World Journal on Educational Technology: Current Issues

Volume 10, Issue 1, (2018) 20-28

www.wj-et.eu

Development of web-based dental health ladder snake game for public elementary school students in Indonesia

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Suggested Citation:
Rikawarastuti, R., Ngatemi, N. & Yusro, M. (2018). Development of web-based dental health ladder snakes game for public elementary school students in Indonesia. *World Journal on Educational Technology: Current Issues. 10*(1), 20–28.

Received date August 12, 2017; revised date November 26, 2017; accepted date December 22, 2017.
Selection and peer review under responsibility of Prof. Dr. Servet Bayram, Yeditepe University, Istanbul, Turkey.

Abstract

Education of oral and dental hygiene for elementary students is often constrained by the nature of children who are easily saturated, so that media and games need to be an interactive, interesting and fun simulation that entices their interest and curiosity in learning. The purpose of this research is to develop a web-based dental health ladder snake game for oral health education of the elementary school students in Indonesia. The analysis, design, development, implementation and evaluation model approach is applied and tested by material and media experts. In this study, the fifth grade elementary students were participated as a trial group, and they were asked to use the designed ladder snake game. Questionnaire about the feasibility of learning media ladder snake game using a Likert scale was developed. The feasibility test results showed that the material experts were 80% (very good), media experts were 75% (Good) and 83% (excellent) for elementary students.

Keywords: Ladder snake game, dental health, multimedia designing.

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1. Introduction

Health is a valuable asset for every individual and oral health has an important role in individual's health (Wei et al., 2012). The emergence of dental health problems, especially in primary school age children can inhibit the growth and development of general health. Dental health can be seen at the level of oral hygiene that varies among children.

In Indonesia, the behaviour of children aged 10 years and over, who mostly have a habit of brushing their teeth every day and have increased (2007: 91.1%, 2013: 93.8%). Of this only 2.3% (2007) and 7.3% (2013) are brushing properly (after breakfast and before sleep at night). This happens because of lack of knowledge and public awareness of oral hygiene (Kemenkes, 2014).

Oral health issues need to be addressed through a variety of strategic efforts. Oral and dental curative services are still limited, so that the government should provide health services that are focused on oral health promotion in schools. One way is to cooperate actively with education authorities (Jurgensen & Petersen, 2009) because the school-based oral hygiene specialists are very effective (Afandi, 2015).

Health promotion activities in schools can be done through education by utilising learning media. One of the learning media that can be used is a ladder snake game. Implementation of learning media of ladder snake game in elementary school is able to motivate student learning (Afandi, 2015) and very helpful in improving retention level of knowledge of student to comprehend learning material content (Owston, Wideman, Ronda & Brown, 2009). Development of online ladder snake game is a step forward in learning, because the use of learning media with online-based multimedia can improve self-efficacy (Tugun & Ozdamli, 2015). This research aims to develop a web-based dental health ladder snake game for oral health education of the elementary school students in Indonesia.

2. Method

Research and development (R&D) design using the analysis, design, development, implementation and evaluation model is analyse, design, develop, implement and evaluate.

a. In the analyse stage, the researcher analyses the content of the material that will be published in learning media of dental health snake ladder.
b. Design stage is done through a) a design of snake ladder with a concept according to the dental health material; b) preparation of rules of the game and placement of dental health materials and c) developing a product assessment instrument by an questionnaire with four Likert-scale options for material experts (lecturer of dental nursing Poltekkes Kemenkes Jakarta I), media experts (lecturer of Electrical Engineering, UNJ), and elementary students as product implementation goals.
c. The phase of development of activities undertaken are a) Product creation by applying design into the web-based snake ladder game; b) Validation by the material and media experts in the form of comments, suggestions and revisions of developed products; c) Revise the product according to the input.
d. Implementation stage by conducting a web-based dental health ladder snake game to test on a small group of 15 elementary students.
e. Evaluation stage to measuring the achievement of product development goal of dental health snake ladder game. At this stage, product evaluation is done by distributing questionnaires with four Likert-scale options to find out the students' assessment of the developed product.

3. Result and discussion

3.1. System development model

The system development model that is carried out in this research is as follows:

a. System requirement analysis
Software that is used to design the online landing ladder snake game is operating system Ubuntu 17.04, and supporting software using Firefox, XAMPP, Sublime and GIMP browser and source image from freepik.com.

b. Design
This stage is done on graphics display design, namely:

a) Online landing snake game view: A design view of online ladder snake game consists of 49 boxes with the length of 7 boxes and the width of 7 boxes, each box contained snakes or ladders and there are pictures that characterise the material that is mentioned on the box. For graphic design purposes, GIMP image editing software is used to map images to each box and layout of snakes and stairs.
b) Display login and select players: Using Bootstrap library 4 grid and Bootstrap 3.3.7 as a component of web component used.
c) Image source: The source image comes from freepik.com
d) Language used: Indonesian language

c. Code generation
Because this ladder snake game is an online game, there are two sides of the program, the program on the client and the program on the server:

a) The server program: Using Apache2 as a web server, PHP 5.6 and MySql databases. In making the program using PHP framework CodeIgniter 3.Teks editor used using Sublime Text editor 2.
b) Client Program: Using the JavaScript language and the jury libraries as the language to create online games using game engines.
c) Testing: For testing using two methods of black box testing, where testing is intended to ensure that all kinds of the content contained in the program runs according to the desired system.
d) Support: Support is done with the aim to optimise all aspects of support that will help to maximise the program.

3.2. Design

Dental health ladder snake game design is as follows:

a. Storyboard design

A storyboard game contains a discussion about the storyline of the game to be delivered using the words and images. Here is the storyboard of the ladder snake game.

Table 1. Storyboard enter the game

Visual	Sketch	Audio
In this page, there is one text box and one button. Participants are asked to fill their name into the text box and then press the start playing button.		Silent

Table 2. Storyboard select player

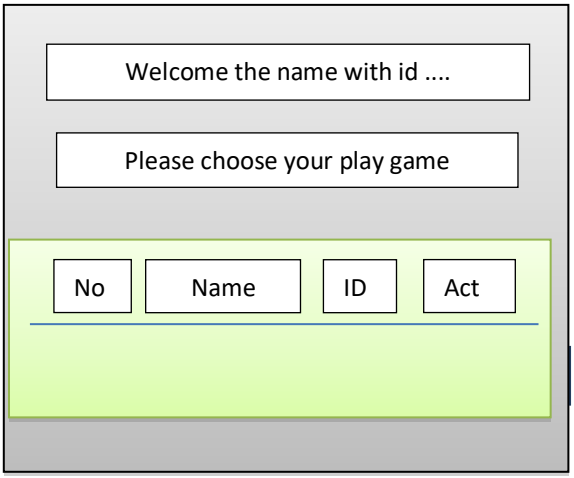
Visual	Sketch	Audio
In this page, players will be able to see other online players who are online and have not earned a spouse to play the ladder snake. Players can send a play invitation based on the existing player list by pressing the play call button on the right side of the player list.		Silent

Table 3. Storyboard sends invite play

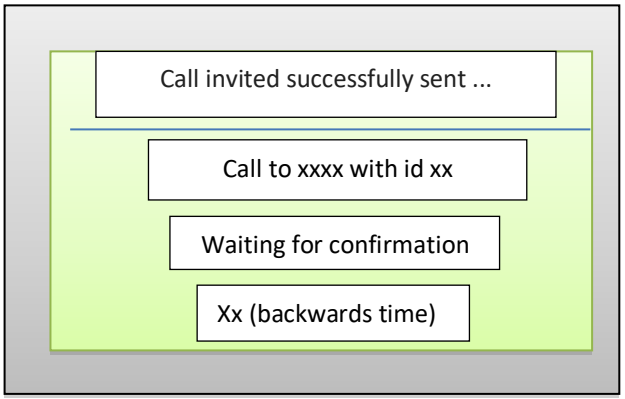
Visual	Sketch	Audio
Pop-up notifications using the bootstrap library are named with modal. Modal will appear when the play call button on the right of the player list is pressed. Modal appears to indicate that a successful play invitation is sent		Silent

Table 4. Storyboard notifications accept solicitation

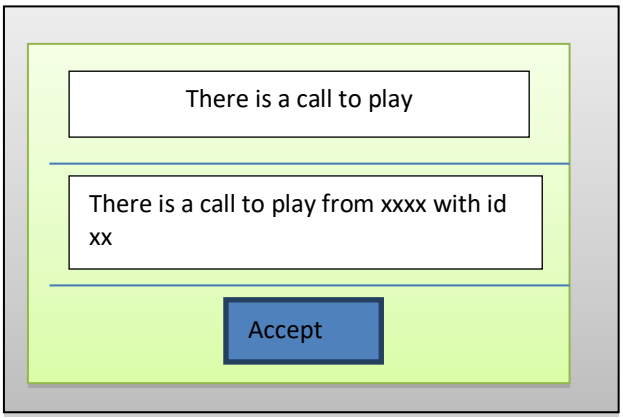
Visual	Sketch	Audio
Notifications received if there is a call to play from an opponent who sends a call to play. If you want to receive and play with your opponent, then players can press the Accept button		Silent

Table 5. Opponent notification is inviting play

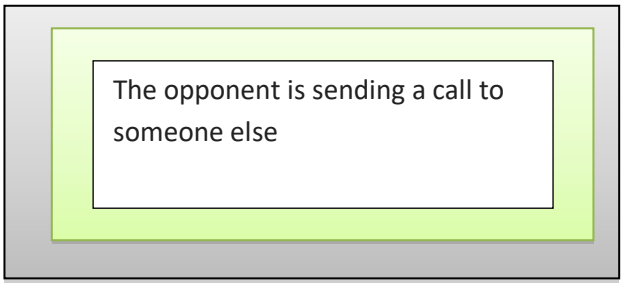
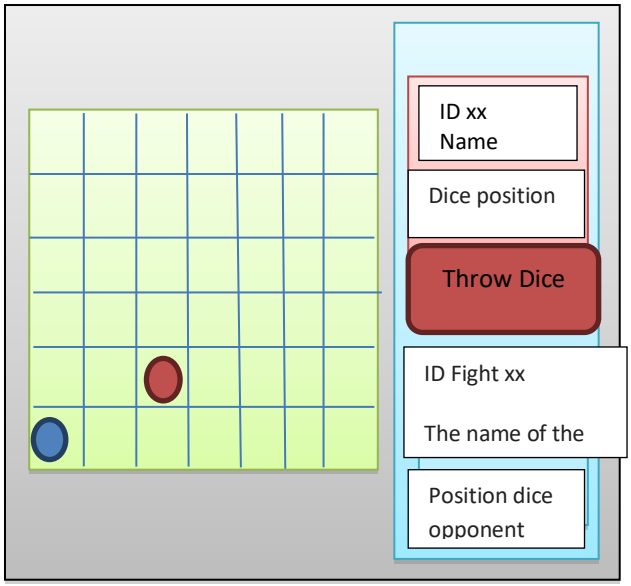
Visual	Sketch	Audio
Notifications received if there is a call to play from an opponent who sends a call to play. If you want to receive and play with your opponent, then players can press the Accept button		Silent

Table 6. Storyboard game snakes ladder online red campus

Visual	Sketch	Audio
Two-player online snake game, with opposite players previously invited. Pirate is always a red camp and given the opportunity to throw the dice first.		NFF-home-switch-on.wav Dump throw sound

3.3. Interface

Interface display using Indonesian language. Interface used in this research is as follows:

a. Scene entering the player name is the page for the player to enter the name and pressing the Start button to enter the Select Friends page.

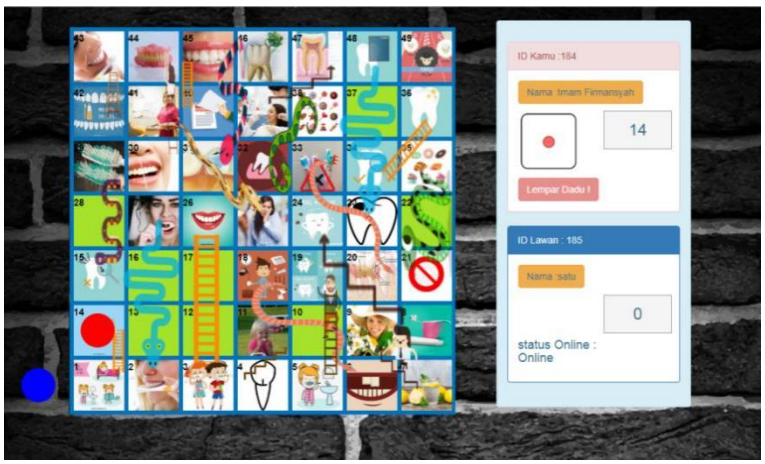
b. Scene select player is the player list page that is online, on this page the player will be able to accept the invitation or invite other players to play.

c. Scene invites other players. Notifications when invited to play were successfully sent.

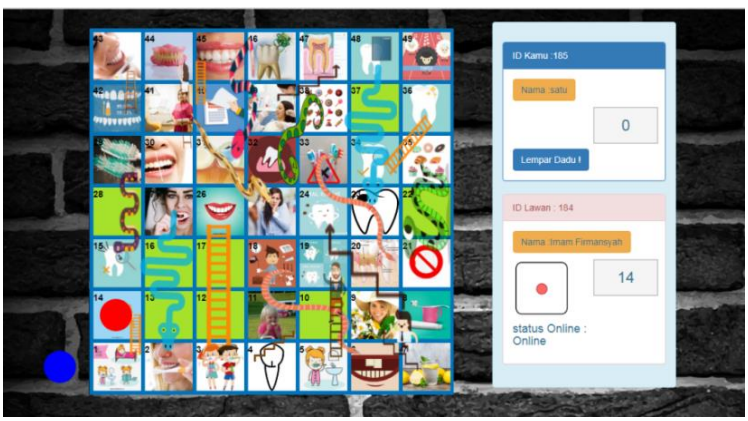
d. Scene accepts solicitation from other players. Notification when accepting calls from other players.

e. Another opponent's notification scene invites other players. Notification when the opponent we are inviting is sending a call to another player.

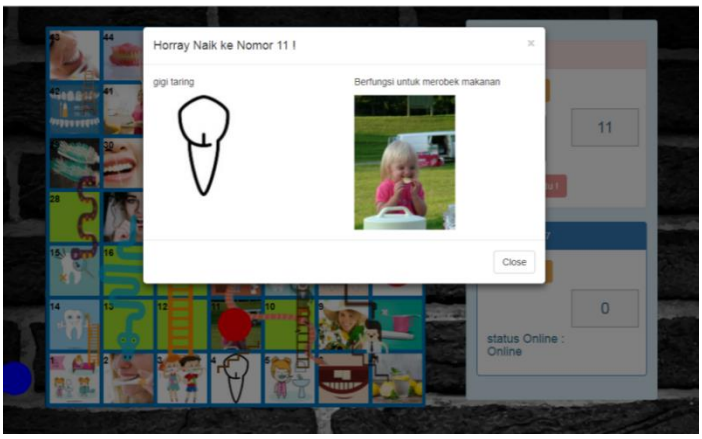
f. Scene into the online snake game ladder as a red camp. Start entering the landing snake game as a red camp. The red camp was given the first chance to roll the dice. When the dice button is thrown, it will come out with dice conditions between 1 to 6 and the position will increase according to the dice numbers out.



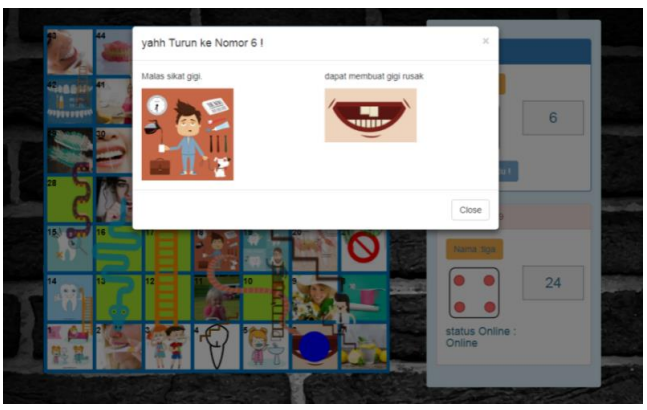
g. Scene into the online snake game ladder as a blue camp. Start entering the landing snake game as a blue camp. The blue camp is given a second chance to roll the dice, after the red camp rolls the dice. When the dice button is thrown, it will come out with dice conditions between 1 to 6 and the position will increase according to the dice numbers out.



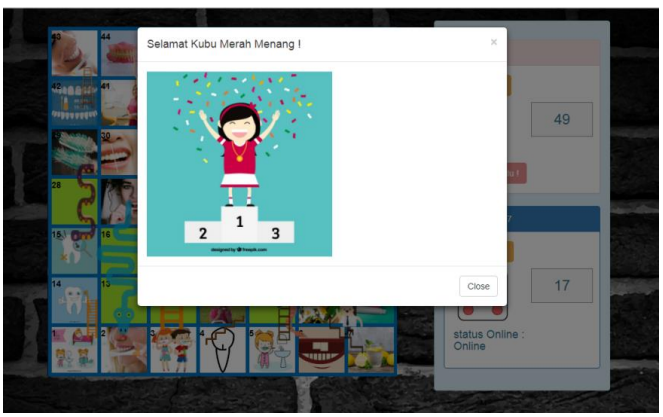
h. Scene notification gets up the stairs. Notifications that come out when the position is in the box up the stairs



i. Scene notification when it got snake box and it should go down. Notifications that come out when the position gets the snake dropout box



j. Scene notification if one player wins



3.4. Validity test

Result of the validity test of dental health material obtained a score of 32 from the total score of 40 (80%), so that the game of dental health ladder snake is very good in presenting knowledge about dental and mouth health. The result of media validity test obtained a score of 30 from the total score of 40 (75%) which means that the game of dental health ladder snake is good in fulfilling a requirement rule in instructional media. The results of the assessment of 15 elementary students obtained show 83% result which means the dental health staircase is very interesting in learning media.

4. Conclusion

Dental health ladder snake game based on web Indonesian version deserves to be used as a media learning for elementary students. In the future, it will be used to know the level of improvement of knowledge and oral hygiene of elementary school students in Indonesia.

Acknowledgements

We would like to express our gratitude to Risbinakes Poltekkes Kemenkes Jakarta I, Ministry of Health Republic Indonesia for funding this research.

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