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The Potential of Virtual Environments to Support Soft-Skill Acquisition for Individuals with Autism

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Abstract

This study examined the phenomenon of online gaming to describe the social interactions of young adults with an autism spectrum disorder (ASD) as they socialize and develop relationships within virtual environments. This research built upon previous literature related to the identification of alternate modes of developing social skills and interpersonal relationships of adolescents with ASD by exploring the social implications of virtual environments. Young adults with autism experience grim outcomes such as low enrollment in postsecondary education, low wages, few living independently, and few maintaining full time employment as a result of poor social skills. Given the availability of online mediums such as massively multiplayer online role playing games, discussion forums, chat rooms, and other social media, individuals with ASD have opportunities to interact without the constraints of face-to-face settings. A phenomenological study was employed using multi-sourced data. Findings yielded 15 initial codes that were developed into five main themes. Findings support a recognition and reciprocation of emotions, friendship development, and role identification. Additionally, the findings support skills required to be successful in postsecondary situations, specifically aligned with science, technology, engineering, and mathematics (STEM).

Keywords

Virtual Environments, Young Adults with Autism, Postsecondary Transition, Friendships, Emotional Awareness, Role Identification, Transcendental Phenomenology

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The Potential of Virtual Environments to Support Soft-Skill Acquisition for Individuals with Autism

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This study examined the phenomenon of online gaming to describe the social interactions of young adults with an autism spectrum disorder (ASD) as they socialize and develop relationships within virtual environments. This research built upon previous literature related to the identification of alternate modes of developing social skills and interpersonal relationships of adolescents with ASD by exploring the social implications of virtual environments. Young adults with autism experience grim outcomes such as low enrollment in postsecondary education, low wages, few living independently, and few maintaining full time employment as a result of poor social skills. Given the availability of online mediums such as massively multiplayer online role playing games, discussion forums, chat rooms, and other social media, individuals with ASD have opportunities to interact without the constraints of face-to-face settings. A phenomenological study was employed using multi-sourced data. Findings yielded 15 initial codes that were developed into five main themes. Findings support a recognition and reciprocation of emotions, friendship development, and role identification. Additionally, the findings support skills required to be successful in postsecondary situations, specifically aligned with science, technology, engineering, and mathematics (STEM). Keywords: Virtual Environments, Young Adults with Autism, Postsecondary Transition, Friendships, Emotional Awareness, Role Identification, Transcendental Phenomenology

Recently virtual environments (VE) have generated interest as a medium that may be a promising practice to support social skills acquisition (Parsons & Cobb, 2011; Parsons et al., 2010). These environments are diverse and entail sophisticated forms of thinking that include: (a) understanding complex systems, (b) creative expression with digital tools, and (c) the development of social networks used to communicate and collaborate (Gee, 2004, 2007; Prensky, 2006). Advancements in VE hold the potential to support social skills acquisition and friendship development that will ultimately improve successful transitions.

Digital technology is rapidly expanding and permeates many aspects of life through the use of computers, tablets, smartphones, and other mobile digital technology (Fullan, 2012). Incorporating technology into daily living allows a user to postulate questions, explore scenarios, and connect with others within global virtual communities (Craft, 2012). Virtual

environments also include social platforms such as Facebook, Myspace, Second Life, and LinkedIn; social platforms are used to build connections and help stay in touch with friends and colleagues (Rybas & Gajjala, 2007). The purpose of these platforms is to network, meet people, establish and maintain friendships, find jobs, and exchange ideas, all in the context of a virtual environment (Granic et al., 2014; Rybas & Gijjala, 2007). To support sustained communication, VEs have interactive tools such as blogs, forums, notes, message tools, chats, and video capabilities that link users through digital devices connected to the Internet.

Young Adults with High Functioning Autism

Young people are dexterous collaborators, navigating digital gaming and social networking with ease; they are capable of generating and manipulating content and experimenting virtually with online social sites and games (Craft, 2012; Durkin et al., 2013). Levering the attraction of young adults with ASD to technology, a digital virtual environment presents a unique opportunity to explicate social communication skills in terms that they can directly relate to through authentic interactions (Bricker & Bell, 2012; Durkin, 2010; Durkin et al., 2013). Applying the historic lens of social learning theory (Vygotsky, 1978), a video game can be used to increase social skills in heterogeneous groups. Video games can be used outside of school as a way to connect academic content, interests, and community for adolescents and young adults with ASD; a practice shown to increase learning and engagement (Bricker & Bell, 2012).

Simulations and virtual training are increasingly used in professional fields (Carlson, Min, & Bridges, 2009) and include training for the military, medical fields, hospitality industry and others. Practice in simulated settings can be an effective mechanism for developing individual and team skills and can occur in a wide array of settings—for example, in simulation centers, virtual settings such as *Second Life* or techniques including immersive simulations, as well as single and multiplayer games. Note that regardless of location and format, simulation is increasingly being viewed as an enabling technology that transcends traditional educational boundaries and allows individuals to acquire the competencies needed for inter-professional practice. This provides support for the need to explore in depth the educational potential of VEs, specifically for students with ASD.

Young adults with ASD are chronically underrepresented in postsecondary education despite the fact that they often possess unique attributes considered necessary for success in STEM fields including the ability to: (a) hyper focus on a specific analytical task, (b) think systematically and solve problems objectively without social bias, and (c) conceptualize innovative solutions to complex problems (Baron-Cohen, Wheelwright, Burtenshaw, & Hobson, 2007; Fessenden, 2013; Wei et al., 2013). Additionally, young adults with ASD are often high-ability learners in STEM areas (Fessenden, 2013; Wei et al., 2013) making them ideal candidates for a variety of STEM-related careers (Baron-Cohen et al., 2007).

Currently, high school graduates with ASD have the lowest college matriculation rate as compared to neuro-typical graduates and graduates with other disabilities (U. S. Department of Education, 2012). Roux, Shattuck, Cooper, Anderson, Wagner, & Narendorf (2013) reported that just under half (46.6%) of young adults with ASD could not find paid employment within the first eight years after high school. In addition, young adults with ASD earned a lower average hourly wage (\$8.90) when compared to the average hourly wage of young adults with other disabilities (\$10.44/hr; Newman, Wagner, Cameto, & Knockey, 2009; Roux, Shattuck, Cooper, Anderson, Wagner, & Narendorf, 2013). Researchers have stated that the poor postsecondary transitions and outcomes of young adults with ASD (independent living, employment, education, and careers) can be attributed to their lack of social skills and an inability to develop and maintain interpersonal relationships (Alpern & Zager, 2007; Baron-

Cohen et al., 2007; Durkin, Boyle, Hunter, & Conti-Ramsden, 2013; Muller, Schuler, Burton, & Yates, 2003; Rao, Beidel, & Murray, 2008; Wei, Yu, Shattuck, McCracken, Blackorby, 2013).

Social situations are multifaceted and become more complex as individuals enter adolescence, postsecondary settings, and employment. Unspoken social “rules” vary within different environments, situations, and cultures, making it increasingly difficult for a person with high functioning autism (HFA) to understand and adapt to situational social norms (Myles, Bock, & Simpson, 2001). These challenges remain problematic throughout life and directly affect postsecondary transitions and outcomes, specifically college participation and graduation (Schall & McDonough, 2010).

According to Noel-Levitz (2011), social interactions and friendships were identified among the most salient factors of success in postsecondary education. Researchers noted that communication skills are required for development of sustained friendships and serve as the foundation for success in college and careers in STEM fields (Ducheneaut & Moore, 2005; Moore, McGrath, & Thorpe, 2000; Robles, 2012).

Emerging research has begun to focus on interpersonal relationships and friendships for individuals with HFA. Researchers have noted that young adults with HFA possess a desire to establish friendships (Bauminger & Kasari, 2000) but fail to recognize and accurately interpret verbal and nonverbal social cues, which often leads to social exclusion (Iovannone, Dunlap, Huber, & Kincaid, 2003). These feelings of exclusion contribute to the high college dropout rates and job loss for young adults with HFA (Fessenden, 2013). Given the ubiquitous nature of virtual gaming environments and the collaboration, communication, and socialization that occur, it is possible that individuals with HFA are already engaging in these social realms and utilizing soft-skills. Therefore an exploration of socialization in the context of a massively multiplayer online role playing game (MMORPG) could yield findings that support soft-skill development and improved postsecondary outcomes for individuals with HFA.

Virtual Environments and MMORPG

Virtual environments are supported by the Internet and accessed through a stationary or portable digital device. In a MMORPG, individuals represent themselves as avatars who interact with other human-controlled avatars as part of a computer-generated gaming scenario (Fox et al., 2014). Virtual environments such as MMORPG have the potential to remove extraneous variables such as noise, movement of people, and body language that contribute to unsuccessful face-to-face interactions between individuals with HFA and their peers (Yee, 2006). The skills required in successful gameplay in MMORPG include complex communication, advanced digital literacy, collaboration and communication within a team, time management, and task completion (Ashinoff, 2014; Granic, Lobel, & Rutger, 2014; Prensky, 2006; Yee, 2006).

These skills are hypothesized to be parallel to the soft-skills required in postsecondary education and employment, specifically in a STEM career (ABET, 2013; Gallup, Duff, Serianni, & Gallup, 2016; Robles, 2012). Soft skills outlined by the Accreditation Board for Engineering and Technology, Inc. (ABET) engineers included five soft-skills that are required for success in the chosen STEM career:

- an ability to apply creativity in the design of systems, components, or processes appropriate to program objectives;
- an ability to function effectively on teams;
- an ability to communicate effectively;
- a respect for diversity and a knowledge of contemporary professional, societal,

- and global issues; and
- a commitment to quality, timeliness, and continuous improvement.

These skills are repeatedly practiced in the context of MMORPG through interactions between and among avatars as the players naturally engage in the game. As a result, MMORPG may be a tool that could be used to support the development of those critical soft-skills in young adults with HFA.

MMORPG and Real-world Benefits

A small but significant body of research has begun to emerge, documenting the benefits of gaming utilizing a complex, diverse, realistic, and social medium (Ashinoff, 2014; Gallup et al., 2016; Granic, Lobel, Rutger, & Engels, 2014). Ashinoff (2014) describes social gaming as a tool to learn complex skills such as mathematics and refine the skills through the game's natural scaffolding process. For example in most games a tutorial is provided to learn the basic strategies of the game, as the game progresses the strategies and tasks become more complex requiring the players to develop their interaction skills with other players to critically analyze complex situations and identify the best course of action to solve the problem. Further, Granic and colleagues (2014) stated that video games may foster real-world psychosocial benefits. Considering the immersive social contexts that include social and pro-social activities as part of the gaming experience, gamers rapidly learn social skills through the act of solving complex problems with a team that could generalize to social relationships outside of the gaming environment (Alawami & Heng-Yu Ku, 2016; Gentile & Gentile, 2008; Gentile et al., 2009; Vitelli, 2014; Yee, 2006). Online video games are an exceedingly social activity (Gee, 2007; Prensky, 2006; Yee, 2006). Today over 80 percent of gamers play with friends, whether as part of a team or in direct competition, and often spend several hours a day in VEs (Moore, McGrath, & Thorpe, 2000; Vitelli, 2014). Boyle, Hainey, Connolly, Gray, Earp, Ott, and Pereira (2016) discussed the potential impacts and outcomes of serious games. Serious games are designed to master a specific educational content in a short amount of time and are not intended to facilitate ongoing communication, collaboration, and active social engagement. A MMORPG or virtual online game is designed for entertainment and holds the potential to be a conduit for the acquisition of social skills and support greater interaction and support networks for individuals with ASD.

Virtual modes of communication such as an MMORPG can provide opportunities for young adults with HFA to engage socially without the stress or anxiety associated with face-to-face communication (Cheng, 2005). Given observed improvements in communication skills and socialization that have occurred through the use of virtual communication in the context of a MMORPG, there is the potential to integrate young adults with HFA into a gaming environment that may improve communication and socialization skills (Cheng, 2005) that may generalize to face-to-face settings (Yee, 2006).

Purpose

There is a dearth of research in regard to efficacious interventions to teach and support social skill development by adolescents and young adult students with ASD. To date, there is a scarcity of research published to elucidate the impacts of MMORPG specifically related to soft-skills and supporting individuals with ASD and social skill development. Many studies mention the potential of VEs; however, few study the impacts on social skills acquisition, and to date, no study describes and explains social interactions of young adults with ASD who successfully interact in an MMORPG or VE. Additionally, there is a gap in the research related

to the reasons adolescents and young adults with ASD engage in online gaming and other digital social environments. The purpose of this study was to describe the social interactions of young adults with ASD in the context of virtual gaming environments. One primary research question was addressed during this research:

1. What are the social experiences of young adult college students with ASD, enrolled in a STEM track, as they participate in an online gaming environment (MMORPG)?

Parsons and colleagues (2013) stated that the effectiveness of interventions for young adults with ASD tends to be measured by quantitative data, leaving an absence of qualitative research evidence. Kemp, Petrewskyj, Shakespeare-Finch, and Thorp (2013) suggested that researchers must examine the contextual relevance of social processes and strategies that occur in naturalistic settings to increase the level at which young adults with ASD generalize and maintain learned social skills. Qualitative findings could offer insights into the contextual influences on outcomes for young adults with ASD (Parsons et al., 2013).

Context of the Researcher

As a mother of a child with autism, the lead researcher has watched the impact of VEs, particularly MMORPG, on the development and generalization of social skills, communication, and friendships on her adolescent son who has HFA. She observed as those VEs became a mechanism for him to experience and explore science, technology, engineering, and mathematics in the context of a game supporting the development of those skills and an interest in STEM careers. Over time she watched a boy with HFA, without the ability or motivation to communicate or build/maintain relationships, develop into a young adult with a keen interest in STEM who was excited to talk about his interests, meet and build relationships with people with similar interests, and collaborate with team members toward common goals.

As a special educators, each of the researchers have witnessed the challenges that communication and social skill deficits present for students with ASD at all levels, particularly their impact on postsecondary transitions. Adolescents and young adults with HFA, who often possess extraordinary abilities that could be assets in any number of STEM fields, are stymied by their soft-skill deficits. The inability to self-advocate, initiate conversations, ask questions, build and maintain relationships, understand social cues, and adapt to group or societal norms prevent young adults with HFA from successfully transitioning to college and careers. It is frustrating and heartbreaking for this group of researchers to watch so many young adults with great potential derailed by their disabilities, especially in light of emerging evidence that those skills can be learned and applied to support successful postsecondary transitions. All of the researchers have some experience using technology and gaming with students and family members with exceptionalities and have found it an effective medium for teaching and learning academic as well as soft-skills for all types of students, particularly students with ASD.

Role of the Researcher

The researchers acted as an instruments of data collection and analyses: data were mediated through the human instrument rather than through inventories (Bloomberg & Volp, 2012) Questions asked to the participants and decisions about the research may be influenced based on experiences as a parents and teachers of children with exceptionalities. Given the propensity of young adults to engage in MMORPG and use technology, it is a bias that the researchers felt strongly that these unique VEs may serve as a naturalistic environment to help support post-high school transition to STEM degrees and ultimately careers.

The researchers developed a rapport with the participants by discussing relevant aspects of self, including biases and assumptions, and experiences that qualified the researcher's ability to conduct the study (Greenback, 2003). The researchers described their role to the participants as taking an etic role; an etic role is described as taking an outside perspective (Bloomberg & Volp, 2012). The researcher interviewed participants using a series of probing questions that were reflected upon during the interview to include further probing questions in order to elicit detailed information for the study. Qualitative researchers become immersed in the situation they are studying (Bloomberg & Volp, 2012; Denzin & Lincoln, 2003; Tufford & Newman, 2010). Researcher bias was recorded through a bracketing interview with the second coder. Bracketing is a method used in qualitative research to mitigate the potentially deleterious effects of preconceptions that may taint the research process (Tufford & Newman, 2010).

Based on the description of the qualitative research process, it can be noted that qualitative data are closely connected to the researcher and adds another aspect to the researcher's role (Bloomberg & Volp, 2012). This data material consisted of five interviews, observations, field notes, and "recollection."

Methods

After obtaining permission from the Institutional Review Board, participants were identified through inclusionary criteria, then data were collected via interviews and observations. Next, data were coded using Moustakas' modified Van Kaam method (Moustakas, 1994). Finally, coded data were put into themes and validated between researchers. The researcher collected a large amount of data from a limited number of respondents which met saturation.

Participants

Participants for this study were identified through the Student Disability Services (SDS) office on the university campus. The inclusionary criteria for student participation in the study were: (a) student must have a diagnosis of ASD, confirmed by registration with the SDS, (b) student must play a MMORPG, (c) student must be enrolled in a STEM track as defined by the university's catalog, and (d) student must be in the first two years of their program (3-60 credits). For the purposes of this study, students with HFA are reported in the literature as having average cognitive ability, or an IQ of 70 or greater. (Tyson & Cruess, 2011).

The researcher contacted potential participants via electronic mail that met these criteria and offered a \$25.00 Visa Debit Gift Card for participation. One attempt was made and nine potential participants responded. Five were selected from the initial nine, because the other four stated that their schedule did not allow for interviews and observations during the spring semester. The selected five participants completed all components of the research.

The participants selected met the established criteria of current enrollment in a science, technology, engineering, or mathematics degree track at a large urban university and were of diverse age and gender. Additionally, each participant had weekly gaming opportunities and time for this research. Each participant was assigned a pseudonym. All participants lived in a dorm setting with roommates at the university. In addition, there was at least one participant from each major: science, technology, engineering, and mathematics.

Participants were between the ages of 19-24, all Caucasian with a primary diagnosis of ASD. All were enrolled in a STEM track at a large urban university as an undergraduate student. Participants all enjoyed gaming as a primary focus for socialization and recreation; they engaged in approximately 21-26 hours a week of social gaming time with their guild or clan. Each participant had a different role within their guild or clan but participated as a team

member communicating, collaborating, managing a schedule, and solving problems within a game to help the team solve problems to achieve a goal within the MMORPG.

Participant Interviews and Observations

Interviews were held in the university library or public library. Observations of gaming events were done remotely using digital technology. Participants did not know each other and did not interact online or participate in the same gaming events.

Interviews

First, individual semi-structured in-depth interviews were conducted using an interview protocol (Contact the lead author for a comprehensive list of questions). During the interviews, follow-up questions were asked to clarify responses, get additional details, and solicit stories or examples related to the question (Seidman, 2006). All interviews were audio recorded and transcribed verbatim.

Observations

After the interviews were completed, the researchers asked participants to observe some of their online gaming events. Because the gaming events do not occur in a setting where multiple people gather, the researchers were invited to observe via a host server. The purpose of the observations was to identify and document participant behaviors during gameplay, including communication and collaboration. This would allow triangulation of data from the interviews and confirm that the experiences described by participants in their interviews aligned with what happening during gameplay.

Three virtual observations were conducted during actual online gaming events involving each participant. The participant set up a host server and created a character that would allow the observer to “follow along” in the game to see and hear the action. Before each gaming event, the group of gamers met in an online chat room for 10-15 minutes to discuss gaming strategy and their individual roles for achieving the given objective. Those informal chats all began with social “small talk” including asking how the day went, friendly banter, discussions of in-game activities, discussions about everyday life. Data collected from the observation included:

- Description of the setting and social interactions;
- Written conversations of social interactions captured in chat boxes during gaming; and
- Descriptions of participants’ oral conversations related to gaming.

Data Analysis

Once the interviews and observations were transcribed and reviewed by the participants, analysis was conducted using Moustakas’ modified Van Kaam method (Moustakas, 1994). Moustakas’ analysis method was used to organize and code text gathered from interviews. Moustakas’ (1994) transcendental or psychological phenomenology is focused less on the interpretations of the researcher and more on a description of the experiences of participants. Each statement made by the participants was listed and considered as having equal value. Analyses consisted of bracket assumptions that identify non-repetitive and non-overlapping statements with interviews and transcripts. Margin notes were taken to interpret the social experiences of the participants. Margin notes depicted different types of

information that were used for coding data. Transcripts reflected textural and structural descriptions of the experiences (Creswell, 2013; Hayes & Singh, 2012). Reduction and analysis of specific statements was used to tease out overarching themes (Simon & Goes, 2012).

Throughout these processes of data analyses, the researcher conducted member checking and created an audit trail to ensure that no misinterpretation of the participants' views or comments had taken place. Member checking is a process whereby participants are provided with transcripts or summaries of interviews to allow them to correct any inaccuracies (Creswell, 2013; Hayes & Singh, 2012). Participants reviewed the notes, analysis and interpretations, and transcriptions to ensure accuracy and trustworthiness. All interviews were transcribed verbatim. The transcripts, along with the researcher's comments, were sent via email to the participants. Participants were given time to read the transcription and provide feedback and reflections based on the comments of the researcher. Participants were also given the opportunity to correct any of the transcripts to reflect what they intended to say in the event that a word or phrase was missed in the transcription process. All five participants reviewed the transcripts and comments and verified changes with the researcher.

Reduction and Elimination

The central phenomenon in this study was social experiences in VEs specific to young adults with HFA. The next step in Moustakas' (1994) analysis process was to determine if a statement was pertinent to the research question and the experience of socialization in the context of a VE. If the statement contained relevant social information pertaining to the experience and could be abstracted and labeled or coded, the statement was considered an invariant constituent. If the statement did not reflect the social experience or was irrelevant to the research question, it was not included in the analysis. For example, one participant expressed her inability to stay on target during interviews or conversations due to a tendency to provide comments and information prior to presentation of a question and a desire to read the chat log before moving forward. These data were not included in the data set for analyses.

Descriptive codes were given to each constituent. Similar constituents were merged or new labels given to more accurately reflect the specific social experiences in a VE. Labels used were verified against each participant's transcript to check for accuracy and relevancy to the experience. This process produced a total of 15 codes that reflected the experiences of social interaction in a VE. After identifying invariant constituents and generating labels for each line of text, an external check by an outside source was used to review decisions about codes and groupings.

Clustering and Thematizing

Clustering the invariant constituents was the next step in the analysis process suggested by Moustakas (1994). Clusters were formed from the similarities between descriptive labels for each invariant constituent as they related to the research question. The codes were arrived at by unpacking the language used and linking the ideas presented by the participants back to the idea and research question, and then again back to the main idea presented. Codes were then combined to develop themes by reviewing the closely related literature. The identified codes (see Table 1) were combined to form final themes in the research (see Table 2). Emergent coding was used to help identify and confirm themes. Five main themes emerged: (a) seeking social interaction, defining friendship, and overcoming challenges, to include barriers to friendship; (b) comfort in socializing through a VE; (c) roles in life, increased socialization, and friendships; (d) emotional awareness; and (e) skills learned and generalized.

The themes from codes listed, and Table 3 describing the coding relationships, depict the relationship between the research question, clusters of thematic labels, and development of the final themes.

Table 1. Coding Relationships

Color	Initial Codes Identified
Blue	Comfort and safety of socialization
Yellow Green	Barriers to socialization and interaction
Red	Challenges with the game socialization
Pink	Socialization in the game
Yellow	Friendships
Grey	Self-perceptions of interaction
Teal	Skills Learned
Purple	Management of frustration
<u>Underlined & Bold</u>	<u>Personal perception of video games</u>
Rust	<u>Socialization and life roles/rules</u>
Yellow with Blue	Friendship perceptions
Pink with bold Blue	Perceptions of social communication and technology to communicate
Blue bold	Perceptions of social communication
Black with Purple	Friendships and interactions outside the game
Green	Emotional Recognition

Table 2. Codes for Identifying Themes

Initial Codes Combined	Emergent Themes
Friendship, perceptions of friendship, and interactions online Barriers to socialization online and face-to-face correlate with 21 friendships and social interaction and socialization in a virtual environment Common theme awareness of comfort/safety net in the game Emotional recognition and Self-perceptions, , and roles skills learned	Seeking Social Interaction and Defining Friendship and Overcoming challenges Barriers to Friendship comfort in socializing comfort in socializing Emotional awareness Roles in life, Increased socialization and friendships Skills Learned

Validation of Invariant Constituents and Themes

Final identification of themes was validated against the interview text from each participant to ensure they were comparable to the experiences of the participants and validated with a second researcher. The second researcher read the field notes and asked questions to

help examine assumptions and consider alternative ways of looking at the data through peer debriefing (Bloomberg & Volp, 2012). Each invariant constituent was explicitly expressed within the text or found attuned with the social experiences described by the participants.

Individual Structural Descriptions

Structural descriptions are interpretations of the underlying dynamics of the social experience. The structural descriptions provide an interpretation of each participant's thoughts, feelings, and emotions regarding the social experiences in a VE. The essence and deeper meaning of the experience for each participant is a synthesis of textual data and observational field notes, interviews, and other non-verbal cues during each interview (see Table 3).

Table 3

<u>Participant</u>	<u>Hand twitching</u>	<u>Eye contact</u>	<u>Wiggling in Seat</u>
P-1	Would flex his fingers open and shut.	Made very limited eye contact.	
	He used his phone as a distracter; he rolled it over and over in his hands when he was not flexing his fingers.	Eye contact increased when he spoke about frustration and not having to do things alone. He also increased his eye contact when he wanted to emphasize a point such as when he described his friends in the game. discussed his	In the 42 minutes P-1 sat in the interview he repositioned eight times.
P-2	P-2 continuously touched his index finger to his thumb throughout the entire interview alternating from left hand to right hand.	P-2 had excellent eye contact that did not make the researcher feel that he was staring or not paying attention.	P-2 was very wiggly in his seat and changed positions 13 times in the 68 minute interview. He would sit on his leg, move it out from under him, lean on the table, rearrange the glasses on his face, and move his hair from one side of his head to the other when not connecting his index and thumb.

P-3	P-3 continuously picked at her right foot or left index finger when talking.	P-3 eye contact was limited Eye contact was greatest when speaking about being clan administrator.	P-3 changed positions six times in the 59 minute interview, and then asked if it would be ok if she just lay on the ground so she wouldn't move.
P-4	P-4 Sat with her hands clenched in her lap or on the table when talking; however she wiggled her fingers across her knuckles as if her knuckles were a piano.	P-4 had very limited eye contact and made consistent eye contact when discussing how important friendships were to her and how not having socialization affected her mental health.	P-4 preferred to sit on a yoga ball in the library and rocked side to side or back and forth during the interview.
P-5	P-5 brought his lunch to the interview – one piece of cheese pizza, a chocolate lava cake, and a large glass of mixed soda. He picked off very small pieces of the crust and crumbled them in-between his index and middle finger, and thumb until they were very fine pieces of bread.	P-5 had very limited eye contact; his eye contact was very prominent when he discussed his social clan.	P-5 changed his position about every two minutes from sitting back in a very relaxed leaning back position to an upright attention position.

Textual-Structural Descriptions

Developing composite descriptions is the last step in Moustakas' (1994) modified Van Kaam data analysis procedure. These descriptions provide a synthesis of the textual and structural meaning and create a common understanding about the essence of the phenomenon associated with the participants and their social experiences in a VE. For this study, the composite descriptions provide the essence of socialization in the context of a VE (see Table 4).

Table 4

Initial Codes Combined	Emergent Themes
<p>Friendship, perceptions of friendship, and interactions online Barriers to socialization online and f2f correlate with f2f friendships and social interaction</p>	<p>Seeking Social Interaction and Defining Friendship and Overcoming challenges Barriers to Friendship comfort in socializing</p>
<p>and socialization in a virtual environment Common theme awareness of comfort/safety net in the game</p>	<p>comfort in socializing</p>
<p>Emotional recognition and</p>	<p>Emotional awareness</p>
<p>Self perceptions, , and roles</p>	<p>Roles in life, Increased socialization and friendships</p>
<p>skills learned</p>	<p>Skills Learned</p>

Discussion

Themes

Seeking social interactions, defining friendship, and overcoming barriers

All of the participants described a desire to socially interact and engage in friendships primarily through VEs. All participants were focused on friendships during a significant part of the interview. The primary and overriding finding of this study is that making and maintaining friendships are an important part of the daily activities of individuals with HFA. Participants described friendship as not only important, but a necessary part of their daily interactions. This finding is very important, all participants identified specific friendships that developed in the MMORPG and actively sought out friendships and social interactions both in the MMORPG and in face-to-face settings.

Based on analyses of the data, there appears to be a strong connection between social interactions within a VE and friendships both inside and outside of the VE. Friendship was described by participants as interactions and socialization that primarily occurred within the context of a virtual gaming environment, but also in face-to-face settings. Qualities of friendship were discussed in terms of support, trust, humor, and reliability.

Friendship is probably a mutually beneficial interaction between two people where they care about each other and there is a mutual feeling of trust. There has to be overlap. Ideally friendship has to benefit both parties, has to have some shared core values, and some degree of trust involved. (Sequoia)

All participants described using the VE as a way to bolster friendships, to get to know people better, and to develop a level of trust that was easier for them than in a face-to-face setting.

So, I meet this guy. We have some sentences together like, "oh hey." We bump into each other in the hall, which is like an acquaintance. But online, that becomes a blossoming friendship. (Redwood)

Descriptions included a level of familiarity and enjoyment with "seeing" the person, whether online or face-to-face, without verbal exchange. Both types of interactions were described as important. The multiple interactions within the game allowed the participants repeated opportunities to engage and socialize.

As participants they described engaging in interactions with other players over a period of time that allowed them to develop trust, learn to express their emotions, and recognize when their friend was feeling a variety of emotions, they painted a rich picture of socialization in an MMORPG environment. Participants described being able to quickly identify common interests and felt encouraged to socialize within the game to complete specific tasks with several players.

Analyses of the data also illuminated the development of other social skills and solutions to frustration, anxiety, and negative social interactions. Participants described instances in which online friendships supported daily interactions outside of the game, such as managing stress, anxiety, and comfort interacting in a face-to-face setting. One participant stated:

Like, I feel that socialization is really important to allow you to consistently reframe and cope with new experiences. And I can tell you from personal experience that the impact [of limited social interaction] on my personal psyche and my mental health and wellbeing was disastrous: like it was not good. (Sequoia)

The definitions of friendship provided by all the participants led to the identification of socialization in the context of the VE, the importance of virtual interactions, and barriers associated to socialization in a virtual and face-to-face setting. All five participants (100%) described barriers to developing friendships and socialization. During the interviews, participants identified and described challenges in face-to-face interactions, including travel using personal or public transportation and conversational nuances. During interviews participants discussed barriers to socialization and friendships as well as how they used VEs to overcome barriers and find comfort socializing within the virtual gaming environments. Participants described challenges that hindered their willingness to socially engage in a face-to-face setting.

I have a lot of discomfort with traveling, and I have issues with directions and that. So, I have a GPS, but traveling from point A to point B is something that can cause me a lot of anxiety. (Sequoia)

All participants described using VEs, Skype, Ventrilo, Google+ hangouts, or chat rooms associated with video games to get to know other people in place of communicating over the phone. Participants described a web of social interactions they relied on to and develop friends and sustain communications. Further, participants were able to speak freely with others and not feel constrained by typical social norms as they described in a face-to-face setting which allowed them to build relationships with others, which in turn they described as a way to help them learn to accept themselves for who they are, which had been barriers to their face-to-face socialization.

People think I am weird, and I don't speak up often about things I think are bad or could be modified. Because when they say mean things in a virtual game, you don't get punched so it's ok to say how you feel. But in real life, people can be mean, so why should I talk to them? (Maple)

Each participant's self-description was based on face-to-face interactions, which were generally negative. Participants described themselves as weird, ugly, or strange, as they felt others perceived them so they started to own those feelings about themselves. Interacting in the gaming environment helped the participants overcome the negative self-image and build a relationship while feeling like they could act like "themselves." All participants noted that it was easier to interact in a VE than in a face-to-face setting, they noted that the game removed the social stigma and often social norms that were imposed on people such as eye contact, particular outfit selection, unspoken non-verbal cues. Participants felt as if they could be more accepted and sustain a friendship without ever meeting the person face-to-face. All participants felt that they could develop and sustain a friendship without ever meeting the person face-to-face.

Uh no, I would say not, especially in the digital age I would not say it is a necessary requirement. I mean, we see people face-to-face now without even

meeting them in real life. We have Skype, Google+ hangouts, and things like that. (Sequoia)

However, barriers to sustained friendships, socialization, and connections do exist within the context of the VE. The size of the online community can play a role in how people, including individuals with ASD, interact. All of the participants described having to learn to deal with “trolls” (individuals in the VE that harass others) in the context of a MMORPG or chat room. Trolling situations can allow the user to practice emotional recognition, self-awareness, and problem solving skills, as well as understand the broader interactions within the virtual community. Four participants discussed deleting or blocking the troll and one described reporting the trolling to the gaming company to block the user to prevent further harassment to other players. “Discussions online can turn verbally abusive and unfriendly and deter further interactions. Internet interactions can be similar to social cliques or a bullying situation in a face-to-face environment” (Aspen).

Being a member of a guild within a MMORPG was described as an opportunity to develop stronger, more intimate relationships. A guild is a group of individuals that work together repeatedly in an MMORPG to accomplish tasks. Each person within the guild had multiple opportunities each week to interact with each other. Through the interactions in a guild, friendships were developed. Friendship was described as a very important part of life for the group of individuals. Participants described periods of their life when they had limited social interactions that negatively affected their mental health. The Internet was a conduit to active social interactions, development and maintenance of friendships, and support networks. Long-term friends were developed and sustained without meeting face-to-face.

Comfort level of interacting in a virtual environment

An overwhelming theme that emerged was the comfort of a VE as a way to overcome face-to-face barriers and actively socialize and engage in friendships. All participants described being more comfortable developing a friendship online because they can behave in a way that is representative of their personality. During the interviews, participants frequently mentioned being comfortable with socializing in a MMORPG. Additionally, four participants would rather enjoy a quiet game online or lunch with a friend through the VE or MMORPG to face-to-face interactions, while one participant would either enjoy the social interaction online or face-to-face equally.

As evidenced by the many connections built in the VE by the participants, there appears to be increased comfort with the level of anonymity provided by interacting in a world in which participants feel greater control. Within a VE, participants described how they could choose to interact, when to interact, and with whom.

I feel there is a courtesy of the wonderful world of the Internet. I feel like I have come into contact with a wider section of humanity um because the gaming community these are people, a lot of them do feel uncomfortable in social spaces because they are marginalized maybe for their beliefs or their orientation, things and that was a safer space for me as well in that respect. I was actually able to come to terms and accept myself for who I was. Like I mean, to make it very personal I was able to kind of come out and be able to, I was, interested, I'm bi, I did not realize this until I interacted with a bunch of people in the gaming space, and it was ok and much more acceptable. (Sequoia)

All of the participants recognized that the connections provided by the Internet had increased their social connections and had helped them develop a way to interact with people, develop relationships, and define a support network, while managing the challenges of having ASD. For example, Sequoia said, “If it weren’t for the Internet and online gaming, I wouldn’t be as comfortable in social situations as I am right now.” By using a VE they were able to become part of a community and engage in social interactions and have friendships that they defined as meaningful.

Emotional recognition

Participants described having a deeper recognition of emotions in the context of a VE. The researchers felt this is a significant finding as it indicated that the virtual medium holds the potential to support greater emotional recognition and reciprocation for individuals with ASD. It is possible that individuals with ASD can express emotions and recognize emotions easier than in a face-to-face environment and potentially feel more comfortable with their own emotions. Emotions, such as happiness, sadness, enthusiasm, anxiety, love, or anger are internal feelings attributable to some causes that are recognizable to others through emotional behaviors, particularly facial expressions (Ekman, 1992).

Participants described the VE as a medium that allowed them to recognize their emotions and express them easier in relation to their social interactions. Participants described looking forward to socializing with their friends daily in the in the MMORPG. Participants felt comfortable with their identity and being themselves. They described a feeling of being able to reveal their true identity. For example, one participant discussed how he had learned that it is acceptable to feel frustrated, scared, or overwhelmed and asking for help was a natural occurrence. “I don’t have to do everything on my own: I learned that it was ok to ask for help on things I needed help with, from my friends online or face-to-face. I could be frustrated, it became OK.” (Spruce)

In addition to recognizing emotions, participants described using emoticons in the game to fill in verbal discussion; often inserting an emoticon into a chat box to emphasize feelings.

It is really hard to pick up sarcasm over text. But if someone has a smiley face with its tongue sticking out or something like that, is a little bit of a red flag that something is going on. (Sequoia)

All participants used emoticons within the game or chat rooms to express their emotions. They described the emoticons as a tool that would help identify emotions that they were feeling or how others may have been feeling. Finally, all participants identified when a lack of social interaction, both inside VEs and face-to-face environments, negatively affected their psyche. Participants noted they experienced an increase of loneliness and depression when they had little to no social interaction.

Roles in socialization, friendships, and life interaction

Even though roles within the game and MMORPG were minimally discussed, the theme of role recognition for individuals with ASD is important. Participants provided rich descriptions about understanding the individual roles within the game and face-to-face interactions. Participants learned specific skills that could be applied to real life situations and postsecondary education.

An aspect of the game that supports role identification and team interaction is that players can join “guilds” or teams (Simmons, 2010). The participants described their clans or

guilds as teams that allow the players on the guild and in the game that are not part of the guild to complete more difficult group tasks known as “raids,” or missions. Further, they described working in their guild and having to change their specific role to meet the different needs of the raids or dungeons that must be completed in the MMORPG. The most successful guilds are comprised of members who have complementary skills, such as different talents that are combined in a cohesive unit to help one another complete challenges that would otherwise be impossible. The participants described understanding how each role is unique and necessary to successfully achieve the quests in the game.

Participants developed an understanding of different roles required in the MMORPG and face-to-face environments. All participants generalized their roles and skills used in the gaming environment to support interactions at college or other environments. Due to the nature of the games that belong to a category of MMORPG, specifically, *World of Warcraft*, *MineCraft*, *Halo 3*, and *EveOnline*, each player had to develop an avatar and learn a very specific role within the game. The participants described their avatar as having a prescribed role specific to each task or guild event within the game that required the user to make choices based on their desired interactions or goals of the guild. All of the participants in this study chose avatars that were representative of their real-life experiences.

I am always the one in the RTS [Real Time Strategy] type games that is playing the supportive role that making sure that we can see everything on the map and protecting my teammates. (Sequoia)

The avatars represented their perception of self and personified their individual characteristics. With the development of an individual avatar, they could create the “person” they wanted to portray and could explore freely who they were and skills they would like to learn.

Maple sent the researcher a photo of his Pony avatar. His Pony avatar represented his choice to push for equality in gender acceptance. He defined his perception of self as a person who enjoys speaking out, identifying the challenges, and advocating for change. He also described himself as a leader able to immerse himself in a leadership role through his gaming. For example, Maple described enjoying a role as a clan leader in the game *RuneScape*. As a clan leader, he used a Pony name for his avatar to represent equality in gender. Maple also described interacting with his friends in a virtual gaming MMORPG that they, as a guild, were developing. The overarching perceptions of self and roles in a VE and face-to-face were evidenced in the data from each of the participants. Through the use of an avatar, participants explored their ideal self and practiced exhibiting those skills in a relationship through the VE. The avatars were described as a tool to help them cope with humor and learn to understand the small nuances of social communication and verbal exchanges.

Different roles were described in the game and how each role has a specific purpose and must work closely with the other roles needed on the team to be successful. Spruce explained, “Well, we are actually able to work as a cohesive team.”

Skills learned and generalized

All of the participants indicated that they relied on the VEs to facilitate socialization and support skill development for tasks they need to accomplish in the face-to-face setting. Skills were discussed which related to postsecondary education and success with group interaction. A MMORPG was described as instrumental in helping them navigate college level courses. For example, one participant related a biology project to gaming, he stated:

I have to learn to deal with people who constantly try to get in the way because they try to distract me. I have to learn to focus and especially when there is a given objective. Yes, yesterday I did my first dissection, it was of a clam, [and] I broke it down into steps. I have learned that if one thing is not working (and this is also outside of zoology) I have to try a different approach. (Spruce)

In addition, all participants discussed the importance of having a high level of collaboration and communication to manage the tasks of the game. Four participants related collaboration and communication to managing their class work at college and working on a team at their job. This relates back to understanding different roles and emotions that are experienced during the game, as well as in the face-to-face setting. Participants described the MMORPG as an environment where they could learn skills that were helpful in their college classes, as well as socialization in real life. For example, one participant stated:

I like my clan because I can talk to them and not be a geek and they give me feedback on things like me dominating the conversation or not talking about stuff they like. And what's the point of communicating if you're not gonna listen to people and fix your problems? (Maple)

Throughout daily interactions at school, work, or interacting within the community the participants described needing to engage with people who are unknown, new acquaintances, or friends.

Limitations

Phenomenological studies are highly involved and paint a rich picture of the observed phenomenon occurring. Therefore, participants were selected using purposeful sampling to ensure that the participants accurately represent the studied phenomenon (Creswell, 2013). One limitation of the study, however, involved sampling of the participants. In this research, participant sampling at a university setting yielded a homogeneous group, which limits diverse perspectives. Also, challenges can arise with the amount of information that individuals are willing to share. In addition, qualitative research is heavily dependent on the individual skills of the researcher and may be influenced by the researcher's personal biases and idiosyncrasies (Creswell, 2013).

Implications

Participants repeatedly described how the gaming environment provided opportunities to learn to communicate and collaborate with new people using unknown variables (Gee, 2007; Prensky, 2006). The findings represent a rich description of social interactions of individuals with ASD in a VE or MMORPG to further understand these phenomena. Cheng (2005) described a VE as one that may support greater interactions for individuals with ASD. Emerging literature from various researchers discussed the potential use of VEs to teach specific social skills (Cheng, 2005; Parsons & Cobb, 2012). Recently, VEs have generated interest as a medium that may be a promising practice to support social skills acquisition (Parsons, Mitchell, & Leonard, 2004; Parsons & Cobb, 2011). Additionally, Alawami and Heng-Yu Ku (2016) found that individuals were using communication, collaboration, as well as task and time management skills that participants believed supported their academic experiences based off of their experiences from a MMORPG. The research in the analyses described the social interactions of young adults with ASD as active participants in MMORPG

settings. Much of the extant literature focuses on teaching a specific social skill in a serious game or describes young adults with ASD as having limited social interactions and abilities; the findings from this research illuminate this group of individuals as social, engaging in social situations both in and out of the MMORPG, and independently learning soft and social skills through gaming rather than intentional interventions.

Within the VEs, participants were able to comfortably interact and circumvent face-to-face challenges by engaging within this controlled environment (Cheng, 2005; Parsons et al., 2013). As evidenced by the findings, virtual connections such as an MMORPG can be a powerful conduit to increase socialization, friendships, and skills that can be used in postsecondary education. Online role-playing games allow thousands of gamers to play in the game's expanding virtual world at the same time via the Internet (Yee, 2006). Participants explained that gamers often seek out a guild or clan to actively work together and solve complex problems using their advanced digital literacy skills and communication within the game. In addition, the findings presented information related to learning to communicate within a MMORPG and applying skills learned to real-life settings (Gallup et al., 2016). Therefore, based on this study, additional research should be conducted with social and soft skills development in the context of MMORPG and success in educational settings. Young people are dexterous collaborators, navigating digital gaming and social networking with ease: they are capable of generating and manipulating content and experimenting virtually with online social sites and games (Craft, 2012; Durkin et al., 2013). By leveraging the use of current technology by young adults with and without ASD, digital VEs present a unique opportunity to learn and practice social communication skills that may directly relate to authentic interactions (Bricker & Bell, 2012; Durkin, 2010; Durkin et al., 2013; Gallup et al., 2016).

Failure to develop and sustain friendships has been identified as a primary contributing factor to lack of persistence in postsecondary education (Noel-Levitz, 2011). Noel-Levitz identified that 27% of all college students in their first year struggle to develop friendships. Given the additional challenges for individuals with ASD, developing friendships and support networks can be challenging, ultimately augmenting the challenges already experienced with postsecondary education. There is emerging research that states some individuals with ASD seek friendships but fail to interpret social cues that promote building and maintaining friendships (Bauminger & Kasari, 2000). Based on the findings from the data collected, the individuals in this study actively sought out friendship and social interactions. Participants identified that their primary reason for playing MMORPG was to socialize and interact with people in an environment that was conducive to their unique needs. Participants were actively engaging in social exchanges, developing friendships, recognizing and reciprocating emotions and engaging in face-to-face friendships both in the context of the VE and in real-life setting as a result of their MMORPG interactions. In addition, all participants were using social skills necessary for future employment opportunities, specific to careers within the STEM professions.

Based on these findings, the researchers contend that VEs and MMORPG hold the potential to connect individuals with ASD to a community, develop communication skills and relationships, and identify supports that will improve postsecondary transition and increase persistence in postsecondary education. Continued exploration of social interactions, friendship perceptions, and persistence in postsecondary STEM tracts should be explored as that will support the identification of which game features are most effective in promoting engagement, learning, and social skills outcomes.

Recommendations

Given the multiple factors that affect socialization and friendships within the context of VEs, understanding and acknowledging connections between VEs and characteristics of social interactions will support future research specific to adolescents and young adults with ASD. It should be noted that a plethora of VEs exist that entail complex systems requiring socialization and communication. Considering that a majority of all adolescents and young adults play a virtual game at least one hour a day (Granic et al., 2014), it is important to focus on the potential positive outcomes and learning for individuals with ASD when connecting with their typically developing peers within a VE. As described in this study, advancements in VEs such as an MMORPG hold the potential to support social skills acquisition and friendship development that will ultimately increase successful face-to-face interactions and success in educational settings.

From the rich descriptions and findings from this phenomenological study, this researcher recommends further studies be conducted to develop a larger database of information targeting more comprehensive understanding of the socialization and skill development through a MMORPG for individuals with ASD. In light of the findings and conclusions, the following should be considered:

1. Extend the findings of this research through a survey of a large sample of young adults who actively play MMORPG and interact in a gaming environments to assess the extent to which the themes identified in this research appear to correlate with students who do not have ASD.
2. Conduct additional qualitative research focused specifically on one or more of the specific skills required for success in STEM careers. Complete longitudinal studies of young adults with ASD to identify patterns of social interactions in virtual and face-to-face classes and transitions across multiple settings (e.g., virtual, face-to-face, college, jobs).

References

- Alawami, N., & Ku, H. (2016). Every day you are improving: How college students view the educational impact of World of Warcraft. *The Qualitative Report*, 21(8), 1428-1440. Retrieved from <http://nsuworks.nova.edu/tqr/vol21/iss8/7>
- Alpern, C. S., & Zager, D. (2007). Addressing communication needs of young adults with autism in a college-based inclusion program. *Education and Training in Developmental Disabilities*, 42(4), 428-436.
- Ashinoff, B. K. (2014). The potential of videogames as a potential pedagogical tool. *Frontiers in Psychology*, 5. doi:10.3389/fpsyg.2014.01109
- Baron-Cohen, S., Wheelwright, S., Burtenshaw, A., & Hobson, E. (2007). Mathematical talent is linked to autism. *Human Nature*, 18(2), 125-131. doi:http://dx.doi.org/10.1007/s12110-007-9014-0
- Bauminger, N., & Kasari, C. (2000). Loneliness and friendship in high-functioning children with autism. *Child Development*, 71(2), 447-456. doi:10.1111/1467-8624.00156
- Bloomberg, L. D., & Volpe, M. F. (2012). *Completing your qualitative dissertation: A roadmap from beginning to end*. Thousand Oaks, CA: SAGE.
- Boyle, E. A., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers and Education*, 94, 178-192.

- Bricker, L. A., & Bell, P. (2012). "GodMode is his video game name": Situating learning and identity in structures of social practice. *Cultural Studies of Science Education*, 7(4), 883-902.
- Cheng, Y. (2005). *An avatar representation of emotion in collaborative virtual environments (CVE) technology for people with autism* (Unpublished doctoral dissertation). Leeds Metropolitan University, Leeds, UK.
- Craft, A. (2012). Childhood in a digital age: Creative challenges for educational futures. *London Review of Education*, 10(2), 173-190.
- Creswell, J. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: SAGE.
- Denzin, N. K., & Lincoln, Y. S. (2003). *Collecting and interpreting qualitative materials*. Thousand Oaks, CA: SAGE.
- Ducheneaut, N., & Moore, R. J. (2005). More than just "XP": Learning social skills in massively multiplayer online games. *Interactive Technology and Smart Education*, 2(2), 89-100.
- Durkin, K., Boyle, J., Hunter, S., & Conti-Ramsden, G. (2013). Video games for children and adolescents with special education needs. *Zeitschrift für Psychologie*, 221(2), 79-89.
- Durkin, K. (2010). Video games and young people with developmental disorders. *General Psychology*, 14(2), 122-140.
- Fessenden, M. (2013). Students with autism gravitate toward STEM majors [Blog post]. *Scientific American*. doi:10.1038/nature.2013.12367
- Fox, J., Ahn, S. J., Janssen, J. H., Yeykelis, L., Segovia, K. Y., & Bailenson, J. N. (2014). Avatars versus agents: A meta-analysis quantifying the effect of agency on social influence. *Human-Computer Interaction*, 30(5), 401-432. doi:10.1080/07370024.2014.921494
- Fullan, M. (2013). *Stratosphere: Integrating technology, pedagogy, and change knowledge*. Toronto: Pearson.
- Gallup, J., Duff, C., Serianni, B. A., & Gallup, A. (2016). An exploration of friendships and socialization for adolescents with autism engaged in massive multiplayer online role-playing games (MMORPG). *Education and Training for Autism and Other Developmental Disorders*, 51(3), 223-237.
- Gee, J. P. (2007). *What videogames have to teach us about learning and literacy* (2nd ed.). New York, NY: St. Martin's Press.
- Gentile, D. A., & Gentile, J. R. (2008). Violent video games as exemplary teachers: A conceptual analysis. *Journal of Youth and Adolescence*, 9, 127-141. doi:10.1007/S10964-007-9206-2
- Gentile, D. A., Anderson, C. A., Yukawa, S., Ihori, N., Saleem, M., Ming, L. K., . . . Sakamoto, A. (2009). The effects of prosocial video games on prosocial behaviors: International evidence from correlational, longitudinal, and experimental studies. *Personality and Social Psychology Bulletin*, 35, 752-763. doi:10.1177/0146167209333045
- Granic, I., Lobel, A., & Rutger, C. M. E. (2014). The benefits of playing video games. *American Psychologist*, 69(1), 66-78.
- Hayes, D. G., & Singh, A. A. (2012). *Qualitative inquiry in clinical and educational settings*. New York, NY: Guilford Press.
- Iovannone, R., Dunlap, G., Huber, H., & Kincaid, D. (2003). Effective educational practices for students with autism spectrum disorder. *Focus on Autism and Other Developmental Disabilities*, 18(3), 150-165.
- Kemp S., Petrewskyj, A., Shakespeare-Finch, J., & Thorp J. (2013). What if you're really different? Case studies of children with high functioning autism participating in the get REAL programme, who had atypical learning trajectories. *European Journal of Special*

- Education*, 28(1), 91-108.
- Myles, B. S., Bock, S. J., & Simpson, R. L. (2001). *Asperger syndrome diagnostic scale*. Austin, TX: ProEd.
- Moore, D. J., McGrath, P., & Thorpe, J. (2000). Computer aided learning for people with autism—A framework for research and development. *Innovations in Education and Training International*, 37, 218-228.
- Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: SAGE.
- Muller, E., Schuler, A., Burton, B. A., & Yates, G. B. (2003). Meeting the vocational needs of individuals with Asperger's syndrome and other autism spectrum disabilities. *Journal of Vocational Rehabilitation*, 18(3), 163-175.
- Newman, L., Wagner, M., Cameto, R., & Knokey, A. M. (2009). *The post-high school outcomes of youth with disabilities up to 4 years after high school. A report of findings from the National Longitudinal Transition Study-2 (NLTS2) (NCSE 2009-3017)*. Menlo Park, CA: SRI International. Retrieved from www.nlts2.org/reports/2009_04/nlts2_report_2009_04_complete.pdf
- Noel-Levitz, Inc. (2011). The attitudes of second-year college students: A national pilot study on the challenges students face as they transition to their second year of postsecondary education. 2011 Pilot Study/Research Report. Retrieved from <http://eric.ed.gov/?id=ED536419>
- Parsons, S., Charman, T., Faulkner, R., Ragan, J., Wallace, S., & Wittemeyer, K. (2013). Commentary—Bridging the research and practice gap in autism: The importance of creating research partnerships with schools. *Autism*, 17, 268-280. doi:10.1177/1362361312472068
- Parsons, S., & Cobb, S. (2011). State-of-the-art of virtual reality technologies for children on the autism spectrum. *European Journal of Special Needs Education*, 26(3), 355-366.
- Parsons, S., Mitchell, P., & Leonard, A. (2004). The use and understanding of virtual environments by adolescents with autistic spectrum disorders. *Journal of Autism and Developmental Disorders*, 34(4), 449-466.
- Prensky, M. (2006). *Don't bother me, mom, I'm learning! How computer and video games are preparing your kids for 21st century success and how you can help!* St. Paul, MN: Paragon House.
- Rao, P., Beidel, D., & Murray, M. (2008). Social skills interventions for children with Asperger's Syndrome or high functioning autism: A review and recommendations. *Journal of Autism and Developmental Disorders*, 38, 353-361.
- Robles, M. M. (2012). Executive perceptions of the top 10 soft skills needed in today's workplace. *Business and Professional Communication Quarterly*, 75(4), 453-465.
- Roux, A. M., Shattuck, P. T., Cooper, B. P., Anderson, K. A. Wagner, M. & Naerendorf, S. C. (2013). Postsecondary employment experiences among young adults with an autism spectrum disorder RH: Employment in young adults with autism. *Journal of the American Academy of Child Adolescent Psychiatry*, 52(9), 931-939.
- Rybas, N. & Gajjala (2007). Developing cyberethnographic research methods for understanding digitally mediated identities. *Forum Qualitative Research*, 8(3), *Sozialforschung / Forum: Qualitative Social Research*, 8(3), Art. 35, <http://nbn-resolving.de/urn:nbn:de:0114-fqs0703355>.
- Schall, C., & McDonough, J. (2010). Autism spectrum disorders in adolescence and early adulthood: Characteristics and issues. *Journal of Vocational Rehabilitation*, 32(2), 81-88.
- Seidman, I. (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. New York, NY: Teachers College Press.

- Simmons, T. (2010). Team building in world of Warcraft. Retrieved March 16, 2015, from http://todd-simmons.com/docs/MBA_BusComm_TeamBuilding.pdf
- Simon, M. K., & Goes, S. (2012). *What is phenomenological research?* Retrieved from <http://dissertationrecipes.com/wp-content/uploads/2011/04/Phenomenological-Research.pdf>
- Tufford, L., & Newman, P. (2010). Bracketing in qualitative research. *Qualitative Social Work*, 11(1), 80-96.
- U. S. Department of Education, National Center for Education Statistics. (2012). Federal programs for education and related activities. In Digest of Education Statistics 2012. Retrieved from the National Center for Education Statistics Website: nces.ed.gov/pubs2014/2014015.pdf
- Vygotsky, L. (1978). Interaction between learning and development. *Mind and Society*, pp.79 - 91.
- Vitelli, R. (2014). Are there benefits to playing video games? [Media Spotlight]. *Psychology Today*. Retrieved from <http://www.psychologytoday.com/blog/media-spotlight/201402/are-there-benefits-in-playing-video-games>
- Wei, X., Christiano, E. R. A., Yu, J. W., Blackorby, J., Shattuck, P., & Newman, L. A. (2013). Postsecondary pathways and persistence for STEM versus non-STEM majors: Among college students with an autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 44(5), 1159-1167.
- Wei, X., Yu, J. W., Shattuck, P., McCracken, M., & Blackorby, J. (2013). Science, technology, engineering, and mathematics (STEM) participation among college students with an autism spectrum disorder. *Journal of Autism Development Disorders*, 43(7), 1539-1546.
- Yee, N. (2006). The demographics, motivations and derived experiences of users of massively-multi-user online graphical environments. *PRESENCE: Tele-Operators and Virtual Environments*, 15(3), 309-329.

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