Gamification-based The Kampus Merdeka Learning in 4.0 era

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Abstrak
Belakangan ini pendidikan diramaikan dengan hadir program Kampus Merdeka yang dicetuskan oleh Nadiem Makarim. Hal itu menggunakan konsep Kampus Merdeka belajar mengikuti perkembangan pendidikan di era 4.0. Perubahan ini menjadi paradigma bagi Perguruan Tinggi untuk membangun Kampus Merdeka belajar agar siap menghadapi tantangan di era 4.0. Namun, tantangan itu tidak mudah bagi Perguruan Tinggi agar mahasiswa mengikuti program merdeka belajar dengan cepat. Penelitian ini bertujuan agar mahasiswa termotivasi mengikuti kegiatan merdeka belajar pada sistem pembelajaran kolaboratif dengan teknik gamifikasi. Gamifikasi tersebut berupa reward lencana atas pencapaian mahasiswa dalam segala aktivitas pembelajaran yang dilakukan. Sistem merdeka belajar Perguruan Tinggi dirancang menggunakan metode studi pustaka dan Agile Development dengan 2 framework yaitu Laravel dan VueJS. Dapat dibuktikan dari hasil Analisa Skor SUS menunjukan angka 92,5 menandakan bahwa sistem kampus merdeka belajar memberikan manfaat positif dengan gamifikasi mahasiswa lebih termotivasi dan siap menghadapi tantangan belajar di era 4.0.

***Kata kunci**— Kampus Merdeka, Gamifikasi, Laravel, Agile*

Abstract
Recently, education has been enlivened by the presence of the Merdeka Campus program initiated by Nadiem Makarim. It uses the Kampus Merdeka concept to learn to follow the development of education in the 4.0 era. This change has become a paradigm for Higher Education to build a Merdeka Campus to learn to face challenges in the 4.0 era. However, the challenge is not easy for universities, so that students join the independent program to learn quickly. This study aims to motivate students to participate in independent learning activities in a collaborative learning system with gamification techniques. Gamification is in the form of reward badges for student achievement in all learning activities carried out. The higher education independent learning system is designed using the library study method and Agile Development with two frameworks, namely Laravel and VueJS. It can be proven from the results of the SUS Score Analysis showing the number 92.5 indicating that the independent learning campus system provides positive benefits by gamification of students being more motivated and ready to face learning challenges in the 4.0 era.

***Keywords**—Kampus Merdeka, Gamification, Laravel, Agile*

1. INTRODUCTION

Education is an essential part of life and must be in line with the times. The times must have challenges with the flow of globalization and technological advances. Nowadays, the world has entered a high-tech era in life. Revolution 4.0 or often referred to as era 4.0, is the fourth phase marked by the birth of digital technology which is very influential in people's lives [1]. For example, in the field of economics, the internet is not only used to find information but can be used as a business area such as online transportation, online shops, and so on [2]. This era is also said to be the era of disruption because it influences life to make it easier, more affordable, cheaper and faster in all fields, for example learning some vocabulary from English is absorbed into Indonesian [3]. Seeing from the growing needs of society, university students must prepare and adapt themselves to become useful human beings, not for themselves but those around them [4]. Learning innovation 4.0 using educators mastering learning methods for educators by adopting and even developing their creativity is a first step that can be done and take advantage of mastery of technology in learning [5][6]. This refers to the independent learning program initiated by Nadiem Makarim.

Figure 1. Legal Basis of Free Learning Policy

The background to the idea of a Kampus Merdeka is a concern over the many unsynchronized or separate learning processes from the real world. Whereas learning often does not bring about factual reality which is warmly discussed, the impact is that there is a dividing line between lectures and the real world [7]. Merdeka Campus has 4 (four) central policies, namely, Opening of New Study Programs, Higher Education Accreditation Systems, Higher Education for Legal Entities and Three Semester Study Rights Outside the Study Program, each of which has its legal umbrella. Permendikbud No.5 and 7 regulates the Policy on the Opening of New Study Programs, Permendikbud No.5 regulates the Accreditation System Policy for Higher Education and Higher Education Legal Entities in Permendikbud No. 4 and 6 as well as the right to study three semesters outside the study program under Permendikbud no.3 [8][9]. It is a challenge for students to be able to follow the new policies of the government. If the learning method used is less attractive, it makes students less enthusiastic and sleepy during lectures, and the teacher feels there are too many lecturing activities rather than communication

practices [10]. So it takes learning with a system that is not boring, namely the presence of gamification in independent learning. Gamification in learning has a very positive impact and fun learning for the world of education [11]. So with the application of gamification techniques for students, it is useful to increase student motivation to join the Kampus Merdeka program, which is the urgency of this research.

2. METHODS

2.1 Agile Scrumban Method

The method used in this research is Agile Scrumban, by combining the Scrum and Kanban methods, researchers can easily select the work to be done based on the level of difficulty and finish it in a short time so that the system creation process is more effective and efficient.
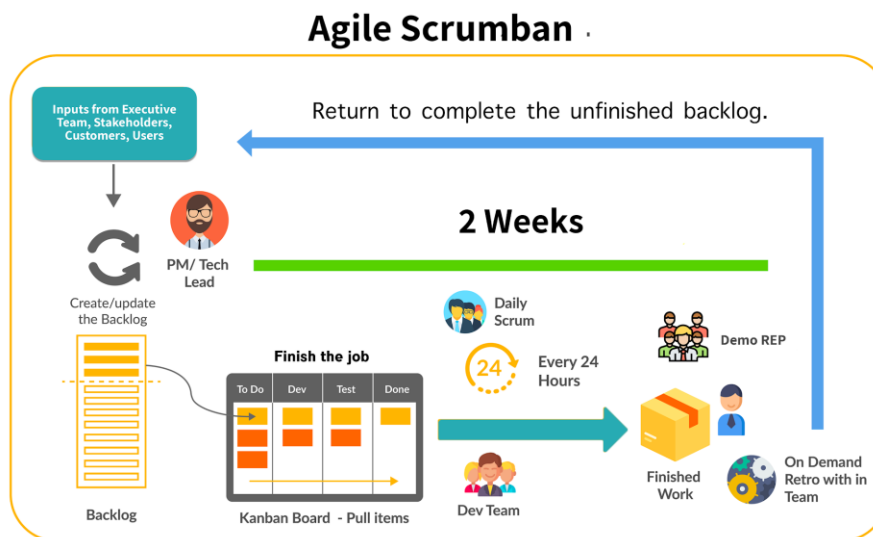

Figure 2. Agile Scrumban in the Kampus merdeka learning system

In Figure 2, there is a flow from Scrumban, starting from the researcher making a backlog list containing work based on the system requirements that have been analyzed starting from the work of creating a database structure with PostgreSQL, Algorithms for the backend of the system such as gamification using Laravel, RestAPI and the system User Interface using VueJS. Then from the backlog list will be reselected by the team based on the level of difficulty and speed in completing. Furthermore, the selected backlog will be added to the kanban board in the To-Do section; each selected backlog must be completed within two weeks or during the sprint period. Every day the team conducts a daily scrum together, discussing achievements, existing obstacles and plans for the next work. If all the backlogs have been successfully completed, the next is a demo of the REP system to the owner and students after that the system is ready to be released. The difference between the scrumban method and the others is that after all is finished, there will be a retrospective meeting, all team members will discuss the previous sprint, plans for the next sprint to be better and more effective than before so that it can produce a system with good quality and useful functionality.
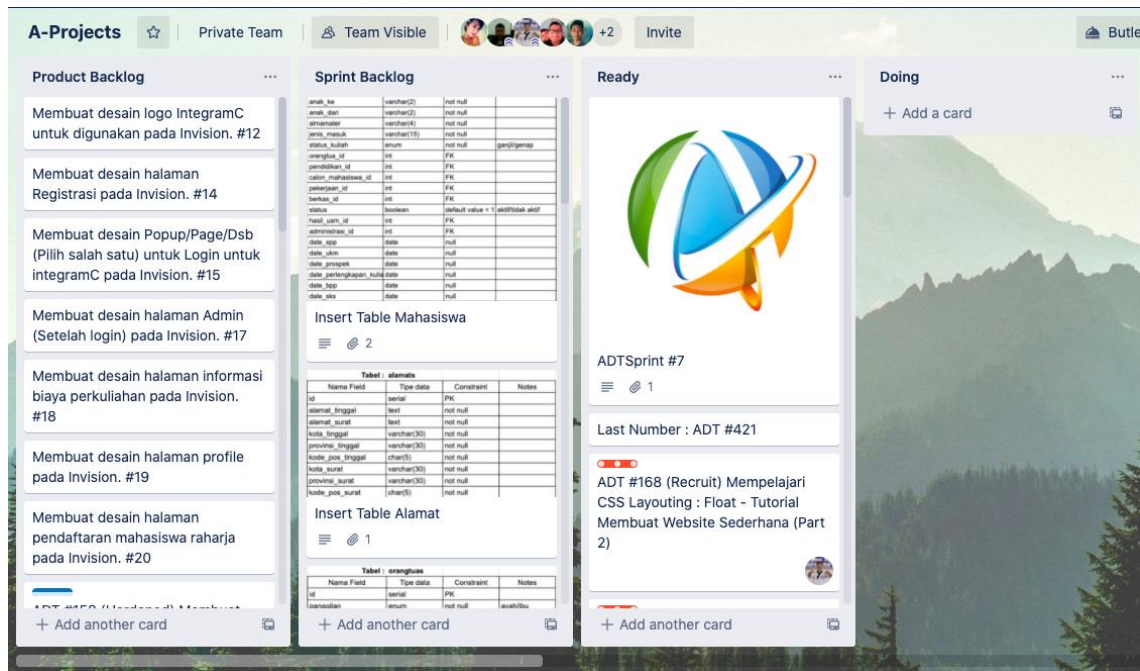
Figure 3. Scrumban Board

Scrumban board in figure 3, in the product backlog section, has been inputted and compiled by the researcher based on the needs of the analysis carried out. The backlog list in the product backlog will be transferred to the researcher's sprint backlog so that the sprint work is ready to be done. Every backlog that is being worked on must be entered into the Doing table so that other researchers can monitor it. After completion, it will be transferred to the review table, the part that has been done will be reviewed together at the daily meeting stage, and if it has passed the review, then the backlog is declared complete. Each sprint will be carried out for two weeks, five sprints.

2.2 Literature Review

There are 12 (twelve) literature reviews to support this research according to the topics discussed. Free learning which is implemented in the era of society 5.0, which is centred on human potential in developing critical thinking skills, therefore a professional teaching role is needed [12]. The relevance of the learning method with gamification following an era where students prefer to play games rather than learning; this can be applied to higher education [13]. Facing the alpha generation requires an innovative method by applying Tri Hita Karana based gamification with the aim of preserving students' understanding of human-human relations, human-god and human-human-environment so that the class can enjoy and be more active in the class room [14]. Then the technology in the era of 4.0 is increasingly disrupted, which emphasizes universities to improve the quality of teaching, in this case, the existence of iLearning learning with a combination of gamification features to increase student enthusiasm for doing assignments on time and learning more interestingly [15]. The survey results by the Director of Learning showed 23% low engagement of leaders, then the application of gamification showed a significant impact on employee engagement on learning with an increase of 38.4% [16]. The learning reality today is based on Game-Based Learning (GBL) as a new dimension, gamification applied in Arabic learning contributes positive and relevant factors towards continuous quality improvement [17].

A flexible platform is needed in the design of lecture gamification so that it has excellent performance and can be accepted by the user and is integrated with SI games [18]. The presence

of students in higher education often occurs because of boring learning, the function of gamification shows the activity of students who are diligent in going to campus to research in order to get a reward from the lecturer [19]. Other studies have shown an increase in students' mathematical strategic abilities by applying a gamification-based cooperative learning model as much as 78% [20]. Furthermore, the implementation that is applied to gamification learning with kahoot media also helps increase learning activities, learning motivation and improving journal learning outcomes for students [21]. Subsequent research on the learning program in PAUD also applies gamification techniques to increase students' motivation in learning hijaiyah letters and everyday Arabic to be closer and interested [22]. Even gamification in the world of education can now be more sophisticated towards blockchain so that students can further explore their knowledge [23].

3. RESULTS AND DISCUSSION

3.1 Decision Tree Model

From the analysis results, then developed into an illustration using the Decision Tree Model in order to make predictions with a hierarchical structure and tree structure. Figure 3 describes the Gamification Algorithm in the Independent Learning Campus system which is illustrated in the form of a decision tree structure, where there are 1 (one) root, 6 (Six) Internal Nodes, 12 Leaf Nodes.
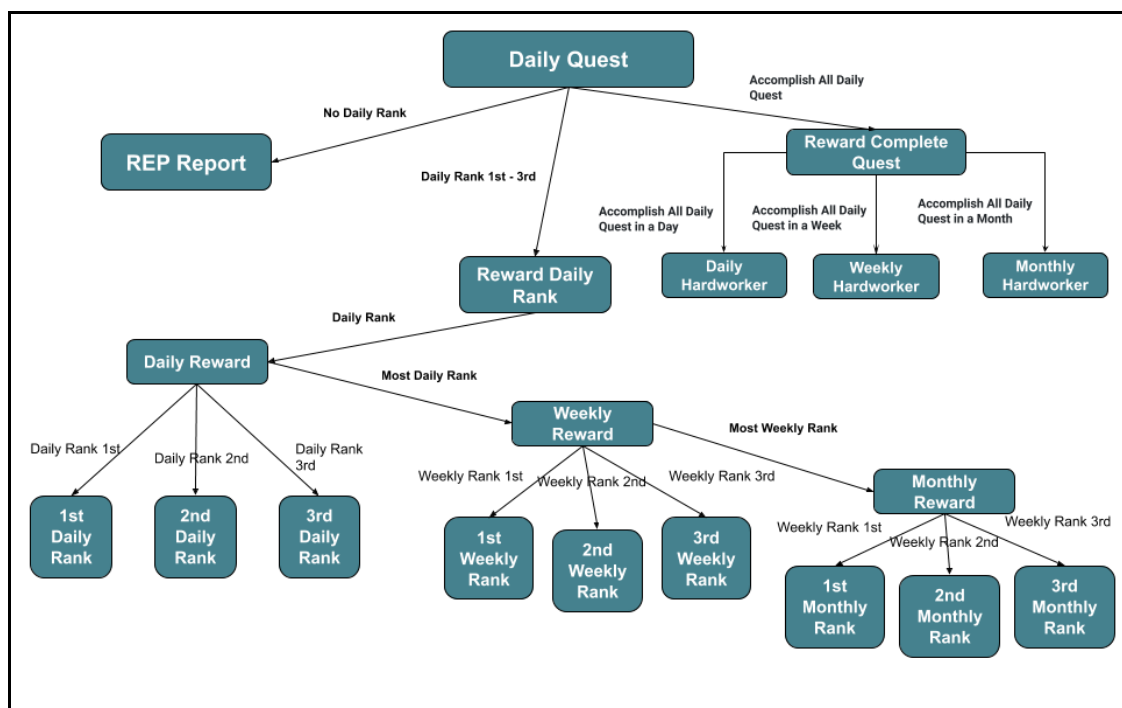

Figure 4. Decision Tree Kampus Merdeka Belajar System

Starting from the Daily Quest and daily assignments to get a reward in the form of a badge, students are required to complete the assignment given, each task that is completed gets points that will be accumulated and calculated to determine the daily ranking. If a student gets a daily ranking from the first to the third rank, he/she is entitled to a badge according to the rank. Points will be accumulated to produce weekly and monthly rankings by counting students who can get the most points. Also, students who can complete all daily assignments are entitled to get the

Daily Hardworker badge. If students can survive to complete all assignments well for one week to 1 full month, they will get Weekly Hardworker and Monthly Hardworker badges. By using a decision tree structure model, it makes it easier for researchers to understand, so it is more effective in shortening the system development time to make it more efficient.

```php
public function monthly(){
    $date = Carbon::now()->setTimeZone('Asia/Jakarta')->format('Y-m');

    $users = User::whereIsActive(1)->whereRoleId(3)->get();

    foreach($users as $user){

        $experience     = Experience::whereUserId($user->id)->first();

        $records        = Record::where('created_at','like','%'.$date.'%')->whereStatus
        ('verified')->whereUserId($user->id)->sum('value');

        $count          = Record::where('created_at','like','%'.$date.'%')->whereStatus
        ('verified')->whereUserId($user->id)->count();
        $data[]     = [
            'detail_user'   => $user,
            'media'         => $user->media->path,
            'level'         => $experience->level()->first(),
            'total_value'   => $records,
            'total_quest'   => $count,
        ];

    }
    $badges         = Badge::with('media')->whereBetween('id',[7,9])->get();

    $media  = collect($badges)->map(function($item){
        $path  = url('/').$item->media->path;

        return $path;
    });

    $data = collect($data)->sortByDesc('total_value')->skip(0)->take(10)->all();

    $array = data_get($data,'*');

    return response()->json([
        'details'       => $array,
        'media_badge'   => $media,
    ],200);
}
```

Figure 5. Gamification algorithm in the system kampus merdeka belajar

In Figure 5 there is a line of gamification code using the Laravel PHP framework with the aim that each student will be ranked based on the points earned within a specified time such as per day, week and month. If after the calculation, the student gets a top 3 rank, then the student is entitled to a badge according to the ranking obtained, so that it can motivate students who get a badge and those who have not received a badge further to increase their activeness in independent learning campus activities.

```php
//Route for Global Rank
public function global(){
    $users = User::whereIsActive(1)->whereRoleId(3)->get();
    foreach($users as $user){
        $experience = Experience::whereUserId($user->id)->first();
        $data[]     = [
            'detail_user'   => $user,
            'media'         => $user->media->path,
            'level'         => $experience->level()->first(),
            'total_value'   => $user->experience->total_value,
            'total_quest'   => $experience->total_quest,
        ];

    }

    $data = collect($data)->sortByDesc('total_value')->skip(0)->take(10)->all();

    $array = data_get($data,'*');

    return response()->json($array,200);


}
```

Figure 6. Route for Ranking Global

Furthermore, Figure 6 above is a gamification algorithm for the ranking system of the Vue JS programming language. This algorithm will calculate as a whole as long as students take part in Kampus merdeka activities based on their experience, namely the points collected that can be obtained from daily assignments that must be complete.
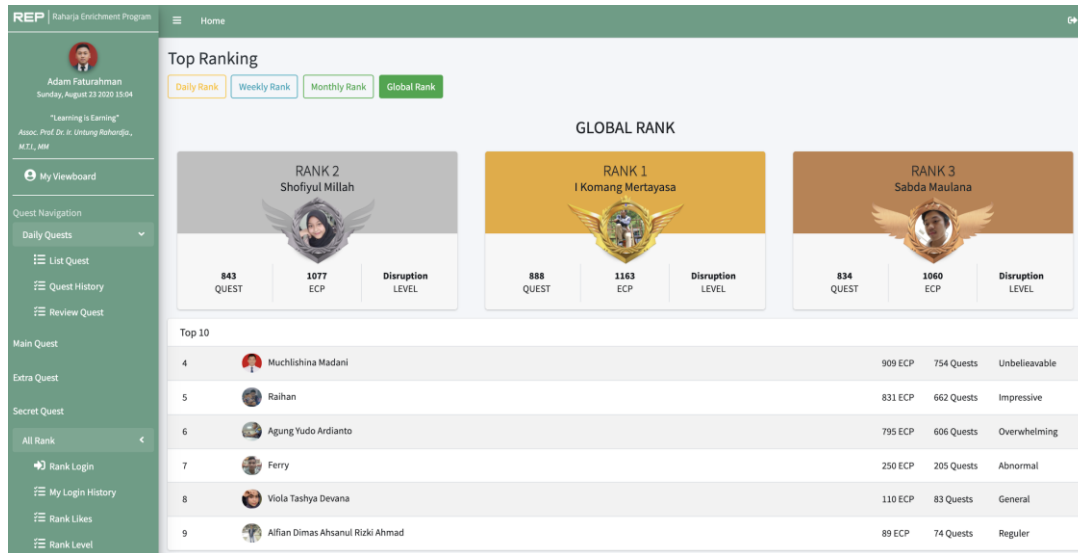
3.3 Testing System

Figure 7. Viewboard System

In the viewboard that has added gamification, there is a list of daily, weekly, monthly and overall rankings. Students can see the points they have earned, how many they have completed assignments and ranking status. Every student who successfully enters ranks 1 to 3 will get badges and unique frames on student photos. The existence of a special badge and frame can increase student motivation to learn to be the best.
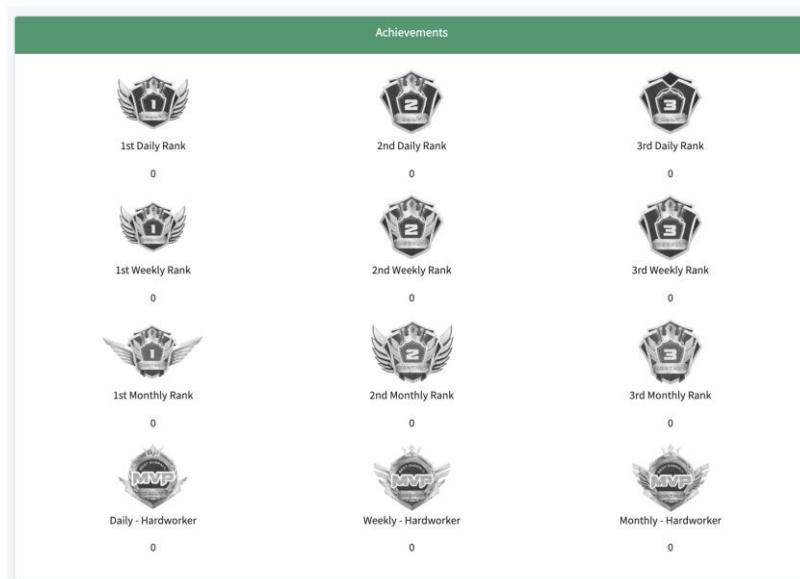

Figure 8. List of badges for students

Figure 8 shows gamification in the form of badges that can be obtained by students if they meet the specified requirements, there are 12 badges and divided into two categories. The first category is based on the rankings with a total of 9 badges that can be obtained if students succeed in ranking daily, weekly and monthly with positions 1 to 3. The second category has three other badges that can be obtained by completing all daily tasks every day and will get a Daily Hardworker if students can complete all assignments in 1 consecutive week then they are entitled to a Weekly Hardworker badge and if it exceeds one month get a Monthly Hardworker badge. Every badge earned will be accumulated and can be seen on the My Viewboard menu so that the existence of gamification in the form of badges can increase the enthusiasm of students in participating in Kampus merdeka activities.
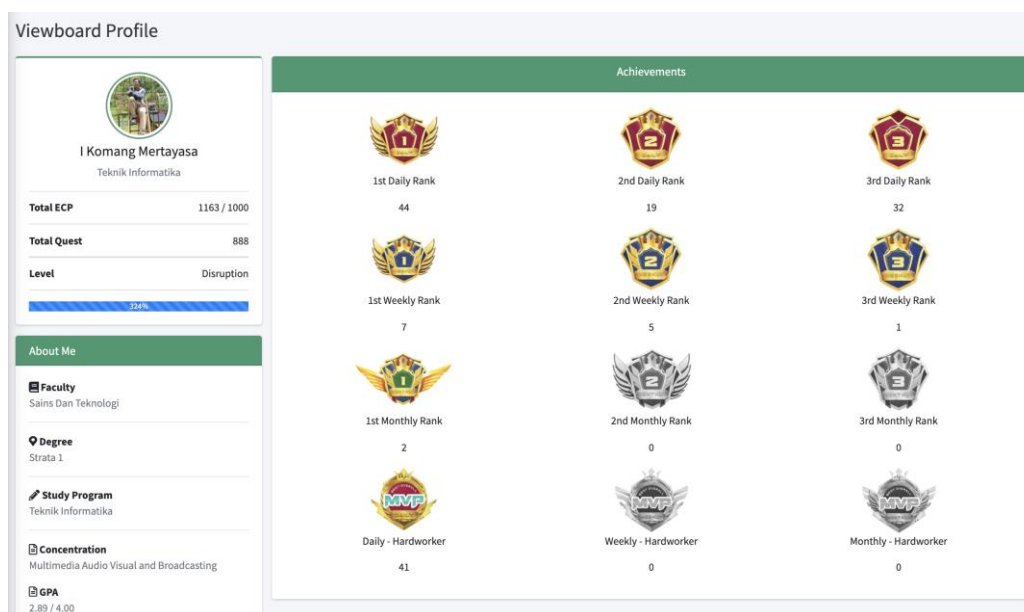

Figure 9. Viewboard student profile

Figure 9 shows the viewboard page of the Kampus merdeka student profile. Students can see information on their achievements during the Kampus merdeka study program. There is information in the form of how many badges students have obtained when the badge is successfully obtained. The badge image will be light-coloured, if not successful it will be dark. Also, students can see information about how many points they have earned, the number of assignments that have been completed and the levels that have been achieved.

3.4 Evaluation System

After the system was released and accessed by many students, researchers evaluated to determine user satisfaction with the gamification-based learning system using the System Usability Scale (SUS). By using SUS, it can be seen the benefits and effectiveness of the system that has been designed through a questionnaire distributed to students of independent learning campuses. The evaluation process starts with obtaining population data; it is known that 200 students have participated in independent learning campus activities. The slovin formula is used to make it easier to determine the right number of samples (1). The population data will then be processed with the Slovin formula and will be calculated with an error margin of 1% to produce the following.

$$n = \frac{231}{1 + 231.(0,1)^2} \tag{1}$$

$$n = \frac{231}{2,32}$$

$$n = 99,56 \rightarrow 100$$

Based on the calculations that have been done, the number of samples obtained is 99.56 or if rounded up to 100 respondents. The questionnaire in the form of google forms was distributed via email to students. Each student provides a statement of each question asked. It was calculating the weight of the student's statement using a Likert scale from a scale of 1 to 5. The Likert scale value will be accumulated after being processed to produce a student's SUS score (2). The average score is obtained from each statement given by the student. Then the average value will be entered into the variables R1 to R10.

$$X = ((4) + (5) + (3) + (3) + (5) + (2) + (4) + (5) + (3) + (3)) * 2,5 \tag{2}$$

$$X = \frac{92,5 * 100}{100}$$

$$X = \frac{9250}{100} = 92,5$$

The first stage is to find the X value, namely the total of the SUS score as a complete, valid student statement. Students who followed the questionnaire were 100 respondents. Of the 100 respondents, the average value was obtained and entered into the variables R1 to R10. Next, multiply and divide by the number N, namely the number of respondents so that the SUS score was obtained of 92.5.
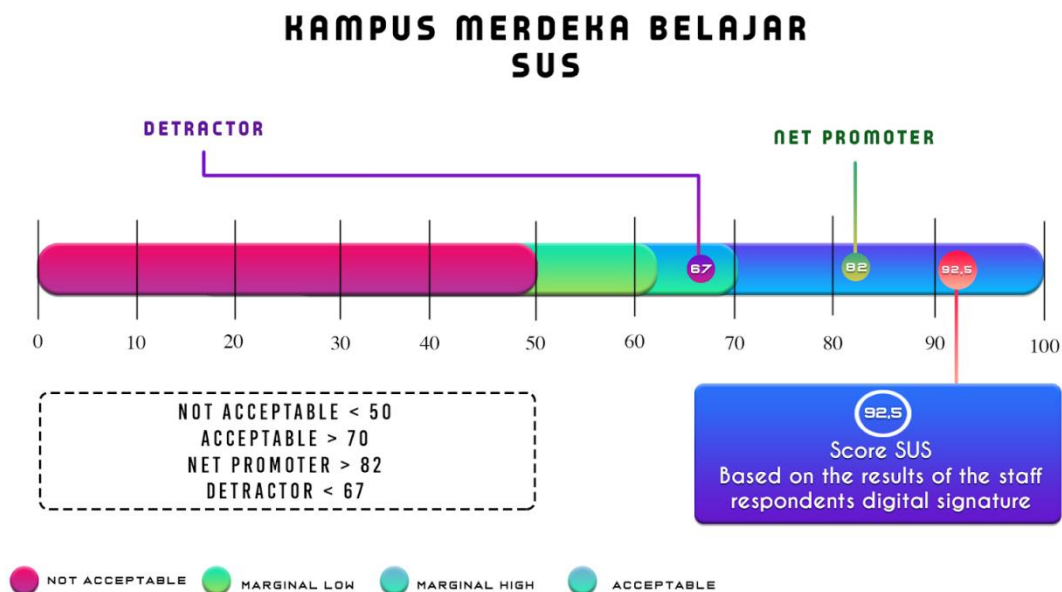

Figure 10. Score SUS The Kampus Merdeka system

The results of figure 10 show that the SUS score reaches 92.5, the Independent Campus learning system provides many positive benefits for students and tertiary institutions so that it proves that student motivation can increase significantly if the gamification concept is implemented in a system. The positive impact given by the Free Campus learning system is a force capable of the success of Kampus Merdeka program in higher education.

4. CONCLUSIONS

Learning is the most crucial thing in the world of education so that a new paradigm is needed so that educators can become professionals and students can be more innovative. The presence of the Kampus merdeka or independent learning in the 4.0 era is a challenge for Higher Education to be more advanced. This study shows the impact of the benefits felt by students after implementing gamification in the independent learning campus system. The solution to the problems faced is a Kampus merdeka learning system with gamification. The presence of gamification is the key that can provide significant benefits for students and universities as well. Because students are increasingly motivated to participate in Kampus merdeka activities and are enthusiastic in competing to complete assignments and get rankings and badges like playing a video game, of course, this will have a positive impact on universities in the success of the Kampus merdeka program. Based on the research that has been discussed, the authors have not developed an Kampus merdeka system to learn to a further stage towards more sophisticated data distribution, namely blockchain with Artificial Intelligence. It does not rule out the possibility that it can be developed into the next research so that this research has more value and is increasingly useful. It is hoped that this system and research can be useful and develop globally for the success of a Kampus merdeka.

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