Visual Perception Diagnostic Tools For Autistic Learners

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ABSTRACT –The objective of this paper was to develop autism diagnostic tool using serious games technique as a tool for special education teachers to diagnose visual perception problems among autistic students. A diagnostic tool known as Vi-Per Games was developed based on ADDIE model. Vi-per Games was able to diagnose autistic students without the needs for teachers to have some experience and knowledge of diagnosing visual perception. This prototype will be a high-tech solution to diagnose visual perception problems designed for autistic children.

1. INTRODUCTION

According to Howlin P., Goode S., Hutton J., and Rutter M. (2004), the number of diagnosed autistic children is increasing. Autism cannot be detected from birth (Wan and Hisham, 2013) and only when the child is around 18 months of age a brain disorder could be detected (Kanner, 1967). Autism refers to a condition that causes children to concentrate in their own world. Autism interferes with mental development of children incorporating speech, communication, social interaction, thinking, behavior and emotion. Autism Spectrum Disorder (ASD) is a distributive developmental disorder within individuals in numerous degrees of impairments (Sicile, 2004, Adkoli 2018). For example, although these autistic people look well, their gross motor control is lacking. By and large, they love to interact with technology and video games and become attached to a particular interest like dinosaurs, trains or outer space (Hung, I. C., Kinshuk, & Chen, N. S. (2018)). Children with ASD symptoms have more learning problems and other developmental delays (Sharifah Nadiyah et.all 2014). The visual perception problem is very common in autistic children and they often have difficulties in recognizing, remembering, organizing and interpreting visual images. As a result, they are easily confused in situations that involve using written or pictorial symbols for learning (Kurtz, 2006, and Stough, T., Ceulemans, K., Lambrechts, W., & Cappuyns, V. 2018). Currently, there are not many research on serious game used as a tool to diagnose and assess visual perception problem for autistic children. Visual perception serious games will be a technological solution to diagnose autistic children's problems. The list of serious games for autism was proposed and adapted by Helmi AMN, Faaizah S, and Naim CP (2012a), Helmi AMN, Faaizah S, and Naim CP (2012b), and Helmi AMN, Faaizah S, Naim CP, Nur FY, Mariana Y, Khoo LMS, and Kamaruzaman J. (2013).

This paper described the development of prototype Vi-Per Games. This paper is divided into four parts. The first section deals with introduction. Section II describes the development process. Section III describes the prototype interface and the last section IV concludes the paper and suggests future work for research.

2. DEVELOPMENT PROCESS

Vi-Per Games is a name for Visual Perception Games. In terms of content, the prototype Vi-Per Games was developed based on the famous and well known multimedia development model namely ADDIE. ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation. It consists of five-phase systematic model used to guide through the process of creating multimedia products for a variety of settings. Each phase of the ADDIE model is an important element of the design process. In each phase, decisions, iteration and testing are made for ensuring the effectiveness of the game experience

3. PROTOTYPE INTERFACE

As the saying goes, a picture is worth a thousand words. Thus, it is essential to incorporate graphics in order to increase users' understanding. In this project, two types of graphics were incorporated, vector and bitmap. Vector graphics or vector images defined the curves and shapes in a picture and they were stored as algorithms or a set of mathematics equations. Each game started with an introduction montage (Figure 1) and end with Diagnostic Report (Figure 2). There are five parameters proposed by Chalfant & Schefflin (1969) to diagnose visual perception problems namely visual closure, visual discrimination, spatial relationship, visual memory, figure-ground and lastly visual form constancy.

Figure 1 Let's go fishing game 1 exercise interface

Figure 2 Diagnostic Report Interface

4. CONCLUSIONS

In conclusion**,** a diagnostic tool known as Vi-Per Games has been developed based on ADDIE model. Vi-per Games is able to diagnose autistic level among potential autistic students. This prototype will be a high-tech solution to diagnose visual perception problems designed for autistic children. Some of the future work for research could be adding intelligence features such as data analytic to improve Vi-Per Games.

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