Educational game analysis

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Abstract. Game is one of the media currently popular with various groups. In the field of education one of the most widely made is an educational game. The method used in this study is to include data collection and analysis of needs. The purpose of this study is to analyse a learning game. This research produces an educational game analysis that has a challenge and has one level, equipped with instructions and buttons to repeat.

1. Introduction
The development of technology nowadays has a role in all fields of life is no exception in the field of education, especially learning. Millennial generation is currently very fond of technology in the form of games. This millennial generation is also one of the factors in learning. It seems not strange that then the game that they are interested in becomes a medium in learning that they take at school. Games keep the users highly engaged in carrying out thought processes and behaviours in a new environment. The thought process and behaviour of users are very involved in a game, especially in gamification where the game thinking involves a methodology that outlines how to engage and motivate users [1]. Until now the gamified system has succeeded in involving players by providing both positive and negative emotions [2]. The concept of gamification becomes an alternative in overcoming learning conditions that can solve learning problems in class with pleasant learning conditions. This is certainly related to the encouragement that appears in students. The adoption of games in learning can result in motivation, engagement and social influence [3]. Gamification can be described as the integration of game mechanics into a non-game environment in order to give it a game-like feel [4]. Whereas game mechanics are the workings or rules of the game that apply to a game. So, game mechanics is the link between the game program and the players who play it. [5].

Previous studies have shown that gamification is intended to promote engagement [6]. Gamification also has become a concern for practitioners because it produces strong experiences because gamification provides experiences that are as strong as games [7,8]. As for the company field, gamification has increased engagement, awareness and customer loyalty of a brand [9]. In addition, this gamification mechanism can contribute to supporting manufacturing education about Industry 4.0. [10]. Therefore it is necessary to analyse a game in learning so that it has a real influence in the learning process. This study aims to find out how to analyse a game in learning.

2. Research methods
The method used in this research includes collecting data about information from books that are relevant to the application design, observing the application design guidelines available, observing
through structured interviews with experts in making educational games for transportation learning materials and conducting analysis educational game design that is in the form of needs analysis used in making educational games.

3. Results and discussion

Analysis of needs in the preparation of this game is a process of gathering information needs to determine the specifications of software requirements. This needs analysis is useful for understanding the needs of the software to be used. The needs analysis process is carried out by observing literatures to address problems and determine subjects that are in accordance with the product being developed. Requirement analysis is carried out to find information on hardware requirements that can be used.

The functional needs analysis results are:

- In this educational game learning transportation learning materials, there are only 1 level,
- there is a game time that has been determined time is 30 seconds, the assessment score will increase and decrease according to the object being captured,
- This game is equipped with instructions to find out how to play,
- There is a Repeat button to repeat the game in this game.

The results of the analysis of software requirements needed in the development of this educational game are Macromedia Flash 8. This software is used to create vector images and animated images. The resulting file is the .swf extension file and can be played if Adobe Flash has been installed with the ActionScript program language. Macromedia Flash 8 produces animation in the form of movie files. as software used to develop edutainment-based learning media. Based on the results of the analysis, the hardware used in the educational game for learning transportation material is the Acer Laptop with 2GB RAM capacity.

Educational game for transportation learning material combines the concepts of learning and playing into one so that it gives birth to a more enjoyable way of learning. The material is presented in an interesting form equipped with pictures, narrative sound and animation so that students enjoy learning. Students can hone skills through the educational game provided, which is a game by capturing transportation using a basket given a rating score, the score will increase and decrease according to the object being captured. This is in accordance with the opinion of Hakak et.al that gamification can have the opportunity to make education more attractive [11].

This design phase includes: UML (Unified Modelling Language) design, flowchart design and display design (user interface). The UML design, flowchart design, and user interface are as follows:

3.1. UML

The design of UML begins with the design of use case diagrams for the development of educational games by Users can be seen in the picture below:
3.2. Flow chart
In developing this educational game, flowcharts are used to show the flow and illustrate the sequence of instructions from this educational game. The following flowchart from the educational game:

![Flowchart Image]

**Figure 2.** Flowchart.

3.3. Display design
The appearance of the game made consists of: loading view, main page, menu, instructions, profile, select learning and game.

4. Conclusion
This research produces an educational game analysis that has challenges and has one level for each challenge, equipped with instructions and buttons to repeat. In addition, it produces an analysis of needs both in the form of software and hardware requirements used.
References

[1] Goethe O 2019 *Gamification Mindset* (Springer)

[2] Mullins J K and Sabherwal R 2020 Gamification: A cognitive-emotional view *Journal of Business Research* **106** 304-314

[3] Zainuddin Z, Chu S K W, Shujahat M and Perera C J 2020 The impact of gamification on learning and instruction: A systematic review of empirical evidence *Educational Research Review* 100326

[4] Deterding S, Dixon D, Khaled R and Nacke L 2011 From game design elements to gamefulness: defining "gamification" In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* 9-15

[5] Schaufeli W B 2013 “What is engagement?” in *Employee engagement in theory and practice* (Routledge)

[6] Cechetti N P, Bellei E A, Biduski D, Rodriguez J P M, Roman M K and De Marchi A C B 2019 Developing and implementing a gamification method to improve user engagement: A case study with an m-Health application for hypertension monitoring *Telematics and Informatics* **41** 126-138

[7] Leclercq T, Poncin I and Hammedi W 2020 Opening the black box of gameful experience: Implications for gamification process design *Journal of Retailing and Consumer Services* **52** 101882

[8] Morschheuser B, Hassan L, Werder K and Hamari J 2018 How to design gamification? A method for engineering gamified software *Information and Software Technology* **95** 219-23

[9] Xi N and Hamari J 2020 Does gamification affect brand engagement and equity? A study in online brand communities *Journal of Business Research* **109** 449-460.

[10] Paravizo E, Chaim O C, Braatz D, Muschard B and Rozenfeld H 2018 Exploring gamification to support manufacturing education on industry 4.0 as an enabler for innovation and sustainability *Procedia Manufacturing* **21** 438-445

[11] Hakak S, Noor N F M, Ayub M N, Affal H, Hussin N and Imran M 2019 Cloud-assisted gamification for education and learning–Recent advances and challenges *Computers & Electrical Engineering* **74** 22-34