enough development knowledge to design more complex scenarios.

In order to address navigation and puzzle-solving issues, game environments, such as the protagonist's house, were significantly modified and/or expanded with the addition and change of visual features. A simpler color scheme was adopted to avoid visual confusion. Furthermore, as the player approached interactive objects, a black speech bubble icon was designed to appear as visual feedback on the screen indicating the possibility of interaction. This strategy was adopted to facilitate puzzle-solving and decrease unnecessary challenge as a result of possible misunderstandings. This visual modification is demonstrated in the image next, taken from the redesigned first puzzle in the game.

FIGURE 6. Opening game puzzle and interaction icon demonstration.

Verbal instructions, both regarding game commands and puzzle-solving challenges, were expanded or reworded to avoid ambiguity or confusion. For instance, in the testing session for the first iteration, participants were unclear that the goal was to ultimately interact with the *video* game in one of the environments. In terms of gameplay, such confusion led to frustration, and presented an unnecessary obstacle towards fun and learning gains.

The creation of this upgraded version of the game also presented the opportunity to improve interactivity through game components, allowing for an intended increased sense of agency and adding a new layer of challenge, as well as, more importantly, active learning. That said, the opening sequence, which was presented entirely in-text and without interactivity in the first iteration, was adapted to an opening puzzle (see *Figure 6*) that introduced the player to general facts about hydrocephalus and the controls of the game environment. Additionally, the final phase of the game was modified to a maze-like setting where further information about hydrocephalus was introduced. In terms of educational information, this puzzle provides insights into directional challenges faced by individuals with hydrocephalus. In this maze, and players moved through a gloomy hospital setting where interactions with objects, such as books and hospital beds, provided further information regarding Marvin's personal life and the struggles he had faced. Taking flow theory (Csikszentmihalyi, 1990) into consideration, I theorized that such an environment could lead to higher levels of engagement and enjoyment due to the mental effort required to overcome the obstacles.

Testing the Second Iteration

In order to gather information on how development could proceed following this second iteration, as well as to assess whether the changes had led to an improvement of the game experience, the second testing experience included users from different play and subject expertise backgrounds. These testers were graduate students in a state university in the southern United States with varying levels of gameplay experience, as well as individuals in online gaming communities related to the development tool, *RPG Maker*. In this phase, gathering feedback with a diverse pool of potential players was theorized to provide valuable insight into possible directions for the continued development of *OFS* from both educational and entertainment perspectives.

In the testing process, an initial email was sent to participants with the URL to the game, accompanied by a brief synopsis. After individual gameplay, participants responded to an anonymous open-ended questionnaire. This instrument

FIGURE 7. Final puzzle in the second iteration.

included questions about: (1) participants' level of familiarity and engagement with digital games in general; (2) participants' level of familiarity with digital RPGs; (3) educational experience; (4) enjoyment derived from experience; and (5) possible areas for improvement. Nine participants provided their evaluations.

Players of different backgrounds demonstrated and reported enjoyment due to the game experience, as well as the learning of basic information related to hydrocephalus. The game succeeded at raising awareness of an issue that was unknown to a few participants. Symptoms related to the condition, as well as the existing treatment (Hydrocephalus Association, 2018), were discussed as the educational benefits of the experience. Even when participants reported previous knowledge of hydrocephalus, *OFS* was found to contribute to a better understanding of the condition and its effects on an individual.

An emotional connection with the main character was also established, according to many participants. The light-hearted writing style was particularly a center of attention, as well as the music and sound effects. Some participants, however, reported that an improvement in the area of emotion and empathy could be achieved by providing further information about Marvin and his emotional and social background, including the financial hurdles of health care. In addition, players suggested that symptoms be more integrated into gameplay in order to promote reflection regarding the daily struggles associated with hydrocephalus. Further theoretical considerations indicate that these modifications can result in more empathy and understanding of the character's point of view (Gee, 2011), allowing players to "visualize alternate realities" (Schell, 2005, p. 3). Overall, increasing the richness of the virtual environment, thus, could lead to higher levels of engagement.

Instructional and navigational issues were not encountered in this testing phase. Participants commented positively

on the commands provided and the directions given by non-playable characters an in-game instructions. The specifics of the game design, thus, did not present obstacles to puzzle-solving, as observed in the first iteration, leading to internal cohesion of the play space (Salen & Zimmerman, 2004) and maintenance of the *magic circle*.

Finally, participants addressed areas of the game that were improved and/or designed for the second iteration. The final part of the prototype, the maze, was praised; the added layer of gameplay challenge was welcomed, particularly by those who identified themselves as frequent digital game players and who were familiarized with the RPG genre. That said, it can be argued that the game succeeded at capturing the attention of participants with varying levels of digital game literacy (Bogost, 2008), presenting itself as accessible to different populations.

GENERAL DISCUSSION

The design experience of *On Fighting Shadows* has, thus far, indicated to me that it is important for designers and educators to be explicit about their educational game design process, detailing decisions and constraints in the creation of game-based learning environments. These discussions contributed to the validity of this tool and the improvement of its instructional effectiveness. Furthermore, I found that involving potential users in design and evaluation of the tool was a potential strategy to bridge (or at least decrease) the gap of engagement and willingness to play that exists between educational and entertainment games.

The second iteration, specifically, succeeded in addressing the two main design objectives: (1) introducing hydrocephalus and its symptoms; and (2) providing a narrative experience that is both engaging and informative. I recognized the establishment of intertwining goals that related to different aspects of the design, namely educational for the former and experiential for the latter, as an effective start in creating instructional and enjoyable virtual spaces. The integration of Gee's (2005) theorizations on effective games for learning was particularly relevant throughout the (re)design process, as the categories provided by the author established useful directions for the interpretation of user feedback and suggested general pathways for game improvement.

Lastly, I now consider that designers and educators should also consider that virtual spaces lend themselves to different styles, and foci, of play (Bartle, 1996; Taylor, 2009). For instance, players indicated varying levels of interest in the narrative, gameplay challenge, and educational outcomes. In my view, an effective instructional game space should take these different profiles into account and possibly surround the player with educational information in an organic and effective manner (Gee, 2005); only then would we be able to state that a game is a useful and accessible learning tool.

FINAL CONSIDERATIONS

This paper introduced the design process and testing phases of a roleplaying game that aims to raise awareness of hidden disabilities. In the prototypes here described, one particular condition, hydrocephalus, was discussed. Both in the design process and in usability testing, the tension between learning and entertainment was experienced and addressed. However, the establishment of complementary educational and entertainment design objectives led to successful learning and gaming experiences, mainly in the second iteration. Playing *On Fighting Shadows* was observed to engage users in experiencing symptoms of hydrocephalus and understanding the character's feelings. This process of emotional engagement (Gee, 2005) was facilitated by visual representations of symptoms, as well as in-game reactions of the main character and his peers. As the full game is developed, this aspect of OFS will be explored in a detailed manner.

This design process was not without limitations. Firstly, the low number of testers and the restriction of users with only two specific social roles, namely scholars from one institution and digital RPG designers, resulted in feedback that may not be generalized to wider populations. Furthermore, this small sample may not indicate nuanced interpretations and challenges that can be found by players when OFS is played in the future. The lack of participants that relate to the condition discussed in the prototype, hydrocephalus, is another issue to be addressed in the continued development in order to improve the accuracy of symptoms and social situations portrayed. Input from this population can increase the validity of OFS as a learning tool.

Game development software such as RPG Maker offered an avenue for an amateur developer and educator with limited (or nonexistent) coding abilities like me to express myself creatively (Anthropy, 2012) and approach my subject-matter in innovative ways. Although the creation process posed obstacles, such as limited time and lack of understanding of game environments and/or mechanics, I see that educational settings can benefit from teachers and educational designers alike who are willing to go one step further in order to engage 21st century learners.

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