

The design of Visual Support for Educational Games of Dental and Oral Health

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Abstract— Game is one of the e-learning that is quite popular with children because by playing our educational games children do not only play games but also learn something new. Knowledge of oral health education is packaged in an educational game in the visual depiction which is good to make children understand the purpose of delivering education that can be applied for everyday life. This paper will discuss game design visualization in dental and oral health education so that children can be in demand in the form of a game gadget or smartphone.

Keywords- Educational, Games, Dental Health, Oral Health, Design Visualization

I. INTRODUCTION

Based on the data from the Health Research or RISKESDAS 2013 stated by the Ministry of Health, it is found that there are high oral and dental problems in Indonesia, with a percentage of 25.9% and the percentage of people who receive teeth medical care is 31.1%. Percentage EMD or Effective Medical Demand that has the ability to get dental care from medical personnel, dental specialists, dental nurse is 8.1% with 6.9% increase in 2017 [1]. DMFT (Decay, Missing, and Filling Teeth) in Indonesia is 4.85. These data are required to educate people on oral health knowledge easily and as early as possible to prevent the diseases that arise in the long term, and early planting is expected so that people have an awareness of dental health that will be

applied in everyday life as stated in Law No. 23 of 1992 on the health chapter 5 that everyone has the same obligations to maintain health and improve the health quality of themselves and their family and the surrounding environment.

II. LITERATUR REVIEW

2.1 Dental and Oral Health

Teeth relates to the health of the body. Dental health affects the health of the body, so if there is damage in the teeth, it will affect the health of the body and can cause various diseases. Dental health also relates to the mouth. In the mouth the food is processes and it is an ideal spot for bacteria to grow. If the mouth is not cleaned properly and the food is not chewed perfectly, it will cause teeth problems and affect oral health [2].

Prevention of dental disease can be done through brushing and rinsing teeth regularly. Prevention is effective and useful for future oral health. In addition, having consultation with dentist and having knowledge of dental health is important for the prevention of oral disease [3].

2.2 Educational Games

Currently the game becomes the part modern society from young children to adults. Based on the study above, the number of people who play the games and game development

have begun to lead the industry of educational game. Game is intended other than for entertainment. However, players also get knowledge [4]. One of the benefits of educational games of visualization of the real problems is that the players can memorize it longer than if it is delivered conventionally5].

2.3 Visualization

Visualization is the manufacturing and engineering drawings, diagrams, or animations for delivering information. In general, the visualization of the images of both abstract and real has been known since the beginning of human civilization, for example, paintings on cave walls of ancient humans, hieroglyph letters of Egyptian, Greek geometry systems, and portrayal techniques of Leonardo da Vinci's engineering and scientific purposes. At this time visualization has been developed and is widely used for the purposes of science, engineering, design visualization products, education, interactive multimedia. The development of the field of animation has also helped a lot in the field of visualization more complex and sophisticated [6]

III. RESEARCH METHODOLOGY

3.1 Source Data

This study uses primary data source. Primary data is data that has been collected for the purpose of resolving a problem, data was also obtained from others who are experts in oral health as an original source data such as interview techniques. The data that were needed in the research is the attitude of children in understanding the oral health and applying in their daily lives, as well as how to design an educational media as a way to maintain oral health through the game.

3.2 Questionnaire and Samples

A questionnaire was used to determine how the response of potential users to the idea of making educational games introduction of nutritious foods. Questionnaires were distributed to 40 respondents of children at the age group of 4-12 years. Questionnaire contains questions about oral health knowledge, as well as the interest of children to the idea of making educational games about oral health.

3.3 Software

Software is a tool in making a draft. From the start the tools are used to create an images for the game. Software used is Adobe Illustrator design of the game that will be developed for mobile devices or smartphones.

IV. RESULTS AND DISCUSSION

4.1 Questionnaire Results

a. Knowing Learning Methods Provided

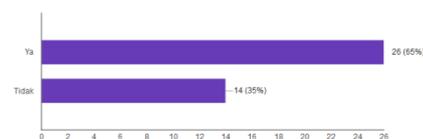


Figure 4.1 Knowing Learning Methods Provided

A total of 26 respondents stated that the teaching media used in schools are varied, among others are books, videos, and practice regarding oral health. While 14 respondents stated that they only received oral and dental knowledge through theory in the book.

b. Interest in the Game

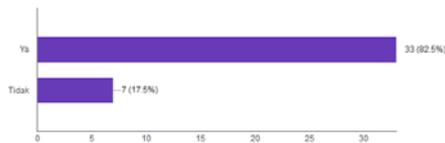


Figure 4.2 Interest in the Game

A total of 82.5% or about 33 respondents expressed an interest in games and often play it. While 7 out of total respondents stated that they were not interested in the game.

C. Educational Gaming Experience

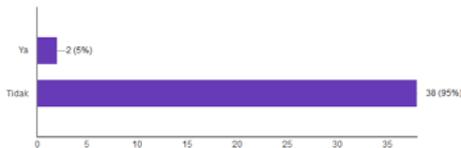


Figure 4.3 Educational Gaming Experience

Only two respondents out of all respondents have ever played educational games, but two of them did not play educational games of teeth and mouth. While 38 respondents said that they never play educational games. They said that they played fun games more.

IV.2 Designing Game

The design of visualization is for the game "The World of Gigi". This game includes design visualization as an enticement for prospective users to play while learning. This educational game provides oral health, such as bacteria on the teeth and mouth, as well as educating the dentists.

a. Main Character



The picture above is an image of human teeth used to design the tooth image as the main character in this game.



The picture above is a picture of a tooth as the main character that has been designed so that they attract the attention of children prospective users of the game.



The picture above is the character tooth fairy, tooth regeneration characters through a variety of germs and challenges to become the tooth fairy in the form of a rabbit.

b. Germ



The image above is a bacterium that is a germ norcadia class destroyer teeth lead to cavities. The image is a sample that will be used for design visualization.



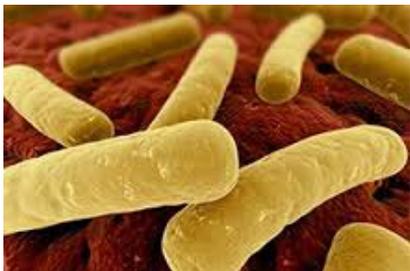
The picture above is the design of germs norcadia design without losing the characteristic of germs norcadia.



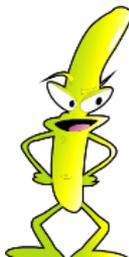
The image above is the bacteria germ Actinomyces Viscous stringy part of the human mouth flora. Sample image will be used for designing visualization.



The picture above is the design of the bacteria Actinomyces Viscous, visualization illustrating the characteristic of the germ.



The picture above is a germ or bacteria lactobacillus acidophilus including in the group of lactic acid bacteria. The bacteria that cause dental caries.



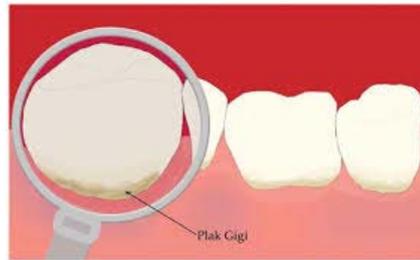
The picture above is the design of the bacteria lactobacillus acidophilus.



The picture above is a germ or bacteria Candida albicans is a type of fungi such as yeast, is commonly found in the mouth.



The image above is the result of design visualization of the bacteria Candida albicans.



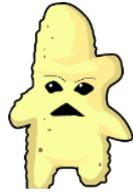
The picture above is a depiction of plaque on the teeth that will be used as the design of dental plaque visualization.



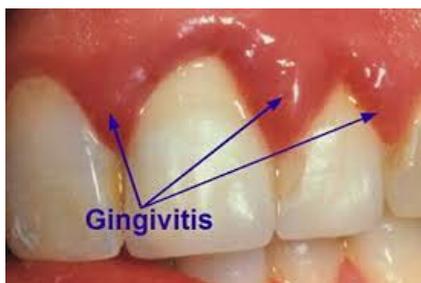
The image above is the result of design visualization of dental plaque. The layer of plaque on the teeth is yellow, so the result of plaque design is also designed as sample images.



The picture above is a depiction of the calculus that occurs due to precipitation of salts of calcium phosphate, calcium carbonate and magnesium phosphate.



The picture above is the design of the visualization of the calculus.



The image above is gingivitis or gum swelling that occurs in the gums.



The picture above is the design of gingivitis made for the original bacteria.



The picture above is a mucocele bacteria that often appear on human lips.



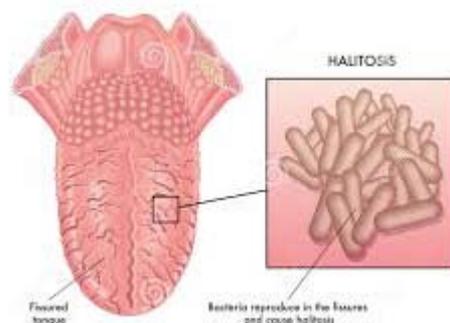
The picture above is the result of bacterial visualization mucocele designed as sample images.



The picture above is a bacteria or germ that has the name S. Mutant fermenting carbohydrates, especially sucrose into acid that causes demineralization of tooth enamel. Enamel demineralization becomes prone to caries. And the picture is a sample design to be created.



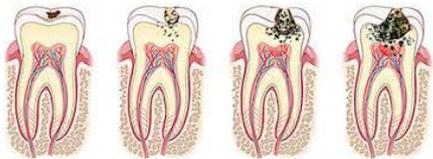
The picture above is the design of germs S.Mutant design that has been created. Shapes and colors are designed similar to the original image, but with a more attractive design.



The image above is germs or bacteria, Halitosis, an unpleasant breath odor. Halitosis is mainly the result of the anaerobic fermentation of food particles by gram-negative bacteria in the mouth that produce volatile sulfur compounds such as hydrogen sulfide and methyl mercaptan. And the image is used to design more visualization in the game later.



The image above is the result of the visualization of the Halitosis bacteria that is bad breath bacteria. Design visualization in the game “The World of Gigi” emphasizes the uniqueness of a bacterium that is considered sordid and frightening that the child is not afraid to recognize and know the functions so they can avoid germs and know how to maintain healthy teeth and mouth.



The image above is the rottenness of the teeth caused by bacteria or a disease called dental caries. Dental caries is an infectious disease which damages the structures of teeth. These diseases cause cavities or major problems in the teeth. This image is a sample that will be used to design visualization caries germs.



The image above is the result of a design process caries germs. Which protrudes from this visualization is to introduce to the children that the caries germs are germs that are harmful, lead to cavities and blackened, and has great hands to damage the teeth. The visualization is expected to deliver education to children through interesting games with its design.

c. Dentists



The picture above is the design figure of a dentist who has a good character depicted with his smiling mouth open and white dressed like physicians in general. The image will serve as an educational provider in the game “The World of Gigi”.



The picture above is the design figure of a dentist who has a bad character depicted with evil face and dressed in black.

V. CONCLUSIONS

Children aged 4-12 years may like the design of the attractive design. Education in the games that directly can be used in the game “The World of Gigi”; visualization of the characters is depicted in the design. Thus, the design of the game design will help educate children about dental and oral as well as the way to maintain oral health.

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