


Smartboard for student information systems using gamification framework

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| Article Info | ABSTRACT |
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| Keywords: Gamification, Student Information Systems, MDA Framework | This study aims to analyze the application of gamification through the user experience of a gamification-based student information center system by providing functions of mini-games, event information, news, service center, and take your wifie. The MDA (Mechanical, Dynamic, Aesthetic) method is used to describe the mechanical, dynamic, and aesthetic aspects of the system. In this study uses questionnaire to evaluate the system. The results of this study are expected to provide insight into how users interact with the student information center system and how the user engagement, motivation, and literacy can be improved by optimizing mechanics, dynamics, and aesthetic aspects. This research has the potential to contribute to the development of a student information center system that is more responsive to the needs and preferences of users, especially students, with the aim of increasing student engagement and active interaction in a digital campus environment. |
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INTRODUCTION

Recently there has been a change in the way humans access information. As technology develops, information no longer concerns only individuals but becomes more complex as it involves technology, resulting in an integration between individual capabilities and the technology itself (Pérez-Tornero et al., 2020). Information is data that is processed into another form that may be more useful, becoming the basis for decision-making to decide things now or in the future (Davis, 1991). Currently, universities are increasingly active in the implementation of technology in the world of education. This implementation is carried out to support the achievement of various aspects, especially in improving the quality of students. Not only through classroom learning, but technology is also beginning to be used to facilitate activities outside the classroom, such as applications to student information systems. Based on data from the Ministry of Education, Culture, Research and Technology, the number of students in Indonesia will be 9.32 million in 2022, this figure shows an increase of 4.02% compared to the previous year which was 8.96 million. Based on a case of a private university in Indonesia, the increase in the number of students poses a new

challenge in terms of equitable distribution of information. According to the student affairs team, the distribution of information is still not evenly distributed among all students causing a reduction in student relationships with the campus and a lack of student awareness of important information they need to know. The information category includes information about graduate student attributes, student values, information about current events, academic announcements, and other information or services for students, such as frequently asked questions about campus, such as room plans, etc. By presenting information that is less interesting, students are less motivated to access the information and do not want to read the information manual regularly. This is consistent with previous research stating that motivation influences students' use of campus websites, the indicators of which are enjoyment, self-esteem, and benefits gained from interacting with the website (Sriwardiningsih, 2013). If students feel that accessing the campus website does not bring them joy, pride, and benefits, then they will lose motivation to access this information through online media on their cell phones.

Apart from that, collaboration between students and campuses is also necessary to create an attractive, collaborative, and integrated information center. A technology that is popularly applied to systems in various fields and that can increase motivation is gamification technology (Swacha, 2016). Gamification combines game mechanics and elements to achieve a specific objective. Implementing this method can have an impact on increasing user engagement, motivation, and performance (Seaborn & Fels, 2015).

Related Works

Gamification is defined as the use of game elements, mechanics, features, design, and structure in a non-game environment or context. In its application, gamification is a game-based technology that applies game elements, thinking, and aesthetics to increase engagement, motivation, learning, and problem solving (Kapp, 2012). Many terms refer to game concepts other than gamification, such as Game Based Learning, serious gaming, and simulation gaming. According to the definitions of the experts who differentiate gamification from other terms, that is, gamification implies incorporating game design elements into the intended system, without removing the main function of the system. In this case, gamification can be interpreted as a process of modifying the design of an existing system or building a new system that has implemented and integrated game elements from the beginning (Seaborn & Fels, 2015). Within gamification there are the terms elements, which include gamification elements such as points, leaderboards, and badges. In addition, various experts have also introduced a taxonomy for gamification, one of which is popular, namely Mechanics, Dynamics, and Aesthetics (MDA) (Pusztai, 2023). There are several gamification frameworks that can be used to create a gamified system. Literature review on gamification design written by Alberto Mora suggests that the gamification design proposed by Kevin Werbach and Dan Hunter is one of them (Werbach et al., 2012).



Fig. 1: Gamification Framework

METHOD

In this research, a user research session was conducted with interviews to empathize to better understand the gamification users' needs. The results of the data collection in the user's research session help researchers understand who will use the gamification design so that the research design is based on real insights and not researchers' assumptions. Then, based on user research, this information is defined and implemented into gamification elements that use a mechanics dynamics and aesthetics framework. After knowing the elements of the MDA framework, the next step is to design the user interface of the student information system with gamification. This design process uses Figma software. After designing a static user interface design, the next step is to develop the design to make it an interactive design so that it can become a prototype that can be simulated. After the prototype was ready, efforts were made to collect feedback through a questionnaire session by testing relevant variables. Questionnaires were distributed to Binus residents, especially students. Students will receive a questionnaire which includes a link to the prototype and system visualization. System evaluation was carried out using a questionnaire distributed to students who would become users of this system. Thirty responses were obtained from this questionnaire. The questionnaire was divided into two parts: one for the conditions before gamification and one for the conditions after. The questionnaire covers 4 aspects: engagement, motivation, literacy, and ease of use. Additionally, there are additional questions related to the design, asking about the best features, suggestions for improvements, and the overall success of the system.

RESULT AND DISCUSION

Analysis and Design of Gamified Student information Systems

The Gamified Student Information System presents various types of information and various activities that students can do. Students and the student affairs team as an administrator can access this gamification-based student information system (Paspallis et al., 2018). Activities that students can do are view event information, like events and news, play games, take selfies, share photo, and ask chatbot. Meanwhile, the activities that administrators can perform are logging into the system, updating events, updating news, setting up game data and leaderboards, and setting up chatbots. Figure 7 illustrates a use case diagram, encompassing two users who can interact directly with the system. However,

this study will focus on the student side as the user.

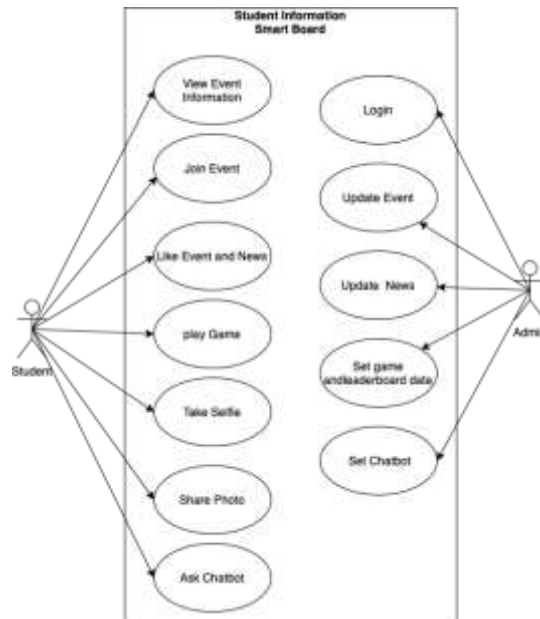


Fig. 2: Use Case Diagram

Figure 2 below illustrates the mapping of menus to be designed in the system, comprising six menus that are included in the dashboard view: calendar events, news overview, video, leaderboard, bubble chatbot, and wefie.

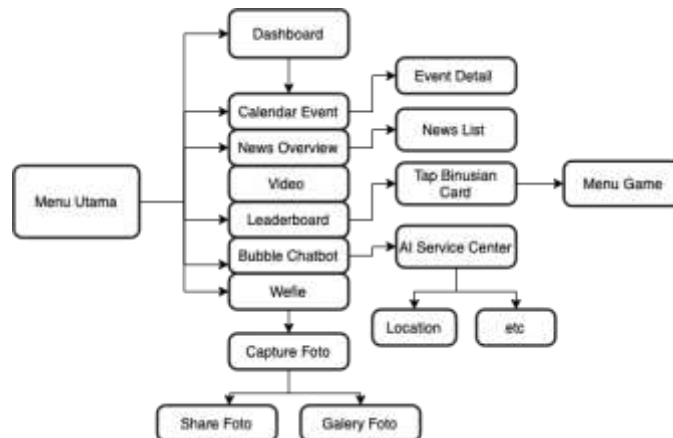





Fig. 3: Menu Mapping

Implementation of Gamified Student Information Systems

1. MDA Framework

To implement the gamification framework in this system, it will be based on the MDA framework which is adapted to the needs of the items as described in the following table:

Table 1: MDA Element Mapping

| No | Mechanics | Dynamics | Aesthetics |
|----|--|---|---|
| 1. | Point (Liu et al., 2017) | Scores obtained by the students of - Student participation with the system, such as "liking" events and news, and sharing photos. - Student success in answering quizzes about games. |  |
| 2. | Badges (Seaborn & Fels, 2015) | Degrees earned by students are based on point acquisition |  |
| 3. | Leaderboard (Deci & Ryan, 2013) (Seaborn & Fels, 2015) | A list of student rankings based on point acquisition. |  |

2. User Interface Design

Based on the results from the previous stages, the user interface design of the gamified information system has been successfully created. The design was developed using Figma software.

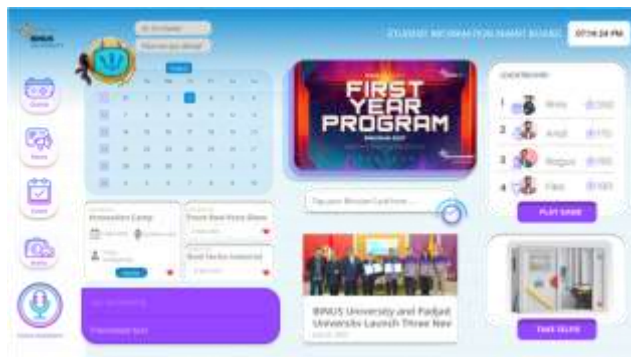


Fig. 4: Dashboard Page

The image above shows the main display which is the dashboard page of the gamification-based student information system. This dashboard provides several features on the side that can be used by users, these features are "play game", "news", "event", "wefie", and "voice assistant". This dashboard screen provides various information snippets such as event information, news, and leaderboard. Apart from that, there is also a feature to tap the binusian card, take photos and there are videos about the campus which are played on loop. To carry out several activities such as liking events, playing games and taking photos, you need to tap a card so your identity can be detected.

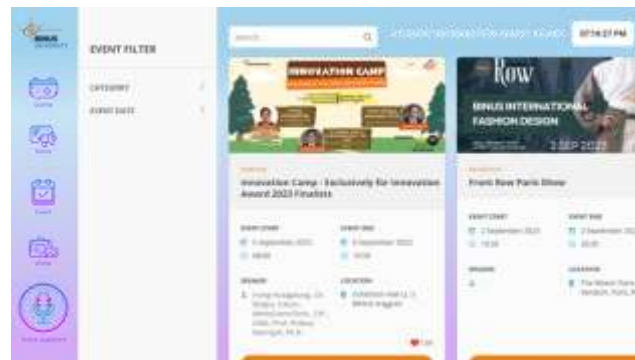


Fig. 5: Event Page

The image above shows the page that appears if the user selects the "event" feature or presses the event information snippet on the dashboard. This page provides information about events taking place on campus in the near future, users can like these events and can register for events through this sgamifikasi-based student information system. Users will get points from every activity they do.

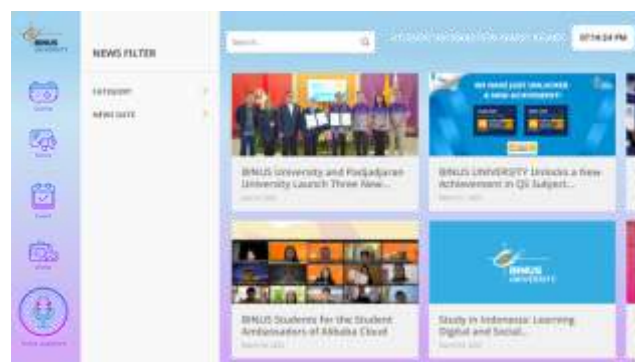


Fig. 6: News Page

The display above is the news display that will appear if the user selects the "news" menu or presses the news snippet on the dashboard. This display contains a list of news about campus that is happening in the near future

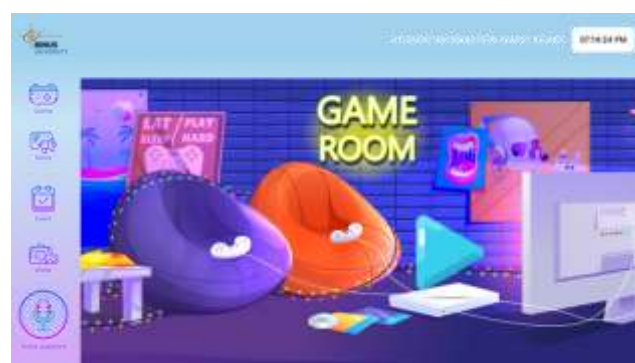


Fig. 7: Game Page

The display above is the display that appears if the user presses the "play game" feature. On this display there is a play button which, if pressed, will start the game.

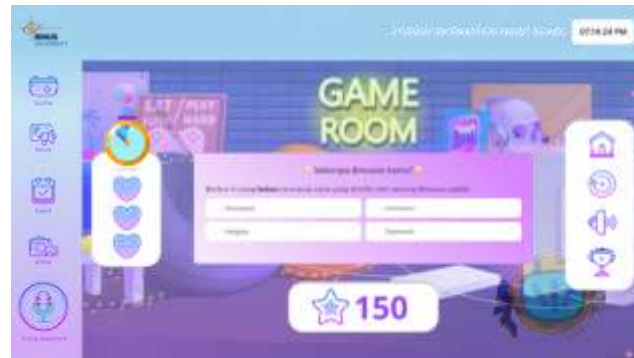


Fig. 8: Quiz Page

The display above is the display when the game is in progress. On this display there is information about the time, lives, score and also quiz questions that must be answered by the user. Then on the side there are various menus such as "home", "replay", "sound", and "leaderboard".



Fig. 9: Wefie Page

The display above is the display if the user selects the "wefie" feature. This display captures the user's image via the martboard and the user can receive the photo via email.

3. Evaluation

The system evaluation was conducted using a questionnaire distributed to students who will be users of this system. Thirty responses were obtained from this questionnaire. The questionnaire is divided into two sections: one for the conditions before gamification and the other for the conditions after. The questionnaire covers 4 aspects: engagement, motivation, literacy, and ease of use. In addition, there are additional questions related to the design, inquiring about the best features, improvement suggestions, and the overall success of the system.

Table 2 : Engagement, Motivation, and Ease of Use Evaluation result

| No | Aspect | Item | Mean Before Gamified | Mean After gamified |
|----|-------------|-----------------|----------------------|---------------------|
| 1 | Engagement | The Frequency | 3.6 | 3.9 |
| 2 | Engagement | Feel Connected | 3.9 | 4.0 |
| 3 | Engagement | Enjoyment | 3.6 | 4.0 |
| 4 | Motivation | Meeting needs | 3.7 | 4.2 |
| 5 | Motivation | Innovative | 3.7 | 4.2 |
| 6 | Motivation | Problem-solving | 3.7 | 4.0 |
| 7 | Literacy | Curiosity | 3.5 | 4.1 |
| 8 | Ease of use | Convenience | 3.6 | 4.3 |

CONCLUSION

This research was conducted to address the challenges faced by the university student affairs team in disseminating information or knowledge about the campus uniformly to all students. The existing student affairs information websites are typically static and non-interactive, leading students to rarely access campus information from these websites but rather from external sources such as social media or chat applications, and through word of mouth among students. Therefore, a gamified design with MDA elements displayed on a smartboard is proposed as a solution. Based on the results of the questionnaire, there is an improvement in the average scores for the aspects of engagement, motivation, literacy, and ease of use in the gamified system. It can be concluded that students will enhance their engagement and motivation to access the gamified system, thereby also positively impacting the literacy improvement among students regarding campus information.

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