Prototype of Mobile Learning Application (MoLearn) by Utilizing the Gamification Concept

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Abstract— **Mobile Learning (MoLearn) is a learning application created specifically to accommodate the learning needs of students with the goal of gaining more learning experiences with more effective mobile devices. Answering this challenge, MoLearn application that has been built previously with web-based and Android needs to be developed. In accordance with the lifestyle of its users, in this case high school students, the MoLearn application was developed using the concept of Gamification. In learning, gamification is an approach in the learning process that uses elements in the game with the aim to provide motivation, build comfort for learners, and interest in the learning process. By utilizing the concept of Gamification, a prototype of MoLearn application development was designed by giving attention to the three elements, i.e character, interactivity and feedback. The development of this application takes into account every student activity that focuses on goals, reward mechanisms, and progress tracking. Gamification, a key review of MoLearn's application development as a concept in the process of creating participative learning experiences and active learning.**

Keywords—mobile learning, molearn, gamification, learning process

I. INTRODUCTION

The new paradigm of learning states that the dominant teaching paradigm must be transformed into dominant learning paradigm. Through this change, the learning process becomes a process of how to learn together between educators and learners [1]. In this context, educators are individuals involved in learning process, not those who know everything. Learners are seen as active individuals who are directly involved in learning. The paradigm shifts from teacher-centered instruction to student-centered instruction is a strategy that aims to enable learners to be actively involved in the learning process and to enable learners to help each other improve mutual understanding. The learning methods used today are different. Today's methods are mostly aimed at forming knowledge in learners actively through themselves, and not just receiving outside knowledge.

Not only the change in learning methods, but learning media also has changed. These changes occur along with the needs of today's generation which is very different from the previous generation. Globalization has opened up the world and allows people to connect in new and exciting ways. In this context, web-based learning and mobile learning are the answer to the present needs in the implementation of learning strategies. Both web-based learning and mobile learning allow learners to learn with media in their hands, with unlimited learning resources, and are very much in line with the era they grow, i.e. learners in the 21st century. The difference between traditional learning and web-based learning and mobile learning is in the traditional classroom, educators are considered as a person who knows everything and is assigned to transfer knowledge to learners. While in web-based learning and mobile learning the main focus is learners, where they are required to be independent at a certain time and responsible for learning. The learning atmosphere of web-based learning and mobile learning will 'force' learners to play a more active role in their learnings [2]. This is in line with the student-centered instruction paradigm.

The student-centered instruction paradigm is very appropriate for learning process in the 21st century. There are four main points of learning in the 21st century [3], namely: (1) Learning should be centered on learners, (2) Education must be collaborative, (3) Learning should be context-based, (4) Schools should be integrated with the surrounding environment. Referring to that opinion, to meet the learning needs that correspond to the younger generation today, learning media is needed to accommodate the needs of learners in accordance with their world. Learning media in question is 'Molearn', which is a web-based learning application and mobile based learning [1][4][5] which has been used for high school in Surabaya especially in Geography and Biology lessons. Survey conducted by Indonesia Internet Service Provider Association (APJII) in 2017 had recorded 143.26 million intenet users out of 262 million population of Indonesia, and 16.68% of users are 13-18 years or in high school level. Of the total internet users, there are 44.16% who

access the internet by using mobile phone/smart phone/tablet. In terms of education, 55.30% of users use it to read articles, 49.67% to view tutorial videos, and 21.73% to share articles/educational videos, while 17.85% to do online courses and 14.63% to do school enrollment. The data presented by APJII has given an idea that mobile learning has great potential in the world of education, thus the planning of content development in mobile learning should follow the learning style of teenagers.

As appropriate learning media to accommodate learning process, the development of the Molearn application was designed by utilizing the concept of gamification. Gamification is a concept of process/way of thinking and game mechanics involving users to solve a problem and affects user behavior [6][7]. Gamification is the use of design elements that make up a game in a non-game context [8]. Gamification is also referred to a process that aims to change the context of non-games to be more interesting by integrating game-thingking, by designing an activity resembling games by presenting a sense of fun and the challenges and motivations for its users. Thus, the development of MoLearn application in the future will be more interesting and can improve student's learning motivation.

II. MATERIAL AND METHODS

A. Gamification

Definition of Gamification is a concept of process/way of thinking and game mechanics involving users to solve a problem and affects user behavior [6][7] which in its development there are basic characteristics or elements contained in games in general activity which focuses on goals, reward mechanisms, and progress tracking [9]. In general, Gamification is widely used by companies to improve employees' productivity and morale. In the field of marketing, Gamification is used to increase customers' loyalty and involvement that ultimately generates profits for a company. With the exception of education, Gamification is used to improve students' understanding and improve the learning focus for students [10]. In learning, gamification is an approach in the learning process that uses elements in games or video games with the aim to provide motivation for learners and build comfort, interest in the process [11] and also promotes learning and problem-solving [12]. The main principles that support the success of gamification are it is able to measure the progress of experience, provides quick feedback and has multiple goals.

Gamification, as a process that creates a participatory learning experience, is particularly suitable for active-learning [13], and can also provide a framework to encourage other learning styles, such as by incorporating audio, images and text into learning experience. Gamification not only makes an activity more enjoyable [14] but Gamification application can provide benefits to enhance the development of cognitive aspects and also increase one's active role. In a lesson, Gamification gives motivation, awards for certain achievements to students after successfully solving a problem [15]. Gamification can be done for positive purposes in the learning process. Some attention can be given by a teacher in utilizing the concept of Gamification, i.e. by making learning materials like a game which is interesting and attracts students'

attention by designing learning materials into video game format and add all problems related to the theme.

The next way is to adopt the elements of the game in learning, that is by changing the value/weight with point system, providing more clearly structured and varied learning missions, and providing more interesting challenges. For learners, the concept of Gamification in their views is an interesting thing just like playing games.

B. Gamification Content

The Gamification content consists of game elements, game mechanisms, and game-like thinking i.e. changing the content to run like a game process [12].

There are many elements in game that can be used into traditional learning content to make it more similar to game. The most common element for converting ordinary learning content into gamification-concept content is to pay attention to some elements of story, challenge, curiosity, character, interactivity, feedback and freedom to fail.

- Story. In learning process, a student will remember facts, terms, and jargons more easily as they study information in story form. Stories evoke emotions and provide context for understanding information. Involving students in a story can make learning more powerful and memorable [16]. A well-made story focuses on helping students solve problems, educate learners, and be memorable when the actual situation arises or when a learner is in the same situation as the story.

- Curiosity. Inevitably, when learners use learning media content, a sense of curiosity will appear in her [17]. They explore one by one from a content to another. People are naturally driven by curiosity, so educators in this case as developers of instructional media can take advantage of this nature by creating different levels and places to explore in a learning material. This curiosity is used to motivate learners to stay in the learning process and engage them with learning environment. Most online learning does not use learners' curiosity to move them through instruction but is more likely to tell learners what lessons they need to know in the on-screen list. Inform participants what they need to do across the module and create desire to continue learning. Take advantage of the natural curiosity of learners by providing an exciting new environment. Setting up the type of learning experience can be done by taking advantage of the curiosity of learners who will naturally encourage them through instruction in the same way as in a game. For example, give learners a variety of options and then let them replay the options to see what would happen if they chose the alternative options. It could also give them space to explore and discover new information and contents.

- Character. Add characters to learning. If the prepared learning content does not create a story with great storyline and tensions, then it is necessary to add characters to help learners engage in-depth [18]. It

seems that having an avatar appears on the screen can motivate learners because it can bring closeness between users and the computer application used.

- Interactivity. The characteristic of gamification content is interactivity. Encouraging learners to engage with content can lead learners to a deeper level of learning. There are many advantages to this interaction. Interactivity can help learners to retain information and increase learners' willingness to spend time with the material [19][20]. Someone tends to learn more and faster when they engage and interact with the content rather than when they become passive content users.

- Feedback. One of the features in a game is to have more than traditional learning environment but also feedback. Feedback in a game is constant and a key element in developing gamification content. Feedback is an important element in learning. The more often feedback is delivered, the more effective the learning is. Unfortunately, in many learning programs, feedback is not often given. Provide continuous feedback to participants in the form of self-training, visual cues, question and answer activities, progress bar, and also provide a menu to give and receive comments. This comment menu can also be used as feedback by having learners perform an activity summarizing the content discussed at the time as an effective review to provide feedback to them about their levels of understanding.

- Freedom to Fail. The development of gamification content on MoLearn application has provided opportunities and made failure as an option. In many environments, learners are objectively assessed and whether they are right the first time or they fail. Only few people enjoy failures in traditional learning environments, and most will do anything to avoid failure. This means that most learning environments do not encourage exploratory or experimental learning. Learners have little insight into the real consequences of wrong answers or wrong decisions other than being told that that answers or decisions are not true. The content of gamification must be able to recognize a failure. This can encourage learners to explore the content and learn to take risks with their decision-making and learn to get realistic consequences for every wrong decision they have chosen. The risk of failure without penalty, makes learners will be happy to explore and check the causes and effects if they know the failure is allowed. In many cases, they will learn a lot from seeing the consequences in a failure and the learner will get the correct answer in their effort through a failure.

III. STEPS OF MOLEARN DEVELOPMENT

The MoLearn application is a learning application created specifically to accommodate the learning needs of students with the goal of gaining more learning experience with more effective mobile devices. Answering the challenges mentioned, web-based and Android-based learning applications [1] were developed that could provide learning strategies that correspond to learners' activities, device advancements and

social conditions [[4]. MoLearn's architectural design that has been prepared can be described as follows:
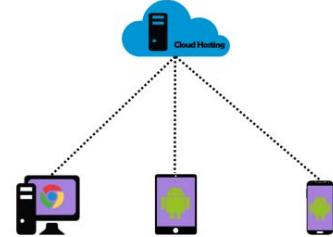

Fig. 1. MoLearn Architectural Design

This research will develop the application of MoLearn which focuses on users by utilizing Gamification concept. In the initial stages of the MoLearn application, the emphasis of preparation is on the standardization of the material consisting of three components with the highest level is the competency standard, then the second is the basic competence, and the last is the indicator. Any material that will be provided by teachers and administrators is required to fulfill these three components. There are several other features provided in the MoLearn application [4] that make this application can be used to support classroom learning process.

In the next research, MoLearn application will experience development by utilizing the concept of Gamification. The concept in question is structured in a development scenario by taking into account of game elements, game mechanisms, and game-like thinking, i.e to change the concept of thinking and user activity to run like a game process. The scenario in question can be seen in table 1 below;

TABLE I.   ELEMENT IN THE CONCEPT OF GAMIFICATION

Element	Description
Story	Storyline is prepared on each content/material to be uploaded. The story is delivered in the form of narration or audio/video according to the type of material file to be used
Challenge	For each teaching material, the evaluation is presented in the form of exercise. Problems given are arranged with multi-level challenges. Each time opens a higher level of material, a student must be able to complete the exercise correctly at the previous level. Every challenge that passes, will get point as a reward.
Curiosity	Each story is prepared and the exercise is given in stages with the intention to grow the sense of curiosity from students in learning a particular material.
Character	Each user, in this case students, is given the choice of characters (avatar) to describe themselves. Profile photos for each student are equipped with a positive character that describes him/her. The choice of character is expected to increase the confidence of each student.
Interactivity	Interactivity is built with the involvement of students directly, one of the forms presented in this application is expected to provide opportunities for collaboration in the learning process and doing group work with other students, including dare to comment and share material to others.

Element	Description
Feedback	Feedback is provided to learners as well as to content/material that has been learned, this feedback can be delivered in several ways ie; Participants get constructive comments for each task/exercise that has been successfully completed, comments can be points/numbers/grades, can also be a note given by educators to students. From the side of learners, they can provide feedback on the material that has been submitted which can be in the forms of positive comments or symbols of likes/dislikes in each material they have learned. A share feature can be provided to share any material that is considered interesting by students. This feedback can also be given by displaying the rank of each student's liveliness. Star/medal/badge/trophy can be given for every activity students have done
Freedom to fail	The system allows students to fail/make mistakes while providing positive constructive feedback. The system provides repeated opportunities to student who fails until he finds the right solution.

From the scenarios above, the following is some designs of mockup/prototype which will be developed in MoLearn applications for three elements: character, interactivity and feedback. This development takes into account every student activity that focuses on goals, reward mechanisms, and progress tracking.

TABLE II. MOCKUP/ PROTOTYPE DESIGN

Development of Element	mockup/prototype design
Character	
A student is not only required to login using the user and password, but the student's is given the opportunity to choose one out of three characters that represent themself. For example, the display besides showing friendly, humble and smart character. Student is also asked to select avatar in accordance with three predefined characters.	
The following is a selection of character samples available in the Molearn application	
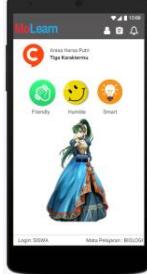
Development of Element	mockup/prototype design
Interactivity	
Each student has opportunity to learn from teacher's materials and assess each of material learned (like it or not) and can also share material they want with others. Students may also comment and also respond to comments from other students on the material they have learned. Each activity, assess and respond, will get compensation in the form of additional points	
Feedback	
One form of feedback provided is that students can see the following ratings based on points acquisition for a certain time period. The points can be obtained from every activity, i.e doing tasks, completing exercises and doing interactivity with other participants.	
Feedback is also delivered with the use of trophy, medals and stars symbols for each calculation of student activities. Feedback in the form of achievement menus, ratings and points can be found on each student's main page. Ssome symbols that describe the acquisition for each student	
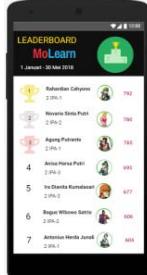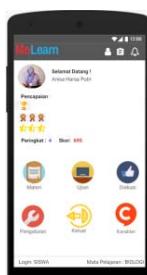
From the mockup/ prototype design that has been arranged, the structural elements of gamification in the form of rules, rewards, leaderboards, points, medals/ badges, leveling, and sharing have been accommodated in the development of MoLearn application.

IV. CONCLUSION

The concept of gamification in the development of this MoLearn application has been delivered to the initiators, developers and users of MoLearn applications in a limited focus group discussion. From the delivery of the development of Gamification concept on MoLearn application, the result shows that the concept in the form of the scenario and mockup/prototype design will make the development of MoLearn application more interesting and and in accordance with users', i.e high school students, lifestyle. The next step is the implementation on further system development that can be

done in subsequent research. MoLearn Application can serve as an appropriate learning media to accommodate the learning process with development designed for learning activities that resemble games by bringing fun, challenges and motivation for its users. Thus, the development of MoLearn application in the future will be more interesting and can improve student's learning motivation.

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