

UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ

Colegio de Ciencias Sociales y Humanidades

**The Effect of Online Role-Playing Games on the Executive
Functioning skills of Students with ADHD**

Proyecto de investigación

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Psicología Clínica

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Resumen:

El trastorno de déficit de atención e hiperactividad (TDAH) afecta a un mínimo de 7.3% de los adolescentes ecuatorianos en el sistema educativo. Aunque haya estudios realizados previamente, se enfocan más en aspectos de salud mental y no tanto en intervenciones académicas. El propósito de esta propuesta de tesis es crear un nuevo camino por el cual podemos facilitar el proceso de aprendizaje de los estudiantes con TDAH en el Ecuador. Para este proceso se ha buscado una intervención relevante, por ende, digital y milenial. El uso de los juegos en línea de roleplay es una herramienta que puede mantener a los estudiantes con TDAH motivados y con ganas de involucrarse. El TDAH causa problemas en las funciones ejecutivas, las cuales se ven potencialmente activas y son necesarias para los juegos en línea de roleplay. La propuesta es encontrar 50 estudiantes con TDAH que serán separados en un grupo experimental y otro de control. Mientras que el de control continúa con el apoyo académico individual del colegio, el experimental va a jugar tres veces a la semana por 45 minutos un juego de roleplay. Utilizando las pruebas Delis-Kaufman Executive Functioning System (K-DEFS) para medir el funcionamiento previo y después de la intervención, podremos ver el efecto positivo que se espera obtener. Una complicación y necesidad a futuro es encontrar una forma más accesible para este tipo de tratamiento ya que no todas las escuelas cuentan con la disponibilidad de un laboratorio de computación.

Palabras Clave:

TDAH (ADHD): En este estudio, el término será utilizado para los adolescentes que han sido diagnosticados con el trastorno.

Funciones ejecutivas: El proceso metacognitivo que nos permite una planificación eficiente, verificación, ejecución y el sentido general de regulación de comportamientos que van hacia una meta.

Juegos Online de Roleplay: Un tipo de género de video juegos en el cual uno o más jugadores se encuentran con la habilidad de competir o compartir con otros sea para ganar una meta de forma individual o de forma colectiva hacia una meta en común. Estos juegos tienen ciertas reglas que delimitan a los personajes, por ende, tus acciones tienen consecuencias dentro del juego.

Era Digital: Caracterizada por el uso de tecnología, el cual incrementa la velocidad y rango de conocimiento que se da actualmente.

Abstract:

Attention deficit hyperactivity disorder (ADHD) is affecting a minimum of 7.3% of Ecuadorian adolescents in the educational system. Although there has been research done, focusing on mental health aspect of the disorder, academic interventions seem to be lacking. The purpose of this proposal is to create a new approach that can potentially facilitate the learning process of students with ADHD. For this new approach, a digital and millennial friendly process is being sought out. The use of online role-playing games aligns with executive functioning that is lacking in students with ADHD. Based on the high level of engagement and motivation that video games can provide, it is expected for students with ADHD to adhere to the treatment plan without a problem. The proposal is to find 50 students with ADHD, split into an experimental and a control group. With the use of the Delis-Kaufman Executive Functioning System (D-KEFS) to measure executive functioning levels pre and post four months of treatment which will take place three times per week in intervals of 45 minutes, it will be possible to monitor any changes on the students with ADHD. It is expected that the experimental group will benefit from the exposure to the online role playing games having slightly better scores on their post D-KEFS compared to students who are in the control group. A limitation to this proposal is the low amount of academical facilities that can provide a computer lab. This limitation leads us to search for international schools, assuming that they will most likely provide the proper computer lab equipment. For the future, it is necessary to find accessible forms of digital play to expand this proposal to a wider demographic.

Key Words:

ADHD: In this study, the term Attention Deficit Hyperactivity Disorder is solely utilized for adolescents who have been clinically diagnosed. This diagnosis must have occurred with a psychiatrist with the use of the *Diagnosics and Statistical Manual V* (APA, 1994).

Executive Functioning: The metacognitive process that allows for efficient planning, verification, execution, and the overall regulation of a goal-directed behaviour encompasses executive functioning (Oosterlaan, Scheres, & Sergeant, 2005).

Online/multiplayer Role Playing games: A specific type of video game in which one of more players have the ability to either compete against each other's or work together to accomplish a common goal or pay-off which is limited by certain rules which cause the players to make choices on which they must act upon and receive the deserved consequences for the decisions made (Galvao, 2000).

Digital Era: The Digital Era is characterized by technology which increases the speed and breadth of knowledge turnover within the economy and society (Shepherd, 2004).

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Introduction

Attention deficit and hyperactivity disorder (ADHD) consists of a pattern of inattention and/or hyperactivity-impulsivity that interferes with daily functioning or development of the child (American Psychiatric Association, 2000). ADHD has an effect on 5.4 million children in the educational system in the United States of America (American Psychiatric Association, 2000). These students are faced with difficulties accomplishing academic success and experience difficulties maintaining attention, modulating activities, inhibiting or controlling their impulsive reactions and remaining on a scholastic task (DuPaul & Stoner, 2003). (American Psychiatric Association, 2000). The educational system faces a challenge due to the high incidence of this disorder.

Attention deficit hyperactivity disorder (ADHD) is currently the most common disorder amongst childhood and can continue through adolescence and into adulthood. According to Ramos, Bolaños and Ramos (2015), a total of 7.3% of teenagers from the ages of 14-18 in Ecuador fit the criteria for diagnostic. A minimal amount of research has been done within the educational system, while the majority of studies have been either medical or clinical trials. Berk and Ghanizadeh (2013) have been involved in clinical trials, attempting to gain a better understanding of Zinc and how it can be a treatment source for children with ADHD. Another clinical trial done in China, has aimed to determine whether the blood lead levels have a significant correlation with individuals with ADHD (Wang, Chen, Yang, Ma, Wang, Tang, Hao & Ruan, 2008). According to Rubio (2011), the use of methylphenidate-OROS had a positive result on individuals with ADHD and with enough time these individual's behaviours would become more stereotypically normal. Although there are many other studies done like these few examples, this proposal focuses on promoting new forms of intervention within the academic system to optimize the learning

process and overall executive functions of children with ADHD. All children with ADHD have difficulty in operating executive function skills while acting out a certain task (Lambeck, Tannock, Dalsgaard, Trillingsgaard, Damm, and Thomsen, 2008). Videogames have the potential to create an emotional involvement and pleasure which are two factors immensely involved in the learning process (Gee, 2007). According to this relationship with learning, patients with ADHD are able to complete complex tasks which require a high level of skill and concentration while using videogames (Gee, 2007).

Students with ADHD have shown positive feedback while using computer technology in learning tasks, even if they happen to be repetitive drills (Keane, 2005; Lopes, 2007). According to Gee (2007), Students with ADHD are highly motivated by role playing games which allows them to embody a certain identity given to them in-game. As the students identify themselves with the character, they are forming strategies which must align with the play style which translates to learning style (Gee, 2007). We will further explore the history behind the diagnostic as well as the world of videogames with the proposal of developing a new treatment plan, usable in the academic system and beneficial to the future generations of Ecuador.

Introduction to the Problem:

The first Latin American consensus around the issue of ADHD took place in 2007. With this, professionals of the mental health set parameters to medication interventions and for therapeutic intervention. According to Barragan (2009), amongst the first health problems in the south American region, ADHD affects approximately 36 million children and adolescents. Out of these who are affected by ADHD, only a 20% of them have accessibility to a treatment plan and possible medications. Due to ADHD's symptoms of high impulsivity

and lack of attention, these individuals find themselves at higher risk of academic failure, professional complications and physical injury to themselves and to society. According to Barragan (2015), up to 60% of individuals with ADHD still have symptoms once they reach adulthood. This will compromise the array of opportunities which are given to these individuals as they approach the working force and adult life. In this consensus it became evident that an early diagnostic is necessary to then accommodate and guide these individuals through a treatment process that promotes or develops an executive functioning which produces more benefits. With the use of technology, new approaches are being developed to help those with this diagnostic.

Antecedents:

The term ADHD was properly introduced into the DSM III in 1980 and since then has received changes and revisions throughout the future DSM's (Faraone et al., 2003). As the term progressed, in the DSM VI R three subtypes were established for ADHD: Combined presentation, predominantly inattentive, and predominantly hyperactive/impulsive. In Latin-American in 2007 a consensus was reached by professionals of mental health determining that an early diagnostic and a treatment plan are essential to reduce the possible complications and costs linked to ADHD (Barragan, 2009). In the educational system, it is imperative to accommodate and prevent possible complications and excess costs. Students with ADHD will present a difficulty in regulating their behaviours, under a high amount of stimulation they will respond in impulsive manners and show an elevated level of distractibility (Barkley, 2011; Stein & Foltz, 2009). On the other hand, students who are provided with under stimulating or dull tasks find themselves having a difficult time when needed to concentrate and come into attention. Both subtypes have demonstrated to

determine a lack of planning skills or impaired planning while also showing a poor sense of timing (Barkley, 2011).

The traditional classroom activities or tasks seem to diminish the persistence of effort on adolescent students with ADHD. According to Xu, Reid and Steckelberg (2002), these same students play video games for hours on end. Video games provide motivation due to its recreational fun and versatility. While the academic lessons tend to be linear, video games have a tendency to captivate one's curiosity which leads to effect over cognitive functioning and motivational factors. The society for Advancement of Games and Stimulation in Education and Training find digital games as a place where one or more players can either compete or cooperate, while focusing on a pay-off which is set under specific rules or a specific setting. This causes the players to make choices which must be implemented on the task at hand and then given feedback whether or not the choice allowed the player or players to accomplish a given objective (Galvao, 2000).

According to Prensky (2007), digital games can be considered as he calls them "Intellectual sports". Role playing digital games, provide situations of collaboration and team work that implies for players to adapt and interact with each other's to better optimize a strategy that will allow progress in the game. As information is shared between players and strategies are built, players must make the best decisions to assist them along the rest of their journey inside the game. Digital games provide the opportunity for players to complete task's which can be measure based on their risk and ethical decisions. These decisions provide a karma system which will further develop your character as it continues to master and learn new skills at a quick speed (Prensky, 2007). This study is interested in particular on Ecuadorian adolescents in-between 14-16 years of age in the city of Quito with a diagnostic of ADHD who are currently not taking medication or under any alternative psychological treatment.

The Problem:

ADHD in Ecuador faces a particular challenge in comparison to other more developed countries with a high prevalence. With less resources, it becomes more imminent to provide help and support on an early diagnostic and a treatment plan. The consensus reached by Latin professionals of the mental health recapped the need for a proper treatment plan following a diagnostic which would include multimodal methods or treatment in which the family and society are involved (Barragan, 2009). In Ecuador there has not been any studies on the technological effects and possible treatment plans for ADHD. Special educators must take steps into this high tech global society to find a way to promote and develop the executive functioning skills of students who have ADHD. Students with ADHD have a higher chance of having difficulties with cognitive skills that involve regulating oneself and those which involve a linear orientation in accomplishing a goal (Barkley, Edwards, Laneri, Fletcher & Metevia, 2001). Other deficits which are experienced in the executive functioning of individuals with ADHD are in working memory, planning, verbal fluency, organization, decision-making, inhibition, attention, cognitive flexibility or inflexibility and in the ability to monitor themselves (Barkley, Edwards, Laneri, Fletcher & Metevia, 2001; Dielmann & Meaux, 2011; Nigg, 2001; Sergeant, Guerts & Oosterlaan, 2002; Welsh, 2002.). With the use of technology and video games, special educators can promote and develop executive functioning skills in their students.

Research Question:

What effect does online role-playing games have on students with ADHD and their global executive functioning?

Meaning of the Study:

In Ecuador there has not been any studies that acknowledge the effect of technology on the treatment of adolescents with ADHD in the academic system. The high prevalence of this diagnosis in Ecuador makes it necessary for special educators and the academic system to find new methods which are engaging and effective to teach these students. Due to the high use of video games among adolescents, this intervention can be considered a new and cost-effective tool for the treatment of ADHD. This study will not only contribute to the development of students executive functioning, but it will provide a template for future special educators to develop engaging and low cost, effective interventions.

In the next chapter we find the literature review and its specific contents which include: ADHD, the etiology of ADHD, the function of inhibition in ADHD, the executive functioning in ADHD, the digital era and how video games which are seen as a game or even a distraction has benefits and possible uses on individuals in the academic system. Following the literature review, we will find the materials needed which is the online role-playing game as the form of intervention and the three different K-DEFS subtests which will provide a quantifiable progression to the intervention. In this section the participants will be specified to fit the criteria of ADHD and an academic system that provides the necessary equipment for the intervention. Finally, you will find the expected results in which the online role-playing video games benefit executive functioning in students with ADHD greater than those in the

control group. In addition to this expected result we can speculate on limitations to this proposal and strive to create even more complete interventions in the future.

Literature Review:

Sources:

On this literature review, the information used has all come from the electronic library of Universidad San Francisco de Quito. In this electronic library, the sources used are: J Store, EBSCO, ProQuest, Google Scholar, amongst others. The key words which were used to find these sources were: ADHD, Video Games, Attention Deficit Hyperactivity Disorder, Executive Functions, and Role-Playing Games.

Literature Review Format:

The literature review for this study has been organized around Attention Deficit Hyperactivity Disorder, executive functioning and online roleplaying video games. The first portion will cover ADHD with its traits and inhibitions, granting a better understanding of the diagnosed adolescents in the academic system. This study explores the connection between the use of digital media and ADHD. The focus of this proposal is to gain new information on the actual use of online role-playing video games and their viability inside the classroom.

Attention Deficit Hyperactivity Disorder

During childhood the standard is for one to be active, drawn to constant exploration and discovery of the world around us. This level of activity is normal, yet when these

behavioural patterns begin to take a toll on the child's academic standards it is important to consider an evaluation. The main symptoms of ADHD include a pattern of lack of attention and hyperactivity that must last for a period of six months and before 12 years of age (Hamilton & Agramovich, 2016). Throughout recent years various etiologies have been recommended for ADHD, with the first being the biological factor and the findings of high heritability (Agular, Eubig & Schantz, 2010). Based on two separate studies on heritability, it was found that anywhere from 70%-76% of symptom heritability (Franke, Neale & Faraone, 2009). This factor of heritability can play an important role in academical systems by helping educators work together with the family and the student. Although a large percentage is given to heritability, environmental factors have been accounted for a low 10% to 15% of the affectation in symptoms (Agular, Eubig & Schantz, 2010).

Current etiological investigations are exploring the various connections between the neurobehavioral deficits caused by environmental chemicals, such as lead and the neurobehavioral deficits of ADHD (Agular, Eubig & Schantz, 2010). The more research is done with ADHD, the more it suggests that it is but a neurodevelopmental process delay rather than some sort of static psychopathology. With the passing of time, disinhibition tends to decrease while inattention remains stable (Semrud-Clikeman, Walkowiak, Wilkinson, & Butcher, 2010). With time, many adolescents will outgrow this neurological disorder as they mature. According to Smith, Mick and Faraone (2009), ADHD shows deficits that are qualitative and not quantitative, supporting the theory that there is a neuropsychological developmental delay.

Together with an evolving etiology, APA has progressed with the diagnostic criteria throughout the years. In the DSM III, in 1980, two subtypes to ADHD were established (Mash & Barkley, 2003). By the DSM IV TR, there are three establish subtypes which include: a predominant inattentive presentation, a predominant hyperactive/impulsive

presentation and the combined presentation. In a new proposed revision for the DMS V, these subtypes are to be eliminated, due to a vast majority of students which are being diagnosed with ADHD predominant inattentive type being purely inattentive and exhibiting no traits whatsoever of hyperactivity (Aguilar, Eubig & Schantz, 2010). APA has identified traits which are linked to learners with ADHD. Impaired planning, poor sense of time, poor rule-governed behaviour, low verbal and nonverbal working memory, delays in motor coordination, speech impediments, poorly organized speech and deficiencies in the regulation of emotions, poor persistence of effort, decreased performance under delayed reward conditions and a larger variability in response. (APA, 2010). With the DSM V new proposal of ADHD, being recognized as a dynamic pathology, the academical system will have the possibility to attain educational interventions that may be effective. The educational opportunities must be equally shared amongst all children as a natural right (Feinberg, Walter; Torres, Carlos Alberto, 2001). With these equal opportunities comes the fact that those students with the need of academic assistance must have the availability for it as a right as well.

Attention Deficit Hyperactivity Disorder (Inhibitions)

The frontal lobe has the function of being a centre for stimulus response, analysing incoming information and then generating the appropriate responses and coordinate motivation (Vaidya & Stollstorff, 2008). The frontal lobe is responsible for the domain of five executive functions: planning, inhibition, cognitive flexibility, fluency and working memory. In order to allow a certain executive function to act, inhibition must first take effect following the response making inhibition a primary executive function. According to Barkley (2005), inhibition control is the primary deficit of ADHD. Inhibition includes distractibility or interference control and response inhibition. The response inhibition focuses on stopping any responses which are occurring and focusing on the single predominant response.

Interference control refers to the resistance of distraction (Lawrence, Houghton, Tannock, Douglass, Durkin & Whiting, 1997).

The youth with ADHD has been found to be affected by motivational inhibition as seen in the bridging delays of these adolescents (Barkley, 2011, 2005). These adolescents have a hard time delaying a reward and rather looking for immediate rewards. This motivational inhibition has a clear effect over planning, a higher order executive function necessary for the academic process. The other inhibition is the behavioural one which accounts for the ability to adjust or adapt one's personal behaviours depending on the environmental conditions which are presented (Lawrence, Houghton, Tannock, Douglas, Durkin & Whiting, 2002). The combination of these two forms of inhibition cause for the person to be unable to create a strategy to be able to undergo sequential discounting and environmental feedback (DeVito, Blackwell, Kent, Ersche, Clark, Salmond, Dezsery & Sahakian, 2008; Fareri, Martin & Delgado, 2008). These difficulties stand out as these adolescents find themselves on long-term tasks which demand attention, continuous monitoring of stimulus and the adaptation to these as they change with time. To persevere with any type of performance, these adolescents find themselves experiencing difficulties at sustaining attention on a specific target and managing their responses to those appropriate ones and discarding those which are presumably inappropriate.

When engaged with videogames, children and adolescents with ADHD seem to play as well as their peers without the disorder. Videogames allow for the player to become immerse and this results in goal oriented, interactive and continuous feedback which is given by the game itself (Delman & Meaux, 2011; Meaux, 2010; Vogel et al., 2006; Roleplay Organization, 2010). Video games hold back or limit the amount of irrelevant distractions which is favourable for students with ADHD. According to Prensky (2007), video games are referred to as intellectual sports. They offer a sense of collaboration and teamwork, decision

making, persistence, deductive thinking, lateral thinking and management of new skills, items and roles (Findley, 2011; Hugh, 2008).

Executive Functioning and ADHD

ADHD although considered a behavioural disorder, ADHD has parallels to certain deficits displayed by patients who have frontal lobe damage. Executive function tests have a limited success in the diagnostics for ADHD, but can be a complimentary tool to the diagnostic based on the relationship between ADHD and executive functioning dysfunctions (Brocki and Bohlin, 2006). Executive functioning problems are not specific to ADHD, and are seen in other disorders such as conduct disorder, learning disabled, autism and/or oppositional defiant disorder (Berlin, Bohlin, Nyberg, & Janols, 2004; Corbett, Constantine, Hendren, Rocke, & Ozonoff, 2009; Geurts, Verte, Oosterlaan, Roeyers, & Sergeant, 2004; Savitz & Jansen, 2005; Vaurio, Riley, & Mattson, 2008). Although distinguishing an exact singular measurement for each executive function has been nearly impossible to accomplish, researchers have found a relationship between executive functioning and ADHD in its neurological components which manifest in a variety of conducts (Gathercole, Alloway, Kirkwood, Elliott, Holmes & Hilton, 2008; Toplak, Bucciarelli, Jain, & Tannock, 2009).

With the use of Electroencephalograms (EGG), adolescents with ADHD were seen to have difficulties with neural regulation which is due to deficient production or utilization of neural transmitters (Toplak, Bucciarello, Jain & Tannock, 2009). The standard alert states contain beta waves that move 13 to 21 cycles per second and theta waves which are travelling at 4 to 8 cycles per second (Wiersema, van der Meere & Roeyers, 2009). Individuals with ADHD produce a greater amount of slow waves, and a lower amount of fast waves than the

average individual. The lack of theta waves on individuals with ADHD causes there to be an under arousal, which in turn impedes the functions of attention (Barkley, 2005). Students with slow brainwaves have a greater difficulty when it comes to orienting to sensory stimuli. This abundance of theta waves on students with ADHD causes for these individuals to be unable to maintain an alert state in the classroom (Stins et al., 2005). Individuals with ADHD not only have a difficulty with maintaining their alert state in a classroom but also find difficulty over self-regulating their behaviour in order to accomplish a task at hand (Barkley, 2011).

According to Barkley the inadequate inhibitory control and poor working memory are a reason why the ADHD behaviour ranges from impulsive, over-arousal to an under-arousal when given tasks that are found to be monotonous. Individuals with ADHD experience difficulties with response inhibition process which involves inhibiting a predominant response and the ability to stop an on-going response (Barkley, 2011). Individuals with ADHD showed a poor motor inhibition when performing a go-no go paradigm. In a variety of studies, it was found that individuals with ADHD have an inability to inhibit their responses to occasional target stimuli (Greven, Harlaar, Dale & Plomin, 2010; Walcott, Schreemaker, & Bielski, 2009; Nyberg, Bohlin, Berlin, & Janols, 2003).

Task performance finds itself interfered by working memory for those with ADHD according to Brown (2009), after utilizing the Tower of London and Tower of Hanoi tests. Two critical aspects of working memory are forethought and hindsight, also known as prospective and retrospective functions. While performing the Tower of London test, participants demonstrated a lack of forethought being unable to utilize the warning stimuli and long preparatory time (Brown, 2009). These participants had an inability to adjust their responses subsequent to feedback from a previous incorrect response which demonstrates a deficiency on hindsight (Barkley, 2011; Barkley, 2005; Wiersema, van der Meere &

Roeyers, 2009). Another difficulty experienced by individuals with ADHD is the retention of sequential events which is a task performed by working memory. The sense of past and present is one that has not developed adequately in youth with ADHD (Barkley, 2005). These individuals with ADHD have a difficulty or complete inability to estimate time passage. Typically, individuals with ADHD will tend to overestimate time, suggesting that their frustration may stem from the failure to grasp the passing of time in a realistic manner (Nyberg, Bohlin, Berlin & Janols, 2003; McHugh & Wood, 2008; Scheres & Sumiya, 2008; Weber & Huettel, 2008; Wilner, Bailey, & Parry, 2010).

The Digital Era and its Cognitive Structure

With the use of digital technology, this era is bound to provide a place where students can become active participants in the process rather than passive observers (Prensky, 2007). As the era continues to switch into this novel form of socialization and interaction, it brings a change to the cognitive style of the individual favouring the use of digital games. According to Prensky (2007), the development a faster processing speed of the data which by digital natives is called “twitch speed”. Through the upbringing of the current youth, T.V. shows feature an approximate 100 images per minute, which has in turn created a need for a faster twitch speed. In this 21st century, the need for speed has increased and become a natural part of the process (Berk, 2009; Tzeng, 2011).

According to Gee (2003), youth utilizes a “divided attention” that allows for simultaneous monitoring of various situations and being able to adapt and respond to each one. Prensky (2007), has agreed with Gee’s findings about multiple routes of input data coming from non-sequential sources. The fact that adolescents are able to use signs, symbols and representations to express meaning and communicate specific meanings provides evidence of critical learning through digital games. These individuals then organize the data

which has been taken in and make their own connection, which is what Gee (2003), called the Multiple Routes Principle. As the environment and material objects give us information which can be stored for the learner when it must be utilized in the classroom, Gee (2003) proposes that digital games offer clues for the games progression fitting the same principle of Material Learning. The ability for individuals to utilize visuals as clues and guidelines in digital games can be combined with other stored knowledge for a greater achievement on a given task (Huh, 2008).

In this digital era the visual guides which are provided in games serve as a new cognitive structure. As digital media emphasizes on the visual graphics, it is the texts purpose to only clarify the predominant image (Gee, 2003). This new form of literacy includes diagrams, artefacts, symbols, graphs and images to communicate through a multimodal text. These digital texts are understood through the personalized experience of the player (Gee, 2003). The meaning which is given to these variables, whether they are text or images, is based on the experience of them. According to Prensky (2007), it was noted that there has been a world-wide increase in the performance of non-verbal IQ scores claiming that its due to visual intelligence, a characteristic of this century.

In a study done by Cole and Griffiths (2007), a total of 76.2% of males and 74.7% of females claimed that they were able to make good quality friends during the playing of online video games. This common endeavour has facilitated bonding inside the virtual world and created cognitively connected global inhabitants (Gee, 2003). Through this shared digital world, Gee (2003) saw individuals envisioning themselves capable of learning, utilizing and valuing new semiotic domains. This digital connectedness has provided the opportunity and impacted the cognitive structure that involves seeking new information. Individuals utilize the digital world and its community to ask questions, read books, articles and manuals that will help them find answers to their questions (Prensky, 2007). This ability to connect with

individuals who know about a certain subject and to research various sources of a given subject is in turn providing a greater amount of useful data to solve problems (Prensky, 2007). This novel cognitive structure requires its new learners to have an active participation in activities where they can have more input and control rather than the traditional lectures (Berk, 2009; Gee, 2003; Prensky, 2007; Tzeng, 2011).

There is a natural need for learners to probe their world, reflect on what they have done, formulate a hypothesis on the task, repeat or re-do the task to then evaluate whether or not the hypothesis is fitting and applicable (Gee, 2003). This cognitive need has been labelled as the Probing Principle. Learners expect more output for their input due to the fact that they are not mere consumers, but rather they have become producers in their own process of learning (Williams, Yee, & Caplan, 2008). This digital era has facilitated a transformation in the learners, being able to customize their own learning experience from an inside perspective rather than being outsiders with no choice but to accept information which is fed to them. Those who are native to this digital era have blended work and play into a single concept of learning. Although there has been a work/play ethic that has emerged from this overlap and the business world has adopted this digital era, it is still far from impacting the academic system due to the little to no control of the student in the classic classroom environment (Prensky, 2007).

In the digital gaming world, the input and effort which is given by the player determines the output, while in the classroom students feel like outsiders, unable to obtain that pay-off (Gee, 2003; Prensky, 2011). In the academic system the combination of effort and input do not necessarily mean or ensure a positive output. Students have a delayed pay-off and it does not sit well with the lack of patience experienced and how different it is from the digital era which grants immediate payoffs (Gee, 2003). The Achievement Principle shows how from the very beginning, digital games offer an immediate feedback, clear

consequences and multiple pay-offs in the form of gained levels, victory against the enemy computer or person and the possible recognition by being on the leader-boards (Presnky, 2007). The rewards which are attained from digital games reflect on the amount of effort and skill that a player has put into the gameplay per level or world. The challenges presented, although filled with complications are within the comfort zone and accomplishable task levels, even if they push players to their most limits of resources (Prensky, 2007).

Online Role-Playing Games

Online role playing games are characterized by a storyline that is defined by a set of quests of challenges that allow the players to improve on their skills, explore the set world and achieving goals with purpose (Gee, 2003). The character which is being played will be defined by the actions taken in game and that will in turn develop the ongoing gameplay. Role playing games specifically contribute to the development of executive functioning skills: efficient planning and execution as well as the regulation and constant verification of a goal driven behaviour (Meredith, Hussain, & Griffiths, 2009; Oosterloan, Scheres, & Sergeant, 2005). The players have complete choice over the way they navigate the digital world and the potential behaviours that influence or determine not only their goals, but those of others.

Although individuals with ADHD tend to be reluctant to reading, the way role playing games texts work by further clarifying an image has an appeal. According to Baker (2011), the reading process is supervised by the executive function controls and the graphic orientation of the digital world helps motivate individuals to read the text for the additional insight that it may contribute to the player. Apart from this remedial factor, Presnky (2007), found additional structural factors that are made to lure in the player. The first structural function is given based on the rules of the game. The set rules define what is in and what is

out of the limits. These set rules help to create a predictable world in which the player then must meet expectations (Weiss, 2004). The second structure is similar to that of the rules, it is the main goal or objective behind the game. Goals and objectives are needed to keep the player motivated. According to Prensky (2007), goals which are restricted by a set of rules cause for the players to create and execute strategies in a decisive manner. Individuals with ADHD have an opportunity to create strategies, execute them and learn from their past mistakes during the gameplay depending on the appropriate level needed for a set performance (Presnky, 2007).

The third structural factor to digital games is the ability for players to measure and obtain outcomes and feedback. Players have the ability to measure the progress which is taken place in the direction of their goals. The feedback is always immediate in digital games, allowing for players to know whether their decisions have moved them closer or further from the games objective and is generally given through a graphical or verbal cue (Presnky, 2007). Immediate feedback is a major factor in facilitating learning for individuals with ADHD in the academic system. The continuous adventure of digital games, allows for those with ADHD to continue immersed and engaged even when the rewards were delayed (Barkley, Edwards, Laneri, Fletcher, & Metevia, 2001; Wu & Li, 2008). With a combination of stimulating themes, specific rules and guidelines, immediate feedback, goals, and appealing graphics and audio make role playing games an effective way to engage students with ADHD.

By capturing the imagination and the attention of those who play role playing games, it has promoted higher levels of socialization focused through this imaginary world. In these games, the distribution of information and ideas occurs rapidly which has altered the prior expectations of how learning occurs. In the traditional classrooms, rarely do we see the level of complex thinking and multiple sensory experiences as they occur in online role playing

games. The processing of this information by the player requires for them to multi-task depending on the demand of the game (Appleman, 2005; Durkin, 2010; Huh, 2008; Rice, 2008). Compared to the traditional classroom, video games offer: set goals, interactive play, and provide rewarding feedback to the players (Vogel, Vogel, Cannon-Bowers, Bowers, Muse, & Wright, 2006). According to Lawrence, Houghton, Tannock, Douglas, Durkin, and Whiting (2002), online role playing games are a valid environment in turn motivating individuals with ADHD. According to Amory (2004), online role playing games affect cognitive functioning and motivation on students by stimulating their curiosity. These games provide a non clinical environment which seems to be optimal for cognitive performance. The immediate feedback and reinforcement is one of the biggest motivators alongside the fact that computer games allow for a personal pace in a private setting, allowing repeated trails for the players response (Durkin, 2010; Huh, 2008; Lawrence et al., 2002; Rice, 2008; Xu, Reid, & Stekleberg, 2002;). The skills which are learnt playing online role playing games are similar to those learned through sport participation. Collaboration, persistence, management, lateral thinking, decision making, teamwork, and the actual application of set skills (Prensky, 2007).

Methodology and Design of the Investigation

Design and Justification to the Chosen Methodology

This proposal speculates on the measuring of the effect that online role playing video games will have on the executive functions of students with ADHD. This proposal will be using quantitative procedures with a pre-test and a post-test along with a control group. With a quantitative methodology, we can measure in an exact manner the executive functioning

scores prior to the treatment and after it, showing any alterations to the scores. The overall trial period of the experimental group for this proposal would be of four months. During these four months, the experimental group will be given the online role playing game for 45 minutes during their technology class, a total of three times per week. The online role playing games chosen is Huntsville Mystery Cases which brings a Multilanguage pack for installation. The instruments to be utilized in this proposal to collect the data on executive functioning are three D-KEFS subtests which are specific to executive functioning skills: Trail Making test, Card Sorting test, Tower of London test. With the use of these subtests, the goal of this proposal is to answer the research question in the most clear and concise manner. This experimental research study proposal is designed to investigate the impact of online role playing games on the executive functioning of students with ADHD. Online role playing games require for the players to utilize fundamental cognitive skills which engage in creative and in abstract thinking and the factors which lead us there: attention, language and perception. The executive functioning skills will be measured using subtests from the Delis-Kaplan Executive Functioning System (D-KEFS). With the pre and post application of these subtests, through a four month time period, there will be a specific measurement on the executive functioning of these students. The quantitative method was chosen for this study due to the ability to collect and analyse data acquired from the three subtests (Sampieri, Collado and Lucio, 1996). This method results in a structured and predictable process which is based on the measurement of data that is in turn transformed to numeric values that seek realities and casual relationships amongst them (Sampieri, Collado and Lucio, 1996). This proposal aims to determine the effect that the independent variable being the video games has over the dependent variable which is the effects on cognitive function on the participants.

Instrumentation

The three subscales of the D-KEFS that will be used are the Trail Making test, the Tower test and the Sorting test. These three subscales are utilized to collect the data on the students pre and post executive functioning skills. The Trail Making test consists on connecting a series of dots as quickly and accurate as possible. According to Homack et al. (2005), the primary executive functioning skill that is worked on with this test is that of flexible thinking on a visual motor sequencing task. Other skills that are necessary for the Trail Making test are motor speed, number and letter sequencing and visual scanning.

The Tower test consists on the rearranging of disks on a board with three pegs and guidelines to how the disks must be moved. The primary executive functioning skill in this test is that of planning and problem solving. According to Shunk, Davis & Dean (2006), inhibition of impulsive responses, rule learning and the maintenance of instructional sets are skills required for the Tower test.

The Sorting test requires for the participants to sort 16 cards based on two conditions. The first condition to sorting the cards is that the examinee sorts all the cards into as many different categories as possible. The second condition is that the examinee describes the categories in which the cards have been sorted by the examiner, also called the rule. The main executive functioning skills that are being tested with this subtest is problem solving and flexible thinking. According to Shunk et al. (2006), the secondary skills that are being assessed include verbal and nonverbal ability through a presentation of cues. To obtain the secondary measure that come from the original raw scores come from the D-KEFS Assistant, a digital scoring program. The raw scores are converted into cumulative percentile scaled scores or ranks (Delis et al. 2001).

The D-KEFS were standardized over a stratified national sample of 1,750 individuals selected to reflect sex, age, ethnicity, years of education and region based on the 2000 U.S. Census. According to Homack et al. (2005), the reliability of this test is adequate and the battery was reliable in the determination of an individuals executive functioning skills. The D-KEFS confidence level is at 95% according to Delis et al. (2001). The D-KEFS are entirely empirically based and not theoretically derived. The intercorrelations between the various D-KEFS were consistent yet the positive correlations with achievement tests were low (Homack et al. 2005). Based on validity studies, it has been proven that the D-KEFS has the appropriate sensitivity to distinguish various clinical groups which includes individuals with ADHD.

The game selection criteria is important due to the need for a game that offers dynamic graphics, minimal text and complex problems to be resolved. Text intensive games fail to engage students with ADHD. The game chosen for the study is Huntsville Mystery Cases which includes a Multilanguage pack for installation. In this game the players gather various clues and build images in order to solve a mystery case. The replay of this game offers different clues and solutions and allows for competition based on scores that rank online.

Participants in the Study

The population for this study will be randomly selected from various schools in Quito that offer computer labs/classes. The participants will be 50 adolescent students who have been previously diagnosed either by a psychiatrist or a psychologist and confirmed by the school's psychologist assessment to fit the criteria for ADHD. As a confirmation other sources if available to gather information can be parents/carers, other family members,

teachers and in some cases partners and colleagues. The participants in the study must range in age from 14 to 18 years old and currently in high school. The sample must be equivalent on males and females taking part of the study. Due to the need for computers for the process of this treatment, International Schools which provide the computer equipment will be the educational facilities of choice of this proposal.

Recruitment of the Participants

The recruitment process will involve first of all academic facilities that can facilitate with a computer lab that is accessible to their students. Once this condition has been met, a proper gathering must happen with the school's psychologist to obtain the best qualifying participants for the study. Once the participants have been identified and meet the qualifications for the study, a meeting will be set with them and their legal representative to go over the informed consent (Annex B) which has to be signed by the legal representatives. These participants will be chosen at random and then will be divided into 25 participants who will receive the treatment plan and 25 participants which will continue to live out their daily lives for the next four months the three subtests will be applied as a pre-test prior to the administration of the treatment plan. Once all three subtests are completed, the participants will now be eligible to receive the treatment plan which consists on playing an online role-playing game for a period of 45 minutes a day, three days a week, for four months. Once this time period expires, the three subtests will be applied again to evaluate the effect of the treatment plan on executive functioning. Participants will receive a 30\$ payment for their collaboration.

Ethical Considerations

This study prioritizes respect and privacy for the participants. Prior to the participation on the treatment plan, all individuals who are looking to participate must have signed an informed consent (Annex B) by their primary caregivers. On the informed consent the participants and caregivers can clearly see the objectives of this study as well as the fact that they can back away at any moment if they choose to. It is important for participants to understand that there are no consequences in the case that they choose to back off the study. All participants will be kept anonymous and will be identified with a code which is only known by the researcher. All information which is obtained from the tests will be destroyed once the data has been processed and analyzed.

Expected Results

According to the revised literature, it is expected that the experimental group will have improved scores on their three D-KEFS subtests, supporting the hypothesis that online role playing games will improve executive functioning in students with ADHD. According to Shaley et al. (2007), a video games intervention can promote a better academic performance, in particular an increase in the attention of students. Due to the fact that video games allow for the individual to have various attempts at a single problem, a sequential approach to learning is being generated (Bavelier et al. 2015). Digital Games will specifically develop efficient planning, execution, verification and the regulation of a goal-oriented behavior (Meredith, Hussain, & Giffiths, 2009; Oosterloan, Scheres, & Sergeant, 2005).

It is expected that the Trail Making Test results will improve. This means that participants will gain greater cognitive flexibility, inhibition and greater retain on the working memory. Based on the Sorting Test, both verbal and non-verbal conceptual and reasoning

skills will improve. Finally, with the Tower Test results, participants will show improvement in their deductive reasoning, improved inhibition at learning the rules and maintaining a strategy. The ability to probe their world in the digital games will motivate participants to engage in the learning process, being able to create a hypothesis and probe it through trial and error in the game making them active participants. The immediate feedback which is gained from the video games will allow for participants to have a greater improvement on executive functions.

Discussion

Based on our expected results of this proposal it is possible that the use of online role-playing video games as a treatment plan to increase executive functioning on students with ADHD. According to Trout, Lienemenn, Reid and Epstein (2007), the incidence of ADHD is of one child per classroom, making it necessary for new and engaging strategies to be applied inside the academic system. The use of online role playing games has a positive effect on executive functioning, in particular their inhibition responses, their recognition and utilization of rules, their focus on cognitive tasks and the ability to plan in a visual and special manner.

Working memory, spatial attention, selective attention, distractor processing and attentional capture will improve from the training and comfortability which is acquired as the individuals gain more hours into the game.

As mentioned before, ADHD causes a limitation and difficulty over executive functioning. Although the students have been previously diagnosed with ADHD, it would be beneficial to re-evaluate and discard the possibility of comorbidity on our participants. According to Bravelier et al. (2015), the improvement on cognitive skills will translate to a proper improvement on the academic achievement of these students with ADHD. ADHD interferes in various aspects of an individual's life, not only does it have an affect over academical achievement but it also has a social toll. Although this proposal aims to find out the effect of online role playing games on executive functioning, according to Gee (2003), the high demand for social interaction in these types of game promotes individuals to gain a better understanding over social conducts. Contrary to prior biases over video games and the claims that these games isolate individuals, online role playing video games offer an opportunity to grant a virtual space in which a community can interact, share, discuss and gain understanding of conducts that have a better adaptation for the highly social experience which the academic process demands such as study groups, group assignments, lectures or simply the general emotional and social support.

The use of a pre-test and a post-test will illustrate for us the quantifiable improvement which is gained from the treatment plan over the control group. Alongside with the school's approach to ADHD, the digital media treatment plan can be easily applied inside the academic facility and can be extended home if the effects cause major improvements in executive functioning. Although the digital media treatment plan can easily be applied, the proper installation and equipment is needed. In the absence of a computer lab or accessibility to computers by the students, then the treatment plan cannot be implemented, forcing this proposal to aim at international schools that guarantee a computer lab/classroom in which the treatment plan can take place. Although there has been a well-documented relationship between ADHD and academic underachievement, there has been minimal research on the

possible effective interventions to promote and improve academic achievement (Trout et al. 2007). Most studies have focused on the psychostimulant medication effects and on the behavioral interventions yet only 42 studies have been documented to involve academic achievement onto the equation (Ryan, 2003).

Due to the educational setting to this study, the game selection had to fit a criterion which is safe for the designated space. The game cannot include violence and should not be a far-fetched fantasy world. The game chosen has to be available for no cost and the schools must agree with the use of the specific game. It should be acknowledged that the large majority of video games in the market are catering towards war-like scenarios, yet it does not all games are isolating, detrimental to attention or a cause for violence. Although there are other games which might address a higher level executive functioning, Huntsville Mystery Cases fits the standard criteria for the game we are looking for. According to National Collaborating Centre for Mental Health, it is recommended that the treatment plan follows up for 3 to 6 months, leading us to propose the four months treatment plan.

Limitations of the Study

The main limitation of this proposal is the fact that the sample size will small. This same small sample comes from the city of Quito, which limits the range on socioeconomic level of the participants which may affect the possible results of the study. A requirement for this study is that the academic facilities provide the computer lab where the participants can engage on the treatment plan. This requirement means that the schools that are best fit for this study will be private schools. The sample to be taken out of private schools, generally holds a higher socioeconomic status, making this study generalizable to others within status. As

stated in the discussion, the time for the study is a limitation. For the development of the neural network, it takes a significant amount of time. Since this study applied the treatment plan over four months, is it likely that the effects on executive functioning are minimal or just starting to take place. A limitation based on prior experience that might come to place with certain participants is the past use of video games. Depending on which games and how they were played, the interpretation and drive that is gained by the treatment plan might not meet the participants bias or expectations of what an online role playing game is. This limitation could cause for participants to not be engaged or motivated by the game.

Recommendations for further studies

Studies like this one can help to promote a change in the way that the academical system views ADHD and how they are managing it. The use of technology should be implemented in the classroom, in particular if findings show promise from it. These online role playing games provide the users with opportunities to use decision making skills and problem solving skills, which should be the main focus when teaching students with ADHD. The fact that video games can hold the attention of an individual with ADHD for hours on end, it appears that video games are a functional way to promote executive functioning. Due to the limiting factors in which school can fit this study, in the future it would be optimal to find an approach that does not require dedicated computer labs to get the treatment plan in effect. Being able to generalize the study to a larger demographic of individuals with ADHD can allow us to have a better understanding of specific differences on the participants and how the treatment plan effects each. With a wider demographic of individuals with ADHD from various socioeconomic status this proposal could obtain greater information to expand to smaller neighboring cities. A consideration for future research is the need for the teachers and educators to adapt to their individual student's approach to learning. Although this

proposal wishes to find out if online role playing games have an affect on executive functioning, it is needed for the ways the these students with ADHD are being taught by. The next step, after finding out whether or not there is positive effect, is to apply a teaching system that can optimize what is being improved by the treatment plan. A final recommendation would be the application of a longitudinal study in which we can measure the effect of online role playing games over a long time in comparison to a control group which follows the traditional treatment plan implemented for students with ADHD.

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ANEXO A: CARTA PARA RECLUTAMIENTO DE PARTICIPANTES
(RECRUITMENT LETTER)

Quito, a xxx, de xxx, del 20xx

Senor/ra xxx:

Agradecemos de antemano su interés por nuestro estudio y deseamos invitarle a formar parte de una investigación científica que busca analizar la efectividad del uso de los video juegos de rol play en las funciones ejecutivas del trastorno TDAH. Esta investigación ha sido diseñada bajo la supervisión de profesionales de la Universidad San Francisco de Quito.

La investigación tendrá una duración de cuatro meses en los cuales se los espera en el aula xxx del colegio xxx los lunes, miércoles y viernes durante 45 minutos de sus clases de computación. Durante este tiempo, podrán utilizar el video juego de rol play disponible el cual podrá ser jugado con o sin otros. Los investigadores nos comprometemos a realizar un pago de 30\$ por su tiempo de colaboración. Se espera su cordial aceptación.

Atentamente,

Diego Miguel Benalcazar

Universidad San Francisco de Quito

Quito, a xxx, de xxx, del 20xx

Mr./Ms. xxx

We would like to thank you for your interest in our study and wish to invite you to be a part of this scientific investigation which aims to measure the effectiveness of role play video games on the executive functioning of ADHD. This investigation has been designed under supervision of a professional staff of Universidad San Francisco de Quito.

This investigation will have a duration of four months in which we will wait for you in classroom number xx on Mondays, Wednesdays and Fridays for 45 minutes during your computer class. During this time, you are invited to utilize the role play video game available to you which can be played alone or with the rest of the group. The researchers will commit to paying 30\$ for your time and collaboration. We await your cordial acceptance.

Best regards,

Diego Miguel Benalcazar

Universidad San Francisco de Quito

ANEXO B: FORMULARIO DE CONSENTIMIENTO INFORMADO Y SOLICITUD PARA APROBACION DEL ESTUDIO



Comité de Ética de Investigación en Seres Humanos

Universidad San Francisco de Quito

El Comité de Revisión Institucional de la USFQ
The Institutional Review Board of the USFQ

Formulario Consentimiento Informado

Título de la investigación:

Organización del investigador *Universidad San Francisco de Quito*

Nombre del investigador principal *Diego Miguel Benalcazar Romoleroux*

Datos de localización del investigador principal *377257, dbenalcazar88@gmail.com*

Co-investigadores *(nombres completos)*

DESCRIPCIÓN DEL ESTUDIO

Introducción *(Se incluye un ejemplo de texto. Debe tomarse en cuenta que el lenguaje que se utilice en este documento no puede ser subjetivo; debe ser lo más claro, conciso y sencillo posible; deben evitarse términos técnicos y en lo posible se los debe reemplazar con una explicación)*

Este formulario incluye un resumen del propósito de este estudio. Usted puede hacer todas las preguntas que quiera para entender claramente su participación y despejar sus dudas. Para participar puede tomarse el tiempo que necesite para consultar con su familia y/o amigos si desea participar o no.

Usted ha sido invitado a participar en una investigación sobre el tratamiento de TDAH porque ha sido referido como candidato por parte de sus profesores.

Propósito del estudio *(incluir una breve descripción del estudio, incluyendo el número de participantes, evitando términos técnicos e incluyendo solo información que el participante necesita conocer para decidirse a participar o no en el estudio)*

Medir la influencia del uso de los video juegos de rolplay sobre el funcionamiento ejecutivo.

Descripción de los procedimientos *(breve descripción de los pasos a seguir en cada etapa y el tiempo que tomará cada intervención en que participará el sujeto)*

Al ser un candidato, el primer paso es tomar las tres sub-pruebas: Tower Test, Trail Making Test y el Sorting Test.

Luego realizar las tres sub-pruebas el candidato comienza el tratamiento que consiste con el uso de video juegos de rolplay tres veces a la semana, durante 45 minutos por cuatro meses.

Al terminar el tiempo de tratamiento de aplicaran de nuevo las tres sub pruebas.

Riesgos y beneficios *(explicar los riesgos para los participantes en detalle, aunque sean mínimos, incluyendo riesgos físicos, emocionales y/o psicológicos a corto y/o largo plazo, detallando cómo el investigador minimizará estos riesgos; incluir además los beneficios tanto para los participantes como para la sociedad, siendo explícito en cuanto a cómo y cuándo recibirán estos beneficios)*

Los riesgos de este estudio son totalmente nulos ya que el uso de video juegos de rolplay no son una actividad peligrosa. El uso de video juegos es una herramienta efectiva en mantener el interés y la motivación de los individuos.

Confidencialidad de los datos *(se incluyen algunos ejemplos de texto)*

Para nosotros es muy importante mantener su privacidad, por lo cual aplicaremos las medidas necesarias para que nadie conozca su identidad ni tenga acceso a sus datos personales:

- 1) La información que nos proporcione se identificará con un código que reemplazará su nombre y se guardará en un lugar seguro donde solo el investigador tendrán acceso.
- 2A) Si se toman muestras de su persona estas muestras serán utilizadas solo para esta investigación y destruidas tan pronto termine el estudio *(si aplica) ó*

Consentimiento informado *(Es responsabilidad del investigador verificar que los participantes tengan un nivel de comprensión lectora adecuado para entender este documento. En caso de que no lo tuvieran el documento debe ser leído y explicado frente a un testigo, que corroborará con su firma que lo que se dice de manera oral es lo mismo que dice el documento escrito)*

2B) Si usted está de acuerdo, las muestras que se tomen de su persona serán utilizadas para esta investigación y luego se las guardarán para futuras investigaciones removiendo cualquier información que pueda identificarlo *(si aplica)*

3) Su nombre no será mencionado en los reportes o publicaciones.

4) El Comité de Bioética de la USFQ podrá tener acceso a sus datos en caso de que surgieran problemas en cuando a la seguridad y confidencialidad de la información o de la ética en el estudio.

Derechos y opciones del participante *(se incluye un ejemplo de texto)*

Usted puede decidir no participar y si decide no participar solo debe decírselo al investigador principal o a la persona que le explica este documento. Además aunque decida participar puede retirarse del estudio cuando lo desee, sin que ello afecte los beneficios de los que goza en este momento.

Usted no recibirá ningún pago ni tendrá que pagar absolutamente nada por participar en este estudio.

Información de contacto

Si usted tiene alguna pregunta sobre el estudio por favor llame al siguiente teléfono 0994160850 que pertenece a Diego Miguel Benalcazar, o envíe un correo electrónico a dbenalcazar88@gmail.com

Si usted tiene preguntas sobre este formulario puede contactar al Dr. William F. Waters, Presidente del Comité de Bioética de la USFQ, al siguiente correo electrónico: comitebioetica@usfq.edu.ec

Comprendo mi participación en este estudio. Me han explicado los riesgos y beneficios de participar en un lenguaje claro y sencillo. Todas mis preguntas fueron contestadas. Me permitieron contar con tiempo suficiente para tomar la decisión de participar y me entregaron una copia de este formulario de consentimiento informado. Acepto voluntariamente participar en esta investigación.

Firma del participante	Fecha
Firma del testigo <i>(si aplica)</i>	Fecha
Nombre del investigador que obtiene el consentimiento informado	
Firma del investigador	Fecha



Universidad San Francisco de Quito
El Comité de Revisión Institucional de la USFQ
The Institutional Review Board of the USFQ

SOLICITUD PARA APROBACION DE UN ESTUDIO DE INVESTIGACION

INSTRUCCIONES:

1. Antes de remitir este formulario al CBE, se debe solicitar vía electrónica un código para incluirlo, a comitebioetica@usfq.edu.ec
2. Enviar solo archivos digitales. Esta solicitud será firmada en su versión final, sea de manera presencial o enviando un documento escaneado.
3. Este documento debe completarse con la información del protocolo del estudio que debe servir al investigador como respaldo.
4. Favor leer cada uno de los parámetros verificando que se ha completado toda la información que se solicita antes de enviarla.

DATOS DE IDENTIFICACIÓN
Título de la Investigación
The Effect of Online Role-Playing Games on the Executive Functioning skills of Students with ADHD
Investigador Principal <i>Nombre completo, afiliación institucional y dirección electrónica</i>
Diego Miguel Benalcazar Romoleroux Universidad San Francisco de Quito, dbenalcazar88@gmail.com
Co-investigadores <i>Nombres completos, afiliación institucional y dirección electrónica. Especificar si no lo hubiera</i>
No-aplica
Persona de contacto <i>Nombre y datos de contacto incluyendo teléfonos fijo, celular y dirección electrónica</i>
Diego Miguel Benalcazar Romoleroux 0994160850, dbenalcazar88@gmail.com
Nombre de director de tesis y correo electrónico <i>Solo si es que aplica</i>
Fecha de inicio de la investigación <i>Septiembre 2017</i>
Fecha de término de la investigación <i>Diciembre 2017</i>
Financiamiento <i>No-aplica</i>

DESCRIPCIÓN DEL ESTUDIO
Objetivo General <i>Se debe responder tres preguntas: qué? cómo? y para qué?</i>

Determinar la influencia de los video juegos de rol play sobre las funciones ejecutivas de estudiantes con TDAH. Se aplicará un tratamiento basado en el uso de video juegos para estudiantes diagnosticados con TDAH. Se medirá previamente y post el tratamiento el funcionamiento ejecutivo de los estudiantes con el fin de determinar cual es el efecto del tratamiento. El estudio desea determinar a los video juegos de rol play como una herramienta que brinda efectos positivos en el tratamiento de estudiantes con TDAH.

Objetivos Específicos

- Evaluar a los participantes con las sub pruebas D-KEFS (Trail making, Tower, Sorting)
- Intervenir por una duración de cuatro meses con un tratamiento de video juegos de rol play
- Evaluar por segunda vez utilizando las mismas sub pruebas D-KEFS
- Analizar el efecto del uso de los video juegos de rol play sobre el funcionamiento ejecutivo.

Diseño y Metodología del estudio *Explicar el tipo de estudio (por ejemplo cualitativo, cuantitativo, con enfoque experimental, cuasi-experimental, pre-experimental; estudio descriptivo, transversal, de caso, in-vitro...) Explicar además el universo, la muestra, cómo se la calculó y un breve resumen de cómo se realizará el análisis de los datos, incluyendo las variables primarias y secundarias..*

Este estudio es de tipo cuantitativo y tiene un diseño de pre prueba- post prueba. Este estudio requiere la participación de 50 estudiantes de colegio diagnosticados con TDAH. Se busca escuelas con la disponibilidad de laboratorios de computación además del deseo y apertura a que sus estudiantes participen en el estudio si desean. De forma aleatoria se dividirá a los estudiantes en dos grupos, 25 participantes experimentales y 25 de control. A todos los participantes se les aplicara tres sub pruebas D-KEFS previo a la intervención. Durante cuatro meses, el grupo experimental seguirá un tratamiento de uso de video juegos de rol play, tres días a la semana, durante 45 minutos cada día. El grupo de control seguirá los procedimientos estándares del colegio. Al finalizar los cuatro meses se aplicarán las tres sub pruebas D-KEFS a todos los participantes y se medirá utilizando el programa D-KEFS Scoring Assistant y analizara los resultados encontrados.

Procedimientos *Los pasos a seguir desde el primer contacto con los sujetos participantes, su reclutamiento o contacto con la muestra/datos.*

1. Contactar a escuelas en la ciudad de Quito que correspondan con un laboratorio de computación y el interés por el estudio.
2. Esperar el contacto de los interesados y realizar un banco de datos de los participantes.
3. Enviar una carta de invitación a los individuos interesados en el estudio.
4. Evaluar inicialmente a todos los participantes con las tres sub pruebas D-KEFS, Trail Making, Sorting y Tower Test.
5. Intervenir en el grupo experimental (25) con el uso de video juegos de rol play durante un total de cuatro meses en los cuales jugaran tres veces por semana, un tiempo de 45 minutos por día.
6. Después de los cuatro meses evaluar nuevamente a todos los participantes con las tres sub pruebas D-KEFS
7. Analizar los resultados individuales de los participantes y comparándolos con el grupo de control.

Recolección y almacenamiento de los datos *Para garantizar la confidencialidad y privacidad, de quién y donde se recolectarán datos; almacenamiento de datos—donde y por cuánto tiempo; quienes tendrán acceso a los datos, qué se hará con los datos cuando termine la investigación*

En este estudio, la prioridad es respetar todos los requerimientos éticos para el trabajo con seres humanos. Previamente al estudio, los interesados deben leer y firmar un consentimiento informado (ANEXO B) donde se les brindara la información necesaria sobre los objetivos del estudio, el tiempo del estudio y la habilidad de poder retirarse de forma voluntaria en cualquier momento deseado del estudio. La identidad de los

participantes será anónima y se les asignará un código durante la participación del estudio. Luego de recolectar la información se realizará un levantamiento y procesamiento de los datos y la información previa recolectada será destruida.

Herramientas y equipos *Incluyendo cuestionarios y bases de datos, descripción de equipos*

Delis- Kaplan Executive Function System (D-KEFS)

-Trail Making Test

-Tower Test

-Sorting Test

D-KEFS Scoring Assistant (Herramienta digital)

JUSTIFICACIÓN CIENTÍFICA DEL ESTUDIO

Se debe demostrar con suficiente evidencia por qué es importante este estudio y qué tipo de aporte ofrecerá a la comunidad científica.

El déficit de atención e hiperactividad es uno de los desórdenes más comunes en la edad temprana y puede continuar a través de la adolescencia hasta la adultez. De acuerdo a Ramos, Bolaños y Ramos (2015) un total de 7.3% de los adolescentes en Ecuador entre 14 y 18 años encajan en el diagnóstico de TDAH. Se ha realizado mínimas investigaciones sobre intervenciones académicas mientras que la mayoría de estudios han sido clínicos. Esta propuesta se enfoca en promover nuevas formas de intervención dentro del sistema académico para de tal manera optimizar el proceso de aprendizaje y el funcionamiento ejecutivo de los estudiantes con TDAH. Los video juegos tienen el potencial de crear un involucramiento emocional además de brindar placer que son dos factores inmensamente grandes en el proceso de aprendizaje (Gee, 2007). Durante el uso de video juegos, estudiantes con TDAH pueden realizar hazañas complejas que requieren alto nivel de concentración y habilidad.

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DESCRIPCIÓN DE LOS ASPECTOS ÉTICOS DEL ESTUDIO

Criterios para la selección de los participantes *Tomando en cuenta los principios de beneficencia, equidad, justicia y respeto*

Adolescentes que cumplen con el criterio de diagnóstico de TDAH

Riesgos *Describir los riesgos para los participantes en el estudio, incluyendo riesgos físico, emocionales y psicológicos aunque sean mínimos y cómo se los minimizará*

Este estudio no representa ningún riesgo físico, emocional o psicológico.

Beneficios para los participantes *Incluyendo resultados de exámenes y otros; solo de este estudio y cómo los recibirán*

Los participantes obtendrán el beneficio de el potencial aumento de su capacidad de regular su atención e impulsividad con los video juegos y la comprensión de juegos que benefician nuestro aprendizaje.

Ventajas potenciales a la sociedad *Incluir solo ventajas que puedan medirse o a lo que se pueda tener acceso*

En este caso los video juegos tienen un efecto positivo en el funcionamiento ejecutivo de los estudiantes con TDAH en aumentar su capacidad de regular su atención e impulsividad, lo cual beneficia a las familias y/o colegas de individuos con TDAH. Se puede acabar con el mito de que el uso de video juegos como algo dañino y agresivo, con la posibilidad del uso en el sistema académico para beneficiar el bienestar de sus estudiantes.

Derechos y opciones de los participantes del estudio *Incluyendo la opción de no participar o retirarse del estudio a pesar de haber aceptado participar en un inicio.*

Los participantes tienen el derecho a retirarse o negarse a la participación en el estudio durante cualquier momento sin consecuencias.

Seguridad y Confidencialidad de los datos *Describir de manera detallada y explícita como va a proteger los derechos de participantes*

Este estudio respeta los parámetros de la ética en el trabajo con individuos. En el ANEXO B se encuentra el consentimiento informado donde se encuentra toda la información sobre la participación en el estudio y sobre la posibilidad de retirarse o negarse a participar en cualquier momento sin consecuencia alguna. La identidad de

los participantes se mantendrá anónima y toda información obtenida será destruida después del procesamiento de datos.

Consentimiento informado *Quién, cómo y dónde se explicará el formulario/estudio. Ajustar el formulario o en su defecto el formulario de no aplicación o modificación del formulario*

Todos los participantes deben firmar un consentimiento informado antes de poder ser parte del estudio.

Responsabilidades del investigador y co-investigadores dentro de este estudio.

El investigador tiene la responsabilidad de respetar a todos los participantes y las consideraciones éticas que van con ello.

Documentos que se adjuntan a esta solicitud *(ponga una X junto a los documentos que se adjuntan)*

Nombre del documento	Adjunto	Idioma	
		Inglés	Español
PARA TODO ESTUDIO			
1. Formulario de Consentimiento Informado (FCI) y/o Solicitud de no aplicación o modificación del FCI *	X		X
2. Formulario de Asentimiento (FAI) <i>(si aplica y se va a incluir menores de 17 años)</i>	X		
3. Herramientas a utilizar <i>(Título de:: entrevistas, cuestionarios, guías de preg., hojas de recolección de datos, etc)</i>	X	X	
4. Hoja de vida (CV) del investigador principal (IP)			
SOLO PARA ESTUDIOS DE ENSAYO CLÍNICO			
5. Manual del investigador			
6. Brochures			
7. Seguros			
8. Información sobre el patrocinador			
9. Acuerdos de confidencialidad			
10. Otra información relevante al estudio (especificar)			

(*) La solicitud de no aplicación o modificación del FCI por escrito debe estar bien justificada.

PROVISIONES ESPECIALES

Esta sección debe llenar solo si aplica. En ella se incluyen manejo de población vulnerable y muestras biológicas, manejo de eventos adversos, seguros de incapacidad o muerte, entre otros.

Click here to enter text.

CRONOGRAMA	AÑO							
Descripción de la Actividad (pasos a seguir dentro del proceso de investigación, comenzando por el contacto inicial, reclutamiento de participantes, intervención y/o recolección de datos, análisis, publicación...)	Fechas							
		1	2	3	4	5	6	7
Contactar a escuelas en la ciudad de Quito que correspondan con un laboratorio de computación y el interés por el estudio.								
Esperar el contacto de los interesados y realizar un banco de datos de los participantes								
Enviar una carta de invitación a los individuos interesados en el estudio.								
Evaluar inicialmente a todos los participantes con las tres sub pruebas D-KEFS, Trail Making, Sorting y Tower Test.								
Intervenir en el grupo experimental (25) con el uso de video juegos de rol play durante un total de cuatro meses en los cuales jugaran tres veces por semana, un tiempo de 45 minutos por día.								
Después de los cuatro meses evaluar nuevamente a todos los participantes con las tres sub pruebas D-KEFS								
Analizar los resultados individuales de los participantes y comparándolos con el grupo de control.								

CERTIFICACIÓN:

1. Certifico no haber recolectado ningún dato ni haber realizado ninguna intervención con sujetos humanos, muestras o datos. Sí () No ()
2. Certifico que los documentos adjuntos a esta solicitud han sido revisados y aprobados por mi director de tesis. Sí () No () No Aplica ()

Firma del investigador: _____ (con tinta azul)

1. **Fecha de envío al Comité de Bioética de la USFQ:** _____

ANEXO C: Guidelines/ Conditions to the application of D-KEFS

Trail Making Test:

- Condition 1: mark only the 3's (150 seconds)
- Condition 2: connect the numbers together (150 seconds)
- Condition 3: connect the letters in alphabetical order (150 seconds)
- Condition 4: connect numbers and letters numerically and alphabetically (240 seconds)
- Condition 5: follow the dotted line and draw a line as neatly as possible (150 seconds)

Sorting Test:

- Condition 1: Given 6 cards (mixed), asked to sort cards into 2 groups (discontinued at about 4 minutes)
- Condition 2: Same 6 cards are sorted by examiner and examinee must identify the categorization rule used (discontinue each of the 8 sorts at 45 seconds)

Tower Test

- Condition 1: Create the picture in the fewest number of moves
- Condition 2: You cannot place a larger disk on top of a smaller one.
- Condition 3: You can only move 1 disk at a time.