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Snake and digital ladder applications involving the behavior of children applying the health protocols

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Abstract. This study defines the problem of how understanding health protocols during a pandemic is correctly conveyed according to age levels. This problem for the Government to implement gamification by modifying game media through snake and ladder game that can socialize health protocols for pre-school. Measuring the acceptance of a snake and ladder game media can be considered as a learning medium from the Government which will refer to four components (game content, ease of play, appearance, and active player involvement). The purpose of this study was to modify online-based games as a learning media and to measure children's active interaction with parents in practicing health protocols during game play. This study will use a quantitative approach with data techniques through playing together experiments and filling in online research questionnaires from 115 samples as participants (7 Kindergartens). The results show that the snake and ladder digital game can have a significant effect on changes behavior in implementing health protocols. This research can provide a contribution that can be used as a reference for the Government to design a strategy for socialization through gamification.

1. Introduction

Applying online in disseminating information, one of which occurs in the world of education as a solution to learning methods during the Covid-19 Pandemic. Gamification itself has been widely used as an application in disseminating information. Even the need to understand the importance of behavior in health protocols for children can be presented through fun online learning [1]. Therefore, the researcher tries to elaborate gamification strategies in the online socialization process that increase children's participation in understanding health protocols. Previous research stated that the use of the right gamification strategy will increase motivation and interest, so that the gamification strategy will encourage user interest to influence behavior [2]. It is hoped that gamification will be able to encourage the level of knowledge of early childhood about the importance of behavior in health protocols.

Using the concept of gamification through online games in measuring the level of knowledge in understanding health protocols has the advantage of opening up the potential for full participation of early childhood in activities by triggering their attention to the games being applied, which means they also pay attention to the material presented, as well as a virtual socialization innovation that can be accepted by the age group of children. In defining these problems, researchers tried to develop educational games through the snake and ladder game model which has been widely used as a medium,

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both for learning media and information media. The simplicity of the game makes it easy for researchers to modify it to achieve specific goals such as making it an online gaming application to inform behavior in health protocols for early childhood.

Measuring an acceptable media and will be developed as a learning media or information media is by paying attention to the four regulatory factors [3] set by the West Jakarta Education Government's considerations which refer to four components, namely starting from, 1) the game content component, which means that the content has the educational side that is accepted is according to the target age or player, 2) the ease of a game to play, where the game must be integrated and easily socialized to make it easier for children to play and understand content, 3) a display that must meet educational and attract children's interests-children, and 4) the game is able to attract active involvement from the players, making children behave or implementing health protocols as content for the game.

Therefore, the research questions in this study are: 1) How is online modification implemented through the online snake and ladder game with educational content on behavior in health protocols? 2) How to measure the value of children's involvement in the value of the direct influence of a media can be accepted by the West Jakarta Education Government and will be developed as an information medium through four components, namely starting from, game content, ease of play, appearance, and active player involvement?

The purpose of this study was to modify online-based games as a learning medium and to measure children's active involvement with parents in practicing health protocols during game play.

2. Literature review

Gamification is a learning approach using elements in games or video games with the aim to motivate students or students in the learning process and maximize feelings of comfort and interest in the learning process, besides this media can be used to capture things that interest. students and inspire them to continue learning [2]. Gamification that is applied to learning media can also provide understanding to users, because gamification is a process where learning units are presented in a game format or combining game elements [4], especially to support efforts to explain the dangers of the Covid-19 virus. Several previous studies have provided several methods to explain the potential dangers of the Covid-19 virus [5], such as using online socialization, face-to-face explanations, to creating a website as a media center for Covid-19.

Implementing games in the learning process is a way to create a fun and meaningful learning atmosphere for player involvement (early childhood). Previous studies have suggested optimizing the implementation of games to help create a relaxed atmosphere through fun and interesting activities and provide support for knowledge construction for students [6]. The snake and ladder game can facilitate students to learn about counting, life, interaction and socialization [7]. In the game, implicitly, students can learn about the ups and downs in life or about pleasures and problems. The ladder represents "to the top of life and joy", while the existence of the snake symbolizes "that in life or difficulties". To make the game of snakes and ladders not only fun but also meaningful in teaching and learning [8], the snake and ladder game can be modified with a variety of instructions according to certain materials [9].

Previous research has become a basis for this study to make modifications using the modified snake and ladder game, which is the basic modification of inserting information content into the game [8]. However, in this study it has a novelty by sharpening a learning media with a model of carrying out an active involvement of the players through a game model with instructions to players (early childhood), where this behavior can increase understanding of the the concept of spreading the Covid-19 virus, so that players are required to be actively involved through behavioral demonstrations of implementing health protocols.

3. Methods

In order to answer the problem formulation, the first approach taken is to use the waterfall method, where the output of each stage of making snake and ladder games is the input for the next stage [9]. This model has been derived from other engineering processes and offers a more concrete way of making

software engineering, namely the design of online media creation of snakes and ladders to introduce behavior in health protocols. Meanwhile, the next is an approach that is carried out in a cross-sectional manner using a quantitative approach to measure the acceptability of the snake and ladder game to be realized as a learning tools for the West Java Government of Education.

This research setting was carried out in 7 kindergartens within the area of the West Java Government of Education. The population in this study were all preschool students (PAUD) from these 7 schools in a participatory and objective manner with the help of parents as many as 129 people. Parent participants will be asked questions on the four components of measuring media through the Google Form application (due to the Covid-19 pandemic). Participants were given a period of 14 days to fill in the Gform (3rd-17th August 2020), then it was found that the sample as participants was 115 respondents or as much as 89.1% of the total population (115/129). The number of samples was taken according to the sample size rule in the PLS (Partial Least Squares) guidelines.

4. Results and discussion

4.1. Modification of the Covid-19 ladder snake game online

The game will be modified by digitizing the snake and ladder board game with the icons (Fig 1). Furthermore, modifications will be given to the learning algorithm. There will be modifications to the rules of the game, in which the life score of each player will be added, besides that there is also the addition of a virus script that can run automatically and make each box it passes into a box that can infect players. Each player completes 1 round, then the virus will run stably by 3 square steps, each time that is passed will become an infected box and can reduce the immunity of the player by 5 points per round.

Figure 1. Virus zone algorithm and display the icon representative for health protocols.

In this game model, all players can finish towards the finish line (Fig 2), but the player's status as an infected or healthy player will be displayed at the end of the game. So that it will increase the alertness of the players. The display is as follows:

Figure 2. Interface and the icon in a board snake and ladder game.

On the way, every player who stops at the box with the mask icon, the hand washing icon, the icon to keep a distance is obliged to perform and demonstrate the instructions of the icon. When demonstrating instructions from the icon, it is expected that there will be an active and direct involvement of the player accompanied by parents. The repetitive behavior that occurs is expected to become an educational concept that provides understanding and habituation for early childhood. It is hoped that the delivery of the snake and ladder game will add to the impression of conveying pleasant information.

4.2. Measuring the acceptance of the game of snakes and ladders

The study will include 115 participants who have played together (parents and children). The assessment is filled by parents to assess the direct and indirect influence between, namely starting from, game content, ease of play, appearance, and active involvement of players on the acceptance of the snake and ladder game as a medium of information from the West Jakarta Education Government. The characteristics of the respondents including the age of the child are presented as follows (Table 1):

Table 1. Characteristic of participants.

Characteristic		f	%
Ages	3 years	24	20,8%
	4 - 5 years	61	53,1%
	≥ 5 years	30	26,1%

The characteristic categories of answers per variable from 115 participants were then processed into an assessment of ranges based on variable descriptive statistics, namely game content, ease of play, appearance, and active involvement of players. All variables in this study were measured through 15 statement items with an assessment of 1-5. So that the questionnaire scores ranged from 15-75.

4.2.1. Statistic descriptive. The frequency distribution of participant answers to the Game content, Ease of play, Appearance, and Active Involvement of Player variable is as follows (Table 2):

Table 2. Descriptive distribution of participant answers.

Game Content				Ease of play			
Interval	**F**	**Std. Dev**	**%**	**Interval**	**F**	**Std. Dev**	**%**
48 - 50	20	5.64	18.75%	23 - 25	12	5.30	8.75%
51 - 53	28	5.64	28.75%	26 - 28	8	5.30	3.75%
54 – 56	18	5.64	16.25%	29 - 31	18	5.30	16.25%
57 - 59	9	5.64	5.00%	32 - 34	19	5.30	17.50%
60 - 62	18	5.64	16.25%	35 - 37	18	5.30	16.25%
63 - 65	7	5.64	2.50%	38 - 40	27	5.30	27.50%
66 - 68	15	5.64	12.50%	41 - 43	13	5.30	10.00%

Appearance				Active Involvement of Player			
Interval	**F**	**Std. Dev**	**%**	**Interval**	**F**	**Std. Dev**	**%**
23 - 25	8	5.58	10.00%	40 - 43	10	4.86	6.25%
26 - 28	8	5.58	10.00%	44 - 46	17	4.86	15.00%
29 - 31	11	5.58	13.75%	47 - 49	41	4.86	45.00%
32 - 34	5	5.58	6.25%	50 - 52	18	4.86	16.25%
35 - 37	25	5.58	31.25%	53 - 55	10	4.86	6.25%
38 - 40	14	5.58	17.50%	56 - 58	7	4.86	2.50%
41 - 43	9	5.58	11.25%	59 - 61	12	4.86	8.75%

4.2.2. Validity and reliability. Testing discriminant validity, namely through the Square root of average variance extracted (AVE) value with an expected value above 0.50. The following is the AVE table 3 and its root results:

Table 3. Validity test by evaluating the value of AVE (*Average Variance Extracted*).

Variable	AVE	Criteria > 0,5
Game content	0,782	Valid
Appearance	0,828	Valid
Ease of Play	0,895	Valid
Active Involvement of players	0,762	Valid

An indicator is declared valid if it has the highest loading factor for the intended construct compared to the loading factor for other constructs. The table above shows that the highest for game content variables compared to other variables, so that the game content variable is able to predict the loading factor values more the height of the other variables.

After being tested for validity and it is stated that the variables and indicators are valid, then the reliability test is carried out. Reliability test is done by looking at the value of the composite reliability of the indicator block that measures the construct of the composite reliability results will show a satisfactory value if it is above 0.70. The results of the outer model reliability evaluation can be seen in the table 4 by evaluating the value of Cronbach's Alpha and composite reliability. Here are the values:

Table 4. Reliability test by evaluating the value in the outer model.

Validity	**Result test**		**Criteria**
	Significance	***Loading***	**>0,70**
Cronbach's Alpha	Game content	0,922	Reliabel
	Appearance	0,883	Reliabel
	Ease of Play	0,948	Reliabel
	Active Involvement of players	0,895	Reliabel
	Acceptance	0,939	Reliabel
Composite Reliability	Game content	0,962	Reliabel
	Appearance	0,945	Reliabel
	Ease of Play	0,957	Reliabel
	Active Involvement of players	0,920	Reliabel
	Acceptance	0,956	Reliabel

4.2.3. Evaluation. Based on the table above, it shows that all variables are declared reliable because the value of Cronbach's Alpha and Composite reliability is above 0.70 so it can be said that the construct has good reliability.

Furthermore, the Inner Model test is carried out, testing the structural model is carried out by looking at the R-Square which is the Goodness-fit model test by table 5.

Table 5. Evaluation of the value of R Square model.

Test Results	
Variable	***R Square***
Game content	0.828
Appearance	0.731
Ease of Play	0,557
Active Involvement of players	0.606
Acceptance	0.709

Based on the table above, it can be seen that the most dominant r square value is in the game content component, the rest of the variables of ease of play, appearance, and active involvement of players also have the next effect in succession on the acceptance of the snake and ladder game as a medium of information from the West Jakarta Education Government.

5. Conclusion

Based on the research results found that: 1) Modification of the game of snakes and ladders can provide the player with an engagement with instruction through its educational content about health protocols. 2) The acceptance value for the success of a snake and ladder game media can be considered as a learning medium from the West Jakarta Education Government which will refer to four components, namely starting from, game content, ease of play, appearance, and active player involvement have been tested significantly with content variables play is a dominant aspect that affects children's involvement as a participant.

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