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Blockchain Education Concept 4.0: Student-Centered iLearning Blockchain Framework

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Abstract

Technological developments encourage digitalization in the learning process. Contrary to the results of the evaluation, which is still the responsibility. It causes students' competitiveness and competencies that are not determined quantitatively. The application of micro-teaching could be an option for solving existing problems. Combining gamification and Blockchain technology makes the learning process more fun with game techniques, where activities such as coursework and assessments are transparent and have security and also have security. This student-centered learning process is called Gamification Blockchain (GamiChain). This Blockchain-based gamification learning application is also an important activity that could be a breakthrough in education. This application aims to encourage the ecosystem of student creativity so that students have a more competitive spirit to compete with their maximum abilities. They can display learning outcomes in the form of accurate certificates in origin and can be used in the industrial world. GamiChain can establish official learning standards by documenting lectures permanently, transparently and distributing them formally and informally on the Blockchain network with the help of smart contracts. The method used in the study is a literature review of previous research and a data analysis method using Slovin's calculations. The gamification strategy used in this study resulted in an evaluation of the implementation of Blockchain in education through Gamification Blockchain, which can benefit universities by making official certifications and increase the confidence of students' values transparently and sustainably that they can control.

Keywords: Blockchain, Decentralized, Education, Framework, Gamification

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INTRODUCTION

The rapid development of technology has triggered a digital revolution. One technology that is attracting attention is Blockchain. Blockchain technology is widely applied and studied in various fields such as finance, health, business, and others

(Goshevski et al., 2017). It does not rule out the use of Blockchain technology in education, even though currently there are only a few literature studies and cases in education and teaching to apply Blockchain itself (Ortiz & Nicolas, 2019). The application of Blockchain technology to the world of education is urgently needed (Al-Azawi et al., 2016). You could say Blockchain seems to be a beacon, a revolutionary solution in educational polemics that often occur (Parra-González et al., 2020). Supporting entering the 4.0 era, it is hoped that Blockchain technology is applied in the world of education because of its superiority, namely cryptography and decentralization, to eliminate fake things, such as diplomas. So that Blockchain can contribute to success in improving the quality of education globally (Ofosu-Ampong et al., 2020). This technology can be the best means included in the validation system for the authenticity of educational documents that often experience forgery because it takes a long time when the company confirms and validates the diploma manually (Sánchez-Carmona et al., 2017). A significant reduction in time is accompanied by a decrease in counterfeiting to the selling point of Blockchain technology (Martí-Parreño et al., 2016). The allocation of Blockchain technology utilization will be the focus of this research.

Student competitiveness and competence cannot be measured quantitatively because the process does not apply micro-teaching. There have been many Learning Management Systems (LMS), but no one has implemented the Blockchain gamification technique, so that student interest in the learning process is inefficient (Khalil et al., 2018). The problems that occur cause students to experience boredom in the learning process to be less adaptive and less creative (Brull & Finlayson, 2016). So it is believed that the importance of applying student-centered learning processes and applying Blockchain gamification techniques is the key to creating a very independent learning process ecosystem (Almeida & Simoes, 2019). Therefore, problem solving can be transformed with a combination of gamification and Blockchain to make the atmosphere of the learning process more enjoyable with game techniques, where activities such as learning, lecture assignments and assessments, are documented transparently, and also have very reliable security (Rahardja, Aini, et al., 2019). The presence of Blockchain technology in education is expected to be a new pioneer by offering a cryptographic and decentralized system. This student-centered learning process is called Gamification Blockchain (GamiChain).

This Blockchain gamification-based learning application can be a solution and have a targeted impact in solving existing problems, in line with the vision and mission in the field of education. In an effort to transform the learning process in Indonesia, it is more enjoyed by the millennial generation (Rahardja, Handayani, et al., 2018). This application aims to encourage the creativity ecosystem of students in independent learning, to have a more competitive spirit so that they can compete to be superior individuals. And can display learning outcomes in the form of certificates that are accurate in authenticity and can be used in the industrial world. This application is a solution for tertiary institutions that want to implement the Free Learning - Merdeka Campus ecosystem in disruption. This research is reliable because the programs offered are in line with developments in the world of education.

As technological developments change, learning has begun to be distributed and online is becoming more common. Some of today's higher education teaching and learning are already online and digitizing. iLearning is learning with the adaptation of an electronic education system that is inseparable from learning activities in everyday life (Erna et al., 2021). iLearning adopts 4B (Learn, Pray, Work and Play) as an iLearning architecture to help the learning process (Sudaryono et al., 2020). The iLearning system in the 4.0 era in the learning process will make learning more effective and efficient by learning online and offline so that time is shorter. However, this still makes students tend to depend on educators in learning. In addition, students' concerns about the results of student

performance evaluation are still centralized (Rahardja, Aini, Ngadi, et al., 2020). Non-transparent assessments can also occur because of hackers in the online scoring system. So that the ability to verify student assets from skills, knowledge, and student outcomes is not well documented. Assessment is a major factor in student motivation in learning (Oganda, 2021). This problem occurred in the era of 4.0, even though it has taken place online, but security is still questionable and needs to be accounted for (Aini, Rahardja, et al., 2019).

With iLearning, of course, students have a high interest in studying. The material delivery is interactive and does not make students feel bored (Aini, Dhaniarti, et al., 2019).If students have a good response, students are always active in following the course. There will be good interaction between lecturers and students. Besides that, it will be easy to turn on effective and efficient learning in the class (Rahardja et al., 2021).

ILearning learning activities are an issue that has an impact on the quality of education in Indonesia. Indirectly in the ilearning process students depend continuously on the educators for the results produced. Dissatisfaction with the non-transparent student achievement is the main cause of the absence of a significant increase in the quality of education (Rahardja, Aini, & Khoirunisa, 2018). Through Blockchain-based Student Centered iLearning (Sci-B) which is being carried out, it is the main step in overcoming this as a transformation of education in Indonesia. However, there will be problems if there is no agreement between students, educators and universities in Gamification Blockchain activities, so there is a need for a smart contract at the beginning of each activity to determine educational standards (Aini et al., 2018).

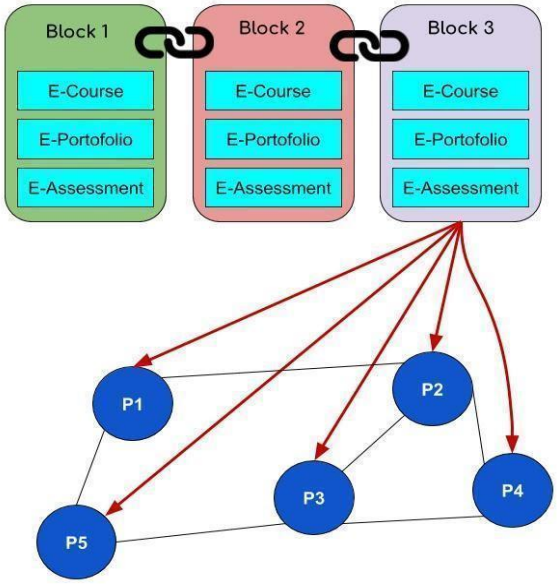

Figure 1. Blockchain asset structure (replicated on each peer)

Blockchain is of concern to many parties because of its transparent nature, eliminates third parties with smart contracts, and distributes assets by replicating to many nodes (peer to peer). It can be said as decentralized, and investments will sync automatically when a new block appears, respectively. Each node stores an identical copy of each existing asset (Sundari & Leonard, 2021). Figure 1 describes the Student Centered iLearning (SCi-B) service, which has various holdings in a block connected to form a Blockchain. The growing implementation of Blockchain in Latvia-Estonia allows students

to accumulate competencies and achievements collected for life in a safe, transparent and permanent environment with direct user access (Aji & Suparno, 2021).

1.1 Research Purposes

This research increases motivation to build a student-centered education environment based on Blockchain gamification techniques to create an educational ecosystem 4.0 in support of the government's Merdeka Belajar Kampus Merdeka Based on Student-Centered iLearning Blockchain, which can: Increase the utility and relevance of the colleges, aligning the development of science and technology in universities to be in harmony with the Education 4.0 ecosystem. Through the implementation of the Student-Centered iLearning program (Aini, Lutfiani, & Zahran, 2021). The improvement of the education system in Indonesian universities is carried out by applying Blockchain technology. It delivers superior technology in the form of the iLearning Passport, which can replace the function of the diploma and list of values into an educational passport, iPassport.

1.2 Research Novelty

The hypothesis is that applying Blockchain Gamification technology in the education system could increase security and transparency in the system system (Rahardja, Lutfiani, Lestari, et al., 2019). The research focuses on using documented and distributed Gamification Blockchain technology with digital Student-Centered iLearning in Higher Education. New challenges include digital ilearning, transparency of assessment results, and verification without a third party being at the center of the program. The 3 (three) research novelties include the Improvement of 3 (three) main elements in ilearning activities, namely courses, portfolios, and assignments that are carried out digitally (Rahardja, Aini, Ariessanti, et al., 2018). Blockchain gamified asset management flow, which is a framework between students, educators, and universities, is made more efficient with a guaranteed security level (Lutfiani et al., 2021). Due to the limited resources and funding, the Student-Centered iLearning framework was tested based on simulation results, which allowed further development to be implemented in real life (Aini, Yusup, Santoso, et al., 2021).

METHODS

The method used in this study is a literature review method from previous studies. In addition, this study also uses the Slovin calculation method. The research was conducted from March 17 to May 31, 2021 at the University of Raharja. This research was carried out. The application of Blockchain technology could be a transformative step that encourages the creation of new breakthroughs in the world of education (Agustin, Aini, et al., 2020). This Gamification-Based Application is implemented with the aim of increasing student motivation for carrying out lectures so that the learning process can be more interactive and efficient (Rahardja, Aini, & Hardini, 2020). Blockchain benefits are also important because it is trustworthy, transparent, distributed and eliminates the nature of third parties. In other words, the industry can independently verify the documents that have been issued by the university (Prawiyogi & Toyibah, 2020).

2.1 Literature Reviews Method

In an effort to strengthen this research, there are 5 (five) Literature Reviews from previous studies, namely:

1. In more detail, defines gamification as a concept that uses game-based mechanics, aesthetics and thinking games to bind people, motivate actions, promote learning and solve problems (Kenta et al., 2021).
2. Gamification can be defined as a process that uses thinking and game mechanics to bind users and solve problems (Prawiyogi et al., 2020).
3. The development of the gamification concept in the learning system, resulting in the efficiency of the work of lecturers in inputting UTS, UAS, and Independent Assignments on time (on time) (Agustin, Syafnidawati, et al., 2020).
4. Gamification technology is needed, in an effort to improve the certificate authenticity verification system (Aini, Budiarto, Putra, et al., 2021)
5. This study discusses the advantages of Blockchain Gamification, namely a high level of security so that it can secure data (Hursen & Bas, 2019), this reminds us of prevention in the use of data by irresponsible people (Kayimbaşioğlu et al., 2016).

2.2 Sample Calculation Method

In the study of learning systems based on Blockchain technology, 30 data will be involved through sampling techniques in the form of interviews using questionnaires distributed through social media such as WhatsApp, Instagram, Facebook, and Twitter. This study will use the calculation method using the Slovin calculation, where the provisions for data are 30 people in the population with a set margin of error of 1% or 0.01. The characteristics of the data used are based on filling out questionnaires filled out by students from universities.

$$n = \frac{N}{(1 + N.e^2)}$$

$$n = \frac{30}{(1 + 30\ x\ 0{,}05^2)}$$

$$n = \frac{30}{(1 + 30\ x\ 0{,}0025)}$$

$$n = \frac{30}{(1 + 0{,}075)}$$

$$n = \frac{30}{(1{,}075)}$$

n = **27,906** rounded to **28**

From Slovin's calculations above, it can be safely analyzed that out of 30 people, there are 28 people who are the benchmark for the minimum data sample used in research on learning systems based on Blockchain technology.

RESULTS & DISCUSSION

3.1 Educational Document Storage Security System

3.1.1 Decentralized approach to online education

In the process of realizing the use of Blockchain technology in education, through the Gamification Blockchain application, there are elements of Student-Centered Learning which are described in the image below:

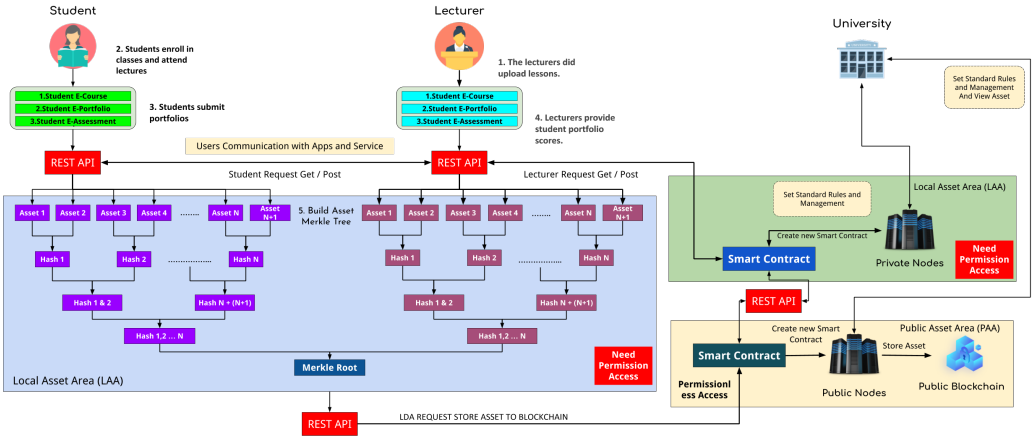

Figure 2. Elements of Student Centered Learning

Figure 2 discusses the elements of Student-Centered Learning which became the reference for the creation of GamiChain. These elements are divided into five including:

1. **E-Course Lesson** - Before lectures begin, the lecturers prepare to teach materials by uploading them to the SCL system. When the lecturer uploads the teaching material assets, the communication process between the lecturers' requests to upload teaching materials through the Rest API will be responded to by the smart contract first to create a new contract and record it in remote nodes (Local Asset Area). After the teaching materials have been successfully uploaded into the system, the assets will be processed according to the Merkle tree method, which will produce a hash in the hash, the entire process that takes place in the Local Asset Area requires permission, which means that the smart contract will verify according to the standards and conditions set.
2. **E-Course Enroll** - After the asset lesson course is complete, students can enroll and access the teaching materials that the lecturer has prepared. When students enroll, the communication between student requests to take a course through the Rest API will be responded to by a smart contract to be made a new contract and record it in remote nodes (Local Asset Area). After the recording process of enrolled assets is successfully uploaded to the system, the assets will be processed according to the Merkle tree method, generating a hash until it becomes one final hash.
3. **E-Portfolio Submit** - During the E-Course, students will produce a portfolio which the lecturer will evaluate to determine the final grade as a condition for passing the E-Course. The submitted portfolios will be verified by the smart contract with the help of the Rest API to ensure that the assets are under the specified standards. The investments will be processed using the Merkle tree method to produce a hash which will later be reprocessed to get the last soup.
4. **E-Portfolio Score** - Lecturers evaluate students by assessing the submitted portfolios, then the lecturers will provide evaluation results in the form of asset records that are ready to be uploaded into the SCL system, the uploaded assets will pass the inspection stage by the smart contract the university has made it, when the contract is successfully made, the assets will be processed using the Merkle Tree method.
5. **Build Merkle Tree** - All assets that have been uploaded in the SCL system will be processed using the Merkle tree method where each asset has an identity in the

form of a hash, then the E-Course, E-Portfolio and E-Assessment assets produced by lecturers and students who have been The hash will be combined into an asset record that is ready to enter the root brand, at the final stage the hash, digital signatures, time stamps and other technologies will be processed with the help of the Rest API to communicate with the public asset area, namely smart contracts to be added to the network public Blockchain, data that is already in the public asset area is without permission, meaning that all data can be accessed by anyone, but because the recorded asset is a hash it will guarantee privacy for students, lecturers and universities.

3.1.2 Gamifikasi Blockchain Based

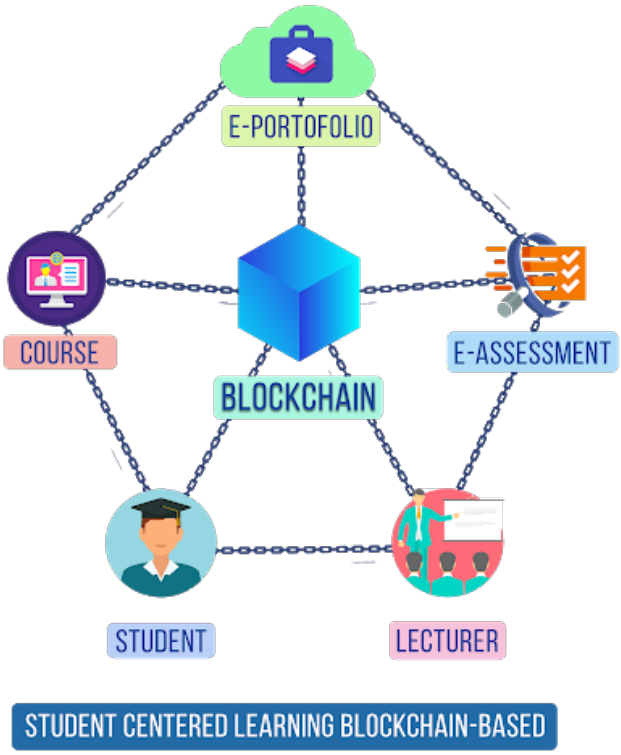

Figure 3.Integration of all Blockchain Elements

Figure 3 describes the Integration of all Blockchain, which consists of four steps, namely:

1. **Users connected to the Blockchain** - All users on the Gamification Blockchain system are integrated with the Blockchain network to enjoy the three-element services Gamification Blockchain, namely E-Course, E-Portfolio, and E-Assessment. When the user enters the system and enrolls, the user's assets will be updated automatically by a smart contract that standard regulations and management have set. Likewise with lecturers, when the lecturer enters the system, they will be given special rights to manage and make rules on the E-Course run (Toda et al., 2018).
2. **Blockchain-integrated E-Course** - The E-Course learning system that is integrated with Blockchain makes it easy for students to access online lessons anywhere and anytime. Students get access to classes without time limitations

because they are stored in a Blockchain that is eternal and secure. An E-Course makes it easy for lecturers to prepare teaching materials that will be given to students automatically distributed in the GamiChain system and Blockchain network (Dicheva et al., 2015).

3. **Blockchain integrated e-portfolio** - student work generated during the E-Course will be stored in a Blockchain network with a high level of security, protected from modification, and immutable (Villagrasa et al., 2014). Students can access the portfolio forever indefinitely and can be used for the future. For lecturers, the existence of an E-Portfolio makes it easy to access student work results that are guaranteed originality and conduct a thorough evaluation of students. In addition, if lecturers and universities need student portfolios for academic purposes, they can be accessed online without fear of losing documents (Rahardja, Lutfiani, & Juniar, 2019).
4. **Blockchain integrated e-Assessment** - Assessment is done online with the GamiChain system which is integrated with the Blockchain network. Lecturers can easily collect student grades based on the E-Course and E-Portfolios that students have and the value assets will be uploaded to the Blockchain network with the help of smart contracts (Lin et al., 2018). This provides an advantage for students because they can access value information quickly and safely and for lecturers there is no need to worry that the grades will be modified because the Blockchain network has very high security so it can avoid modification and third parties (Aini, Rahardja, et al., 2020).

3.2 Increased transparency of learning outcome

The results of student responses to the system were mostly positive in the "course contract," "portfolio contract," and "assessment contract" features by showing:

1. N = 5 assesses that the system can increase the transparency of online learning (e-learning).
2. N = 4 is the feedback from the assessment that the system can control access and maintain student privacy.
3. On the other hand, N = 3 also wants to reduce doubts in the learning process between students and educators regarding different opinions. In addition, respondents noted an increase in the security of e-portfolios and e-assessments that students felt.

Table 1. Results of responses from stakeholder feedback.

No	Statement	N1	N2	N3	N4	N5
1	The system is able to increase higher education credentials online	5	5	3	4	4
2	The system increases trust in higher education	5	5	3	5	4
3	The higher education system is making new history more transparent	5	4	3	5	5
4	Access control system that maintains student privacy	4	5	5	5	5
5	The system is able to reduce doubts and opinions between students and educators	4	5	5	4	5
6	Support system in curriculum administration	4	5	5	3	4

7	The system makes educators more comfortable with transparent courses and assessments	4	5	3	3	5
8	The system increases transparency in learning	5	5	5	5	5
9	System of agreement between educators and students automatically	3	5	5	5	4
10	The system increases the security of students' e-portfolios and e-assessment	4	5	4	5	5

All participants (N = 5) strongly agree that transparency and learning outcomes can increase student confidence in online education. Participants N = 4 believe that SCL also increases the safe storage of student learning records stored on Blockchain and smart contracts to prevent disputes in education over assets. The student access control feature maintains privacy from within the Blockchain.

All participants (N = 5) strongly agree that the level of transparency and learning outcomes can increase student confidence in online education. Participants N = 4 believe that SCL also increases the safe storage of student learning records stored on Blockchain and smart contracts to prevent disputes in the world of education over assets. The student access control feature maintains privacy from within the Blockchain.

The study was conducted by calculating the instrument's reliability using Cronbach's Alpha, based on a reliable instrument if Cronbach's Alpha > 0.6. Based on the distribution of data to 28 respondents, the correct answers that have been collected include data. It can be explained in detail with 28 respondents. The Summary of Case Processing is described in the following table:

Table 2. Case Processing

	N	%
Cases Valid	30	100%
Excluded	0	0%
Total	30	100%

Table 3. Reliability Statistic

Cronbach’s Alpha	N of Item
0.842	30

Based on the distribution of data to 28 respondents, the calculation of Cronbach's Alpha is 0.8, where the instrument is considered reliable.

3.3 The Role of Blockchain Technology in Digital Learning

Student Centered iLearning Blockchain (SCi-B) consists of three distributed elements in the Blockchain network, namely e-courses, e-assessments, and e-portfolios. The E-Course element provides access for lecturers to distribute learning materials on a Blockchain network that can be accessed easily by students (Papadakis & Kalogiannakis,

2018). At the same time, the E-Portfolio element becomes a storage container for evidence of the work that has been done by students while taking the E-Course permanently and can be accessed by students and as evaluation material for lecturers in providing assessments. The E-Assessment element makes it easy for lecturers to collect student (Ortiz-Rojas et al., 2019). All uploaded value assets will be stored on the Blockchain network to avoid modification, forgery by third parties, and permanent (Aini, Lutfiani, Puji, et al., 2021).

3.3.1 Design Smart Contract Student Centered Learning

Students can upload portfolios which will later store their assets on the Blockchain network, and E-Assessment makes it easy for students to see the value obtained online (Lutfiani, Oganda, et al., 2020). As shown in the student centered learning smart contract design:

```
//Check Roles = Student
check if user(User_ID_Roles)>=Student Then;
return student.dashboard;
else popup messages (users not found);

//get lesson E-Course
check if class(User_ID)&& class(id_class) == null Then;
return student.class -> popup messages (class not found);
check if class(User_ID)&& class(id_class) Then;
return student.class;
else popup messages (Error);

//Enroll
check if class(id_class)== true Then;
return student.class.[id_class] -> popup messages  16(congratulation you have successfully joined);
enroll_hash = [enroll, encrypt(enroll, scl_pri_key)];
else popup messages (Enroll code incorrect);

//E-Portfolio
check if portfolio(answer)== “” Then;
return student.portfolio.[id_portfolio] -> popup messages  22(congratulation you have successfully submit);
enroll_hash = [portfolio, encrypt(portfolio, scl_pri_key)];
else popup messages (Portfolio not correct);

//E-Assessment
check if assessment(user_id -> request)&&
assessment(id_class -> request) Then;
return student.assessment.class;
else popup messages (Assessment not found);

//Merkle tree
check enroll_hash && portofolio_hash == true Then;
sign = create_digital_signature[user_ID, X, Issue_time,
course_info, …] = hash(cert);
all_assets = hash(sign);
bc_student = [all_assets, encrypt(all_assets(scl_pri_key)];
add_bc_student_to_SCL_PUBLIC_BLOCKCHAIN
```

Figure 4. Smart Contract for student users

Figure 4 is an order from a smart contract that helps students to be able to enjoy E-Course, E-Portfolio, and E-Assessment services during the lecture period, starting from checking whether students are registered in the system, then taking asset lessons for students who have already registered beforehand. Still, if not, then students do enroll first under the lecturer's directions (Amit et al., 2021). Students can upload portfolios that will later store their assets on the Blockchain network, and E-Assessment makes it easier for students to see the scores obtained online. All purchases sent by students will be packaged in the form of a hash. These assets will enter the public Blockchain network to be distributed appropriately in universities and publicly accessible (Rahardja, Handayani, et al., 2020).

```
//Check Roles = Lecturer
check if user(User_ID_Roles)>=lecturer Then;
return lecturer.dashboard;
else popup messages (users not found);

//E-Course
check if class(User_ID)&& class(id_class) == null Then;
return lecturer.class -> popup messages (class not found);
check if class(User_ID)&& class(id_class) Then;
return lecturer.class;
else popup messages (Error);

//Submit Lesson
check if class(id_class)== true Then;
lesson = get asset lesson from lecturer;
add asset_lesson to assetbase;
return lecturer.class.[id_class] -> popup messages  18(congratulation you have successfully submit lesson);
lesson_hash = [lesson, encrypt(lesson, scl_pri_key)];
else popup messages (Submission failed);

//E-Portfolio
get assets lesson from student;
return student.portfolio;

//E-Assessment POST aset
get all asset from (student);
return lecturer.assessment.class;
check if assessment(user_id -> request)&&
assessment(id_class -> request) Then;
add asset to assetbase;
assessment_hash = [assessment, encrypt(assessment,
scl_pri_key)];
return lecturer.assessment.class;
else popup messages (Assessment not valid);

//Merkle tree
check lesson_hash && assessment_hash == true Then;
sign = create_digital_signature[user_ID, X, Issue_time,
course_info, lesson_asset, assessment_asset …] = hash(sign);
all_assets = hash(sign);
bc_lecturer = [all_assets, encrypt(all_assets(scl_pri_key)];
add bc_lecturer to SCL_PUBLIC_BLOCKCHAIN
return popup messages (succes);
else popup messages (assets not found);
end
```

Figure 5. Smart Contract for lecturer users

Figure 5 above is an order from a smart contract to make it easier for lecturers to carry out lectures. Lecturers are given access rights to prepare teaching materials for predetermined courses. When the lecturer submits teaching materials, the lesson assets will be stored in the asset base to copy the lesson assets. Before learning aids are uploaded to the Blockchain network, they must first go through the Merkle tree stage, where all purchases will generate a hash. Lecturers can see the assets that have E-Portfolio to support the student evaluation process (Aini, Riza, et al., 2020). And after the evaluation process is complete, the appraisal asset is packaged in a hash to be uploaded to the Blockchain network (Lutfiani, Harahap, et al., 2020).

3.3.2 Program Design

Figure 6. Display of iLearning Passport

Students and lecturers will utilize the GamiChain application design in supporting the learning ecosystem of Merdeka Belajar-Merdeka Campus (Rahardja, Lutfiani, & Juniar, 2019). Student interactions with lecturers in one application will be recorded well on the Blockchain. The process of student learning activities starts from courses that have been completed or are being carried out a collection of certificates and contributions to produce a list of values which will eventually be embedded with the asset hash code of ownership (Aini, Rahardja, Santoso, et al., 2021).

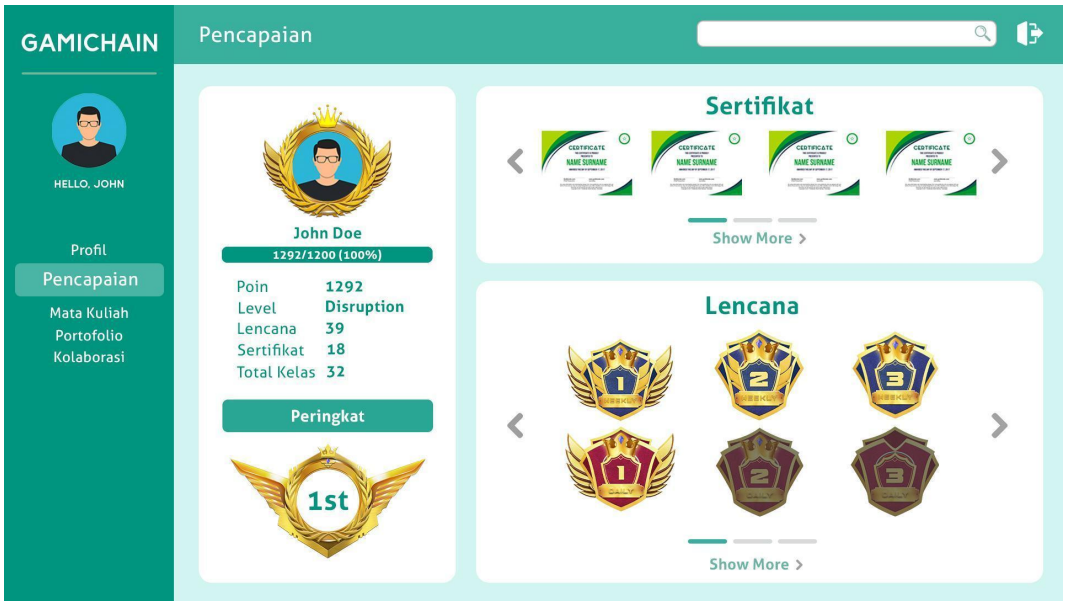

Figure 7. Blockchain Gamification

In contrast to other LMS, if students have completed their work, they only get the status of "Done." However, with the presence of this application, it can be believed that

students are motivated to learn freely and feel free to participate in other activities. It is related to the Merdeka Belajar-Kampus Merdeka program to study outside of campus but is still recorded correctly in this application. Because it is transparent, safe, and decentralized, it is ensured that student activity data cannot be changed or deleted. It is also able to solve existing problems to have a millennial learning application. In addition, this application aims to encourage the creative ecosystem of students in independent learning to have a more competitive spirit so that they can compete to become superior individuals. And can display learning outcomes in the form of certificates that are accurate in authenticity and can be used in the industrial world (Rahardja, Hariguna, et al., 2019).

CONCLUSION

In Blockchain education, graduates are expected not only to have a diploma, but to obtain the necessary additional information that supports the graduation requirements during the learning process. Compared to before, the final learning outcomes obtained are only in the form of diploma documents, as a sign of graduation after the learning process. Then, learning outcomes or E-Portfolios become the basis for proof of internationally recognized higher education. Learning outcomes can come from different educational institutions, practical work experience, online studies, and other learning processes. GamiChain's educational idea is oriented towards three elements, namely E-Course, E-Portfolio, and E-Assessment, which will determine the graduate requirements determined by the college. Therefore, the previous activity, namely the learning process, has become a type of open learning, which is convenient for building a higher education system that is not limited by space and time and adapts to the needs of the times in a new economic model characterized by a sharing economy. In addition, the distribution of learning outcomes will be recorded in an asset record that is integrated with the Blockchain, but the learning content assets and results that have been carried out during education are stored on the blockchain network. can be used for various purposes, such as industry to apply for jobs, continuing education to a higher level at universities around the world. This makes it easier for everyone to get accurate, fast, and guaranteed information. Calculation of instrument reliability using Cronbach's Alpha can be said to be reliable if it has Cronbach's Alpha results > 0.6. Based on the distribution of data to 30 respondents, the calculation of Cronbach's Alpha is 0.8, where the instrument is considered reliable. This research could be further developed towards the implementation of an integrated Blockchain education platform with other institutions and further analysis.

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