ATENDERAH: A SERIOUS VIDEOGAME TO ENTERTAIN AND TEACH SKILLS IN ADULTS WITH ADHD

ATENDERAH: UN JUEGO VIDEO SERIO PARA ENTRETENER Y ENSEÑAR HABILIDADES EN ADULTOS CON ADHD

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ABSTRACT

This paper describes a video game named aTenDerAH, which was created, designed and implemented for attending the needs of adults with Attention Deficit Hyperactivity Disorder (ADHD). The purpose of aTenDerAH is entertains while different cognitive and organizational areas are being taught. aTenDerAH is integrated into an e-learning platform as a recommended tool for students with ADHD which were previously diagnosed with a user modelling process. The videogame was developed using: Unity for the creation of the 3D game and also for the interactive content, Cinema 4D for the creation of the models and animations in 3D, and Photoshop for the creation of textures for the 3D models.

Keywords: Videogame, e-learning, Attention Deficit Hyperactivity Disorder, ADHD, Cognitive trainer, Organizational trainer.

RESUMEN

En este trabajo se describe un juego de video llamado aTenDerAH, el cual fue creado, diseñado e implementado para atender las necesidades de los adultos con trastorno de dficit de atención con hiperactividad (ADHD). El propósito de aTenDerAH es entretener mientras se entrenan diferentes áreas cognitivas y de organización. aTenDerAH está integrado en una plataforma de e-learning como una herramienta recomendada para los estudiantes con TDAH que fueron diagnosticados previamente por un proceso de modelado de usuario. El videojuego fue desarrollado usando: Unity para la creación del juego en 3D y también para el contenido interactivo, Cinema 4D para la creación de los modelos y animaciones en 3D y Photoshop para la creación de texturas para los modelos 3D.

Palabras Clave: Videojuego, e-learning, Trastorno de déficit de atención con Hiperactividad

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1. INTRODUCTION

The continuous development of new technologies including computer vision, videogames, machine learning and new educational paradigms and policies has opened new perspectives for more advanced learning scenarios. It has permitted to address the needs and preferences of all students both in the traditional classroom as in virtual [1, 2]. However, there is still a lot of work to do in this context considering the educational system diversity worldwide.

This work is focused on adults with Attention Deficit Hyperactivity Disorder (ADHD), specifically adults (18-60 years-olds) who are involved in a long life learning process supported by technology, especially in a university context.

Attention Deficit Hyperactivity Disorder (ADHD) is a lifespan, neurobiologically and neuropsychologically disorder characterized by inattention, hyperactivity and impulsivity [3]. In neuropsychological studies performed on people with ADHD, impairments were found in some of their cognitive functions, specifically failures in executive functions (EF) [4]. 'Executive function' has been conceptualized as a term that comprises interrelated higher-order cognitive processes responsible for goal-directed and contextually appropriate behavior [5]. On the other hand, a variety of studies have stated that affective, emotional and organizational deficiencies are also important for the adequate diagnosis and treatment of ADHD [6]. However, cognitive and/ or motivational deficits are not exclusive of ADHD and, nowadays, evaluating ADHD in adults is a complex process.

The reasons for focusing our work on adults with ADHD are: a) during the last few years, the number of people diagnosed with ADHD has been growing [7], b) the research conducted on ADHD, mostly focused on children and adolescents, overlooks the adult population [8], c) several studies have demonstrated that individuals with this disorder might have difficulties and letdowns, such as school and job failures and serious problems with organization [9], and d) several studies have reported that most students with deficits such as those included in ADHD, who take online courses, drop them in few days because they find the courses hard to follow [10]. In addition, people with ADHD have some particular characteristics: they cannot stay for a long time doing the same activity, usually have great difficulty concentrating in class, however they can easily play video games for long periods of time.

There are many references that evidence videogames have great positive potential in addition to their entertainment value and there has been considerable success when games are designed to address a specific student need or to teach a certain skill [11]. In the same way, proposals to use games in the classroom have been well received by students and teachers, and many successful cases have been documented [12].

Based on the above, our work is focused on providing e-learning students with ADHD an alternative to complete their education, taking into account their special learning needs. This means that we must find a way for students to stay motivated to complete their learning processes and not consider the alternative to leave behind their learning processes is finished. Furthermore, it is meaningful to help ADHD students to acquire and to train cognitive areas and organizational skills that are scarce or deficient due to the disorder they suffer. As a result we have conceived, designed and implemented aTenDerAH, a videogame that can be incorporated as a tool into any virtual learning platform.

This paper is structured in as follows: section II introduce some related works; section III describes aTenDerAH; section IV explains how can be aTenDerAH used as a tools to support the e-learning process of people with ADHD; and section V presents some concluding remarks and proposals for future work.

2. RELATED WORKS

In the context of "videogame-ADHD", several tools have been developed to both the diagnosis and treatment of the disorder. In Table 1, some of these tools are presented, so a better comparison can be made.

Table 1. Videogames for ADHD

T	A	E.I	C.E o V	P	O.L	F
MeMotiva	Children and adults	No	C.E	Treatment	No	No
Play Attention	Children and adults	No	C.E	Treatment	No	No
Nanny's circle	Children	No	T.O	Treatment	Yes	No
The virtual classroom	Children	No	C.E	Diagnosis	No	
The virtual Office	Adults	No	C.E	Diagnosis	No	
Supermarket Game	Adults	No	V	Diagnosis cognitive problems	No	No
SPARX	Adults	No	V	Depresion treatment	Si	--
Tradislexia	Childern	No	V	Dyslexia treatment	No	--

T.: Tool, A: Age, E.I.: E-learning integration, C.E o V.: E-learning or Videogame, P.: Purpose, O.L.: On line, F.: Free, L.: Licensed, T.O.: Tools for organization

As shown in Table 1, most of the developed tools for ADHD are computer exercises and not games as such.

3. THE ATENDERAH VIDEOGAME

aTenDerAH is a videogame composed of three levels called as follow: 1) At home, 2) Practice makes perfect and 3) The job promotion. It is a 3D videogame which was developed using different languages according to the requirements in a client/server architecture: Unity for the creation of the 3D game and also for the interactive content, Cinema 4D for the creation of the models and animations in 3D, and Photoshop for the creation of textures for the 3D models.

The story consists of a student (player) who has been accepted to do an internship in a recognized company. At each level the student plays a different role and he must accomplish the rules and tasks fixed by the boss in order to win the game. Good behaviour are regarded with points since a variety of studies have found that frequent short-term recognition is important to motivate people with ADHD. Besides, verbalizations guided (hints) will be presented during the game to help player to manage time, earn points, and make decisions. Before the game begins, a registration form must be completed by the player. The information collected through registration will be used to analyse the game influence according to age, gender and academic performance. The aTenDerAH registration form is presented in Fig. 1

Figure 1. aTenDerAH registration form

Each level presents different challenges as in a real life, trains different cognitive areas and develops organizational skills. Each of the videogame levels are described below.

A. Level 1: at home. The mission at this level is gets to work on the time established by the boss. The setting of this level is the student's home. Before getting to work, players must perform some tasks that usually are part of the daily life of a person, these are: wake up on time, have a shower, get dress, have breakfast and drive to work. The player must remember to take the keys of the house and the car before leaving home to be able to drive the car and come inside the house on his return. Players must comply with the Traffic lights to avoid being penalized. If players fail to perform any of the tasks, it will affect the performance of their game play. In the same way, if players do not pay attention to the organization will not ear points. The cognitive areas that the video game seeks to train in this level are: decision-making capability, since players must decide which clothes are appropriate to bring for work; attention, because players should be attentive to the hints they are

given during the game; speed, considering that players must be able to carry out their duties in a predetermined period of time; rule abiding, since players must follow the rules of the game in order to accomplish their goal. In addition, organization skills will be learned, taking into account that players must manage time in order to accomplish the mission. So, if players are organized, carrying out the duties would be easier and players who are organized are rewarded.

B. Level 2: Practice makes perfect. This level is staged in the workplace Player. The mission for this level is to organize a meeting for the boss. To do this the player must do the following: 1) contact persons are summoned to attend the meeting to confirm attendance; 2) make a list of people who have confirmed their attendance; 3) ask the secretary for an available meeting room; and 4) send the agenda to all participants, specifying, among other details, the meeting place, the date, the start time and end time of the meeting. As in the previous level, the player must be alert to hints, manage time, be organized for a better performance. In level 2 planning capability is training, due to the fact that players must plan a strategy to follow in order to fulfill their duties.

C. Level3: The job promotion. At this point in the story the student ceased to be a university internship and has been working as an employee for a year. The boss promised a promotion given the employee performance. To achieve this, the player must demonstrate: 1) that can help solve faster or better forms a work situation, and 2) maintains a good relationship with your boss and colleagues, because the indicator of social relations has great influence even more than knowledge or years of experience. The mission assigned by the boss in this level is assigned two businesses charged two employees of the company taking into account the profile of each. The plot of this level is that the player does not know any of the two employees, therefore must be attentive to the movements and actions made by

candidates and find a way to talk to them because each position requires specifics features and one of them requires a person with excellent social and communication skills. At this level, in addition to the different areas trained at previous levels, it train some good social and communicative relations since the player must also fulfill its task, demonstrate that it can maintain good social relationships with their peers and superiors.

4. ATENDERAH INTEGRATED INTO A E-LEARNING TOOL

The overall goal of the work in which aTenDerAH is included is to create quality e-learning processes for people with attention problems, specifically adults with ADHD. To do that, it is first necessary to determine whether an individual student might have the disorder. In this context, we propose a user modeling approach to infer a profile for each student which indicates if the student has ADHD symptoms. The characteristics considered to build the user model are: behavior management, cognitive performance and recognition and regulation of emotional states. To obtain information from the students about each of these characteristics we have implemented: 1) a computer-based test, 2) some computer-based cognitive tasks and 3) a computer-based "recognition and concentration" exercise. The first one is used to characterize and quantify user behaviors that may be relevant to ADHD symptoms; the short version of the Adult ADHD Self-Report Scale (ASRS v1.1) is used [13]. The second one is used to evaluate the students' cognitive performance. And the last one is used to identify the students' ability to recognize facial emotional expression.

According to each profile, aTenDerAH is showed or not in the Learning Management Systems as a student tool and instructors should recommended it to their students in order to encourage them to try aTenDerAH.

5. CONCLUSIONS AND FUTURE WORK

The construction of virtual learning environments truly inclusive should be a reality, for this reason it is necessary to continue researching and developing tools to contribute to an inclusion that knows specific preferences, learning styles but also different conditions and limitations. In this paper, we presented a videogame which can be used to help people with ADHD in many aspects. Besides, we designed the way to integrate it into an e-learning platform as a student tool in order to offer an opportunity to these people obtain a better learning performance or have a better use experience. In this way, we are contributing to inclusive virtual learning.

Currently, operating results obtained have been satisfactory. Our task now is to test the application in a real scenario of virtual education and ensure that these tools influence positively the learning processes of e-learning students with ADHD.

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