RITVET

Development of 2D Home Safety Animation Applications for Primary School Students with Learning Disability ADHD

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Abstract: Attention Deficit Hyperactivity Disorder (ADHD) is one of the learning disabilities. ADHD presents challenges that affect everyday life and learning for students as well as their teachers and parents. In conducting this study, the designer did an observation of the student with ADHD in a classroom and an interview with the classroom teacher. Preliminary study found that ADHD students had difficulty in concentrating lessons and the children constantly running, climbing and jumping no matter the time and place. Based on designer observation also, it was found that they had problems of safety especially in the house. Hence, this article proposed the development of 2-dimensional (2D) animation about how to keep home safe for the children with ADHD by using the ADDIE Model which involved 5 phases namely analysis phase, design phase, development phase, implementation phase and evaluation phase. Four experts were selected for evaluation of multimedia elements and content. The findings show that all experts are positive with this application and suggested that this application is a great medium for learning about home safety so that accidents can be avoided in the future. Hopefully in future, this application will be used wisely and will potentially be implemented in ADHD schools in order to give some information to ADHD students about safety at home.

Keywords: 2D Animation, ADHD, Home Safety

1. Introduction

According to Angel (2019), Attention Deficit Hyperactive Disorder hereafter referred to as ADHD is an expression of a brain-based biological or complex neurodevelopmental disorder that is generally diagnosed in children with the average age of diagnosis being 7 years old. The National Institute of Mental Health (2016) defined ADHD students as having a mental disorder that makes a person difficult to pay attention and control impulsive behavior. Other than that Sousa, in Villalobos (2011) stated that ADHD is a syndrome that interferes with an individual's ability to focus (inattention), regulates activity level (hyperactivity), and inhibit behavior (impulsivity) that become one of the most common learning disorders in children and adolescents. Based on the characteristics of ADHD students teachers may face challenges to teach students with ADHD in the classroom because the students cannot follow instructions, not finish tasks on time, interrupt people, cannot sit still, etc. Having students with ADHD means a teacher should have sufficient knowledge about the students' characteristics and their needs toward learning in the mainstream classroom (Ewe, 2019).

1.1 Research Background

ADHD students often fail to pay close attention to something detailed and it is difficult to concentrate for a long time on activities that involve visuals and thinking unless a visual activity involves hearing and seeing. According to Nicholas (2008), these ADHD sufferers are having difficulty taking care of themselves and affecting the people around them, especially their families. Therefore, their parents need mental and physical endurance to care for their hyperactive child as it will involve a great deal of time, money, and energy. Hyperactive child care can influence their mothers to experience depression and anxiety as well as low levels of efficacy (Sahu and Rath, 2003). Therefore, injuries may occur unexpectedly that may result in death. Therefore, as adults, they need to be more careful in keeping children safe in anticipation of the presence of danger. Awareness of the safety of children with ADHD needs to be emphasized in the home to facilitate both parents to maintain and control their movement. According to Dwyer et al (2006), it compares the results of the research into the use of animation in learning, on average shows positive results and it indirectly improves the quality of multi-level learning by 62%. The effect of using animation in learning is emphasized how animation is conveyed to understand students with ADHD. 2D animation is a depiction of the movement of an object and it allows the object to move as if it were live or stationary or static. According to Wyatt (2010), the animation is an image that has been manipulated frame by frame to produce a realistic motion.

1.2 Problem Statement

According to Paediatric Specialists, ADHD children often act before thinking about the consequences, being too active and not focused on doing a task and the percentage of children suffering from injuries at home is higher than that of external injuries involving motor vehicles. These children have no problem understanding and thinking but often ignore it because they prefer to engage in running, climbing, and doing their own work. Interviews at Seri Gading Primary School located in Batu Pahat with the Special Education Teacher explained that the learning style at the school is similar for students with other learning problems such as autism, dyslexia, and dementia. Students with ADHD may not use the same learning approach as this type of learner will become bored quickly and become hyperactive if no activity arouses their interest. The approach used by this teacher was to use LCDs by showing animations and using learning techniques such as drawing, coloring, and writing based on materials such as scissors, paper, glue, and stationery. Therefore, according to the observations of these special education teachers, these ADHD students can demonstrate their interest in learning using an animated learning approach.

1.3 Research Objective

The objectives of this study are to:

- Designing 2D animations for the topic of personal safety to primary school ADHD students.
- Develop 2D animations that will enable ADHD students to learn and understand about the topic of personal safety at primary school level.
- Testing the functionality of 2D animations on the topic of self-safety for ADHD children in Primary

1.4 Literature Review

According to the American Psychiatric Association (1994), ADHD is behavioral hyperactivity and lack of concentration that occurs repeatedly or continuously. Students with ADHD are often described as easily aroused with their surroundings, rugged, difficult to hear the words, do not sit still, and hyperactivity. According to Ghani and Ahmad (2011), students with ADHD have several categories that have been detected by teachers or parents including lack of focus, hyperactivity, impulsivity, and a combination of these three categories. However, each of these categories will reflect certain characteristics in certain environments such as at home and school.

All teaching system design models are based on the ADDIE model. This ADDIE model includes the needs analysis, design, development, implementation, and evaluation of a 2D animated product for students with ADHD. The ADDIE model was selected for reference during this development process as it is very suitable and can assist the development of this product effectively. The ADDIE model is a concept of behaviorism theory and the idea of the model process was developed by Dick and Carry (1996) to design a systematic learning system. According to Desmita (2009), the theory of learning behaviorism is a theory that can understand human behavior in terms of objective approach and change in one's behavior. Therefore, to know and learn a person's behavior, he or she must take a test and observation of the observed behavior. This theory of learning emphasizes the results learned in behavior change that can be measured and evaluated directly. According to Zulhammi (2015), if a person has gone through a learning process and has shown a behavior change, it is assumed that one has learned something from that learning.

According to De Porter et al (2010), the VAK learning style model is direct learning using the senses of seeing, hearing, and responding. The learning style model has 3 learning styles that are visual, auditory, and kinesthetic. This visual learning style can be learned quickly by using visualization such as visualization of existing knowledge and being able to create a clear image to store the knowledge and information gathered during the learning process. The learning style of the auditory aspect is the pupil who uses the listening senses to obtain information during the learning process. According to Murdoch (1984), students can improve their memory by listening to audio recordings, teaching other students, and having face-to-face discussions with teachers. According to James Cook (2013), listening skills can be enhanced through storytelling, explaining, teaching others, understanding information, remembering information, sharing information with others, and analyzing language use. Kinesthetics is the use of touch senses and movement. Pupils of this type have a balance in the use of hearing and seeing, which is hand-eye-ear coordination. Besides, kinesthetic students find it difficult to sit still for long periods of time and can remember and process information by just interacting with the people around them. According to Sanjaya and Budiarsa (2011), learning outcomes are the accumulation of knowledge through learning that is achieved through the effort, experience, and thinking that can change behavior within a person.

2. Methodology

In developing this 2D animated product, developers use the ADDIE model as shown in Figure 1 for referencing during the development process.
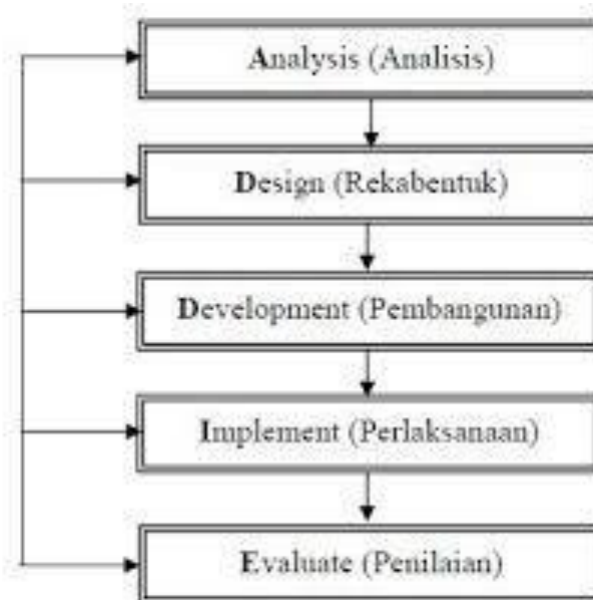

Figure 1: Model ADDIE (adapted from Salmon G, Tombs, M & Surman K, 2019)

Several specifications need to be taken into account during the production process of a product including design, development process, and product design flowchart. In conducting this study, the developer analyses the conditions and the characteristics of the learner, content, media, and strategies in preparation for the specific intended learning outcomes through observation in a school that has several ADHD students in the Sri Gading area. Based on the classroom observation, the student with ADHD was experiencing difficulties in learning such as processing the teacher's information. The students needed to be given more explanation through one-on-one sessions or direct explanation from the teacher. The students also could not pay attention while the teacher was giving explanations due to the distraction of pictures around him. This shows that student ADHD more like animated pictures around them compared with verbal instructions from teachers or someone around them.

3.1 Research Instrument

In order to ensure this application functioned well, two experts in Creative Multimedia and two experts in the contents of Special Education were selected and they evaluated the application through checklist questionnaires. The questionnaire checklist involves four stages: evaluation of reaction, learning, behavior and results will be applied to children with ADHD to evaluate the usability of the product based on their behavior in the 2D animation and audio suitability of use. Since we were facing Pandemic COVID 19, developers had distributed the checklist form using google forms used *yes no* and comments suggestions from experts. All responses data was analysed and presented in percentages value. Figure 2, Figure 3, Figure 4 and Figure 5 were the example of interface design for this application.

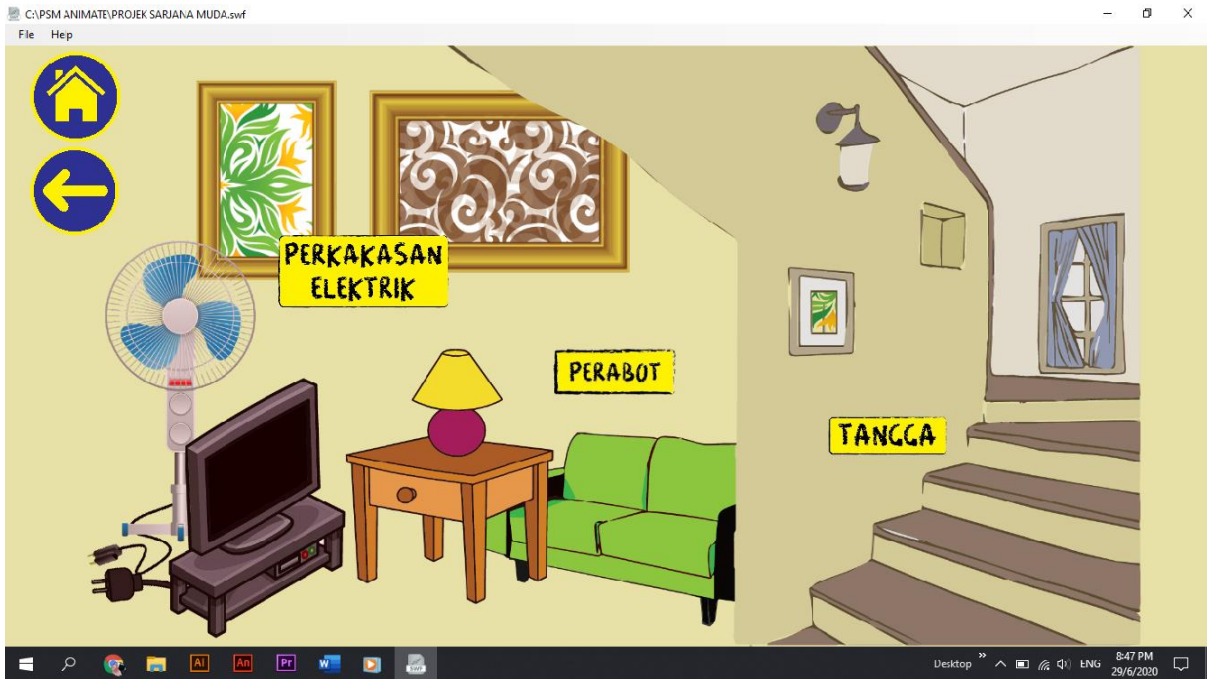**Figure 2: Menu Page**

Figure 3: Sub-Menu Pages

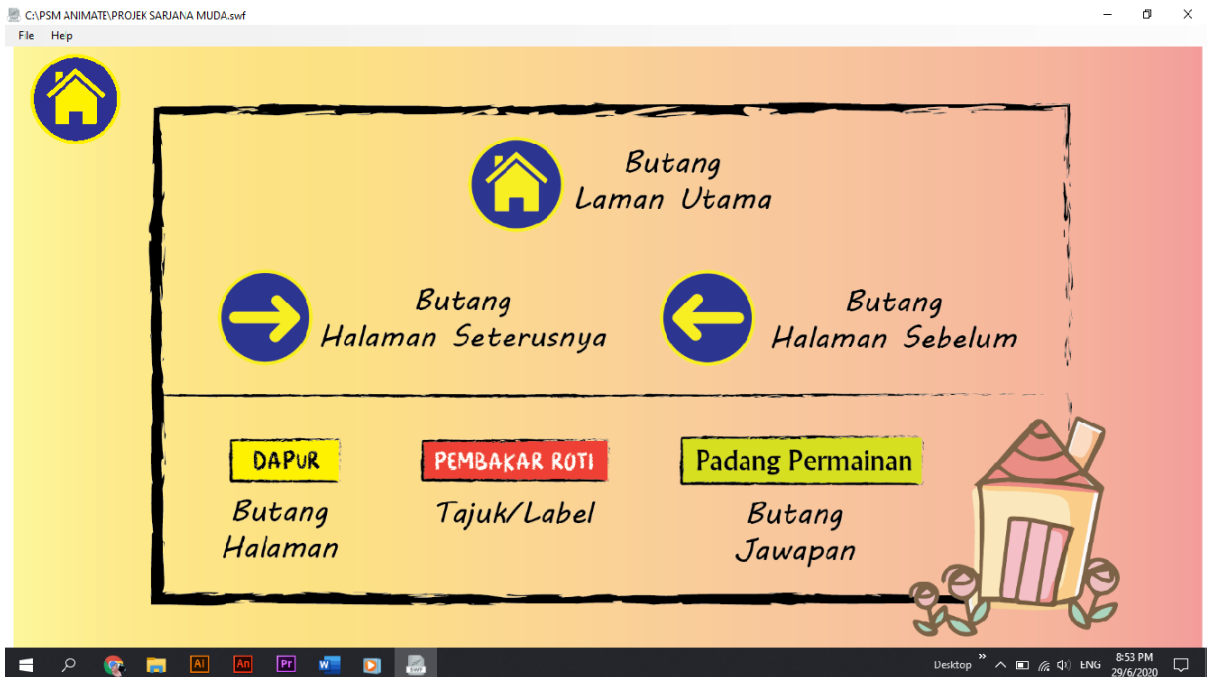**Figure 4: Sub Menu Pages for *Ruang Tamu***

Figure 5: Button and Label Instruction

3. Results and Discussion

Overall, the findings from the experts' feedback had proved that this 2D animation application worked well. Experts were consensus that this application is a good aid and positively will serve as a guide to student ADHD about self-care management at the house. However, the experts made some claims that the 2D animation apps are great and fulfilling the syllabus for the subject Self-care

Management. Color and moving pictures that were used in this app also attracted students to learn about the topic of home safety. Demographic expert is provided as shown in Table 1

Table 1: Experts Demographic

DETAILED	EXPERT 1	EXPERT 2	EXPERT 3	EXPERT 4
Education Level Jobs	Doctorate Degree Lecture	Bachelor Lecture	Bachelor Special Education Teacher	Degree Special Education Teacher
Specialization	ICT Information and Multimedia Technology	ICT	Special Education	Special Education

All objectives of this research were successfully achieved after some improvement based on experts' comments was done. Objective number one of this research was to design an application for self-care management of home safety topics for ADHD students. To achieve this objective, the developer had considered many aspects including analysis of software and hardware that minimize suites with users, multimedia elements that should integrate to match ADHD characteristics students and considered human computer interaction principles to ADHD students. This is related to the statement that some learners tend to have increased difficulty with multimedia, especially if it is visually demanding. For instance, individuals with ADHD have a decreased ability to process visuospatial information (Alderson, Rapport, Hudec, Sarver, & Kolfler, 2010; Sowerby, Seal, & Tripp, 2011).

4. Conclusion

The main purpose of this study was to develop a 2D animation focused on the topic of personal safety for elementary school students with ADHD, learning problems and how these students apply ways to maintain their own safety in daily life at home. There are 3 main categories of security in the living room, bathroom and kitchen. Therefore, with the existence of these 2D animations, it can help the needs of ADHD students and achieve the objective that these animations are suitable for learning the topic of home safety for ADHD students. The suggestions and comments provided by this expert are well received by the developers and at the same time encourage the developers to keep moving and not give up easily producing quality user animations. All of the suggestions provided by this expert need to be improved in this 2D animation application to produce a good and quality product for the user for the future.

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