Digital Ilearning Chain Scheme in Education Blockchain Based

Kim Beom Rii[1]
University of Jisan College
Korea
e-mail: kimbeomrii@yahoo.com

Abstract

In the era of the digital revolution, the use of technology has made technology a major demand, coupled with the development of insight and techniques, technology in this era has been widely used in all scientific fields. In the field of monetary economics, there are payment instruments that can be used to transact both in the form of goods and services. However, nowadays it is difficult to obtain information as technology develops, the term digital transaction appears. Because many activities are carried out manually, such as searching for customer information, entering inventory items, and payment transactions, the required data display time becomes very long for users and in the process of recording reports including paper, notes, receipts, pens, filing cabinets, etc. . equipment when an error occurs during the input process, generally used simultaneously. Therefore, in this paper, the aim of this DLCS (Digital iLearning Chain Scheme) researcher to utilize Bitcoin technology can help overcome the current problem of how to use Bitcoin cryptocurrency technology in the education payment system in Indonesia. This can give birth to a Bitcoin-based scholarship system. This study uses the Blockchain method to build the system, and uses Google Forms to collect information through digital observations and questionnaires. Based on the characteristics of the system, the Slovin formula is used to analyze various aspects of system satisfaction, and the results of 0.840>0.6 are used for processing, which means if alpha>0.6 then the system can be classified as "reliable". The reliability test proved that the evaluation was based on the provided questionnaire.

Keywords: *Digital Education Chain Structure, Bitcoin, Cryptocurrency, Blockchain Education*

1. Introduction

The development of online education information technology must be supported by information to support online teaching activities, without having to encounter difficulties in obtaining information, students can independently access information about activities speech [1]. The iLearning system is an integrated education system that can be implemented as a form of quality improvement to improve the quality of education. Modern quality education, the alibi in implementing the DLCS (Digital iLearning Chain Scheme) system in the education sector, is considered capable of providing an education system that is far very active and has a strong response between lecturers and students. Because the innovative and efficient teaching process certainly increases the joy and enthusiasm of students so they don't feel

bored easily [2].technology Blockchain makes digital authentication tracking and management convenient and efficient, enabling seamless login and reducing fraud. Whether it's banking, healthcare, national security, citizenship documents or online, verification and authorization of proof of identity are environmental processes that have been integrated into businesses and cultures around the world. The Bitcoin structure has a special feature and so far has not been fully utilized in the educational area [3]. With his help, the DLCS (Digital iLearning Chain Scheme) can be realized. The DLCS (Digital iLearning Chain Scheme) system can also provide simplicity and transparency for certain systems, thus providing a major boost in education.technology Blockchain can be used for gift cards and customer loyalty programs in everyday life [4]. With the exception of the Intermediary sending gift cards directly from the seller to the customer without the customer being obliged to share individual data [5]. Thinking that he uses cryptocurrency blockchain to block intermediaries, his goal is to increase security to improve in the education sector [6].

1.1 Blockchain DLCS (Digital iLearning Chain Scheme)

According to the journal entitled "A Beginner's Guide to Cryptocurrency" by Joey Conway, David Shaw of the University of California (1982) first published Cryptography that can maintain the security of an organizer's data. In 1990, David Chaum (David Chaum) founded a company called DigiCash, payment equipment using smart cards and electronic cash or cash, this became the main selling point for the company [7]. The position of money has 3 functions, namely as a legal payment instrument, as a unit, and as a store of value. Before the emergence of the current digital era, the payment process appeared in physical form, be it gold, silver or currency, this is widely used today. (Conway, 2014). In its early stages, this new blockchain will allow signing of smart contracts. So far, smart contracts have been a proprietary element of the Ethereum system. The creation of the DLCS (Digital iLearning Chain Scheme) shares new shards that can be used in the education system. Smart contract systems are already facing normal adoption, supporting thousands of contracts and holding virtual coins worth millions of dollars [8]. Therefore, the basic DLCS (Digital iLearning Chain Scheme) wants to cover the scope of smart contracts. On the other hand, although Bitcoin has an open source system of mathematical algorithms, there are hardly any changes to the cryptocurrency. It happened in previous experiences, starting from the advantages and disadvantages of the following smart contracts that can be applied in the world of education.

1.2 Cryptocurrency

Cryptocurrency is a concept Cryptocurrency produces digital heritage There is for the trade of goods and services, where the digital heritage is No cryptocurrency or controlled by one party (eg Central bank) but controlled by a system Distributed via blockchain. This promotion concept was introduced by Satoshi Nakamoto through Bitcoin currency [9]. In the cryptocurrency, on each user there is a digital account called a wallet which contains a private key, a key and an address or public address. Cryptocurrencies are not static The parties and transactions are not continued by certain parties.transaction cryptocurrency [4], the amount of currency traded by the Sender is bound by the private key of the sender's property. Then the sender sends the currency to the destination address, where this stage combines the currencies into one sent with the recipient's private key. Then, transaction data verified by other users will get a small portion of currency as a validator's expense [4].ledger blockchain that anyone can access. Therefore, make Cryptocurrency transparent and high Security in the education sector.

2. Literature Review

In this DLCS (Digital iLearning Chain Scheme) research, 6 research articles were referenced, namely; Research (Evans, 2014 describes digital payment schemes in some countries, such as PayPal, American Express, Visa MasterCard, JCB discussing Western

Union. This research discusses payment schemes that are managed centrally or by all parties. Which is useful for information management as an application for the three customers. This means that many want to adopt it in terms of dependence on the provider (Adoption Strategy). The impact of using Bitcoin technology is a new era of digital payment transactions being able to carry out payment transactions without relying on third parties (Decentralization) [10] Because Bitcoin applies network technology management in each transaction is intertwined. Other research conducted by Bank Indonesia (Untoro, R, & Wahyu, 2014) also shows that a good payment scheme has a very important impact on financial stability.

In other studies, it is believed that bitcoin completes the requirements for an effective payment instrumentcovers no perishable, has the same quality, cannot be counterfeited, easy to carry, has a balanced value, it can be concluded that Bitcoin can be used as a legal method of payment [11], but the government does not have regulations and legal basis for bitcoin.

According to research conducted by Berentsen and Schair, in 2018, to overcome the problem of double payments in education, the classic electronic payment system is based on a central institution that verifies the validity of payments and traces [12]. The current status of ownership in such a system, usually banks manage the accounts of buyers and sellers. The buyer initiates the payment by sending the order payment. The central agency later confirmed that the buyer had the necessary funds and set up an account [13].

Bitcoin is an electronic currency or digital asset, founded in 2009 by Satoshi Nakamoto Bitcoin is one of the first applications of cryptocurrency [14], It was first described by Dai Wei on cypherpunk in 1998. There are four types of transactions using Bitcoin, namely: mining , exchange, Business and Investment. This type of virtual currency is centralized, regulated and managed by an institution or company.

3. Methodology
3.1 Blockchain Method

Application of blockchain-based smart contracts that can verify, facilitate, and negotiate contracts. The "no middleman" position in this blockchain is decentralized. That is to say, all user interactions with other users are recorded with a block of user information that is recorded on the blockchain after the network node is authenticated. So that the nature of the blockchain is unchanging and protected and always open to surveillance on all networks [10]. There is the ability to save expenses for purposes that are not limited and have a close relationship. Blockchain is decentralized, which means there is no centralized system that can be changed. Blockchain has a default backup characteristic that can restore itself when an attack occurs from an unwanted party, so it is safe from these attacks [13]. Avoiding Manual Errors can be interpreted as a characteristic that can significantly reduce the impact of errors caused by human factors, such as negligence in maintaining document security or storing documents, with blockchain all these problems can be overcome. [14]. Blockchain has the advantage of default backups that can change the situation to improve by itself when experiencing threats from unwanted parties. Avoiding manual errors significantly which can reduce errors caused by the human aspect, such as errors in protecting the security of student data, with blockchain all these problems can be overcome. From a "trustless" perspective, the result of the central innovation is a professional distribution, which in turn allows the determination of the validity of transactions without intermediaries so that it is transparent and convenient. After that autonomous characteristics, meaning that they can operate independently, blockchain systems are decentralized applications; There is no centralized system on the blockchain which means there is no human intervention.

In this paper, the aim of this DLCS (Digital iLearning Chain Scheme) researcher to utilize Bitcoin technology can help overcome the current problem of how to use cryptocurrency in the education payment system in Indonesia. This can give birth to a Bitcoin-based scholarship system. The technical realization, the results obtained, as well as a detailed description of the operational state are regulated in this work.

3.2 Slovin Sampling

In obtaining information and data that match the object of this research, it is done by distributing questionnaires by collecting the amount of data involved in the activity from 100 participants, the next step is to process the data according to SUS (System Usability Scale) in determining the number of samples. In the calculation of the Slovin formula above, the value of the margin of error (e) is stated if the margin of error continues to be small, until the value of the illustration continues to be large. There is also the amount of the margin of error that is generally written in the form of a percentage. It uses the slovin formula to calculate using the formula.

$$n = \frac{N}{1 + Ne^2}$$

Information:
n = Number of Samples Searched
N = Population Size
e = Margin of Error (large error) value of population size

Information validity test is used to measure the reliability or validity of information on the proposed questionnaire. If the information studied displays valid means that the information can be used in measuring what should be measured. Where information is said to be valid if the information studied has a correlation value of 0.3. Reliability test is used in looking at the reliability of each information by using the Cronbach Alpha Coefficient. information is said to be reliable if it has an alpha value of more than 0.50.

4. Results and Discussion

Based on the results of questionnaires distributed by collecting the number of data involved in the activities of 100 participants. Therefore, the results of the DLCS research questionnaire (Digital iLearning Chain Scheme) are calculated using the Slovin formula, and the reliability test is calculated based on the variables in the method After that, the sampling technique used must be adjusted to the research objectives, starting from collecting information about the effectiveness of education. through the system, DLCS (Digital iLearning Chain Scheme) research is conducted by filling out a questionnaire using a Google form. Using google sample data sampling form to adopt this sampling technique [15], which is one or more methods used to determine the number of samples and members. Then proceed with collecting the amount of data involved in the activity from 100 participants, the next step is to process the data according to SUS (System Usability Scale) in determining the number of samples. Where N is the number of participants, and R1 to R4 are variables derived from the respondent's statement in the questionnaire.

$$n = \frac{100}{1 + 100.(0,01)^2} = \frac{100}{1 + 100.(0,01)^2}$$

$$n = \frac{100}{2}$$

n = 50

In this assessment session, researchers want to carry out a subjective assessment of 4 issues that report "strongly agree", "agree", "neutral", "disagree", and "strongly disagree", applied to variables R1 to R4 Questionnaire answers have been distributed to participants. After that, through Google Forms, the informants will get the total SUS results based on the average SUS score.
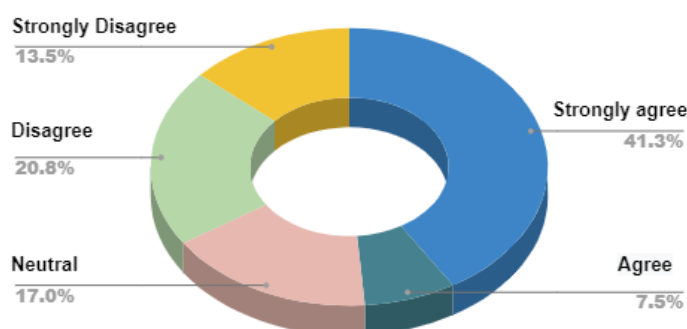
Picture 1. Participant Response Diagram

From the picture, it illustrates the question "is Bitcoin going to take over traditional currencies?" Participants gave answers that most responded strongly agree, This matter is understandable, because in everyday life there has been a long-term power of electronic money, so people believe that paper money is an inefficient matter for today. Students who are asked to participate share their comments on the following questions "How will certain facts affect the future of Bitcoin [16], namely, Bitcoin is not controlled by national jurisdictions or central banks, but is based on a mathematical structure?" The answer can be summarized as the system used in the long term, from the perspective of the future of Bitcoin, the P2P structure may have a positive effect. Next, participants will be asked "will cryptocurrency win in the next 5 years in the education sector?" 28 students answered disagree because they think it can be seen clearly that the future of Bitcoin remains unclear for students as well. However, what is more surprising is that the system used in banking is also not fully reliable. The last and foremost question is: "If you are most likely going to get a scholarship, are you going to get a scholarship in the form of Bitcoin in the education sector?" The graph at the bottom shows the percentage ratio of positive answers. What is certain is that although students are distrustful and skeptical about the future of cryptocurrencies, for this hypothesis n, students will receive scholarships paid in Bitcoin [17], which has been confirmed [18] [19].

Based on the information obtained, After calculating, the number of variants numbered 1 to 4 will be recalculated to find the total results of variants 1-4. From the results of the table below, it can be concluded that Cronbach's alpha is useful for getting results of 0.840 > 0.6 which means if alpha > 0.6 then the system can be classified as "reliable". The reliability test proved that the evaluation was based on the provided questionnaire. Surely this will have a positive impact on the system created because the number of system users will increase in the future.measurements usability can be the first step in evaluating the system to show that the system is available.

Table 1. Reliability Test Results

Total Variance Items 1-4	9,270
Total Variance Number 1-100	25,054
Reliability	0.840

By signing the given contract, DLCS (Digital iLearning Chain Scheme) can automatically track student learning achievements during the study period with the help of the results in the book electronic value. It is very useful for scholarship application. Therefore, if the student meets the required requirements, then the scholarship will be automatically paid at

the end of each student. In the picture below is the flow before using the DLCS (Digital iLearning Chain Scheme) where students experience long payment flows that add to the administrative burden that is inefficient and requires a long process [20] [21].
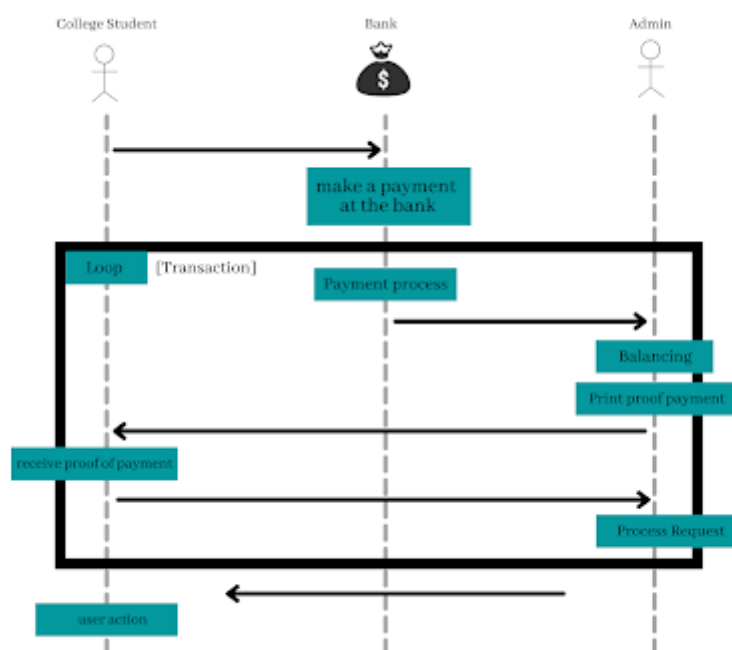
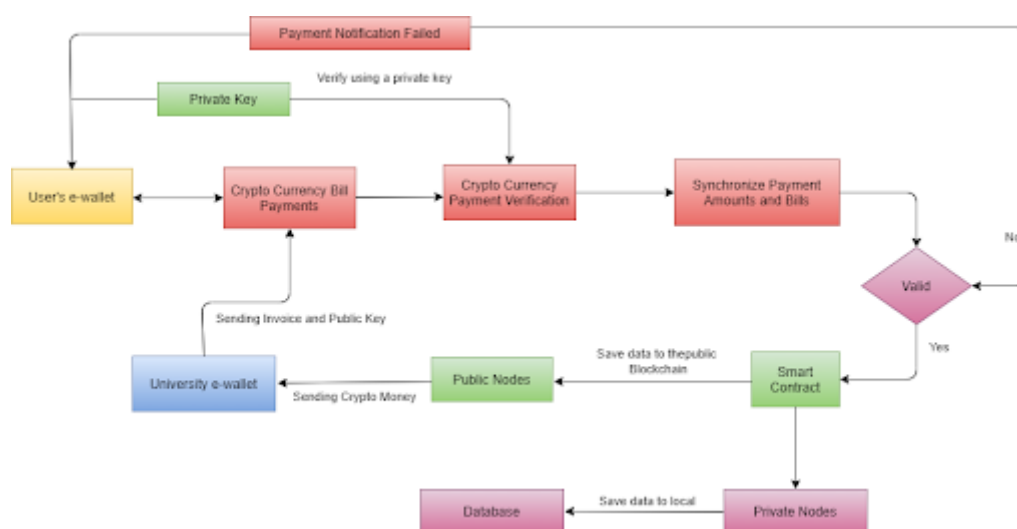Picture 2. Payment Flow Before Using Blockchain

4.1 Contract Terms

Small chance of change for cheating one day in the world of education [22], this is an advantage of smart contracts. This is very useful confirming the contract is executed using tests very well. Regarding scholarship applications, in this contract the student agrees to the responsibilities and prepares all the requirements needed, then the faculty ensures payment [23]. Furthermore, the suitability of repayment is followed by the correct date decision, because the method will make the payment impulsively. For example, repayment is carried out on the first day of the month, as well as on the end of the semester. This kind of repayment has many benefits [24], because it is not consumed due to holidays, weekends, because the activity of the Bitcoin network is minus every day of the year. The initial stage, DLCS (Digital iLearning Chain Scheme) collects the required data from the electronic ledger by continuously extracting student scores and distributing the total value of subjects at the end of each semester [25]. Second, the system coincides with the match, its purpose is to track the exact nature of the symptoms. DLCS (Digital iLearning Chain Scheme) can also read in real time (if any) of electronic values, otherwise the system can perform this task with the boost of Internet access. Not only collecting data, mastering the exchange rate of Bitcoin is also very important, because the price of Bitcoin is quite dynamic, as this type of currency has experienced volatile growth in recent years [26]. A large overall exchange rate is his trademark, but Bitcoin exchange rates seem to be normal [27]. Therefore, it is very important for DLCS (Digital iLearning Chain Scheme) to use the Internet to track fluctuations in exchange rates, because fluctuations in exchange rates will greatly affect the amount of payments. DLCS (Digital iLearning Chain Scheme) classifies and evaluates the collected data. This will check whether the conditions in the contract are met. When the conditions are met, the next step will take

effect: payment. If the student fails to fulfill the terms of the contract, if the DLCS (Digital iLearning Chain Scheme) does not allow payment.

4.2 Payment

Finally, the DLCS system charges students a fee; it transfers the necessary funds to the appropriate electronic wallet [28]. For this, students need to have a digital wallet. Users put their wallets on their machines, but to minimize the risk of theft, they can request an online. Each wallet is based on a key pair - a public key and a private key, both of which perform different tasks. The public key forms an address. The key is used to verify transactions. The address does not contain data about the user, but transactions can be retrieved by signing the public key. Although transactions in Bitcoin can be retrieved from an address, the owner of one address is still unknown.

Picture 3. Payment Flow After Using Blockchain

The image above contains the DLCS (Digital iLearning Chain Scheme) introduced to the Digital Wallet payment bill cryptocurrency after that the Private Key will confirm the payment and will automatically synchronize the payment with the bill if it is not valid the process will redirected to the initial step, and if it is not valid it will proceed to storage the smart contract will be saved to public Nodes after which it will send crypto to the University digital wallet. In addition to storing in public nodes, it will be saved to private nodes where smart contracts will be stored in the data local.

5. Conclusion

With the development of economic globalization, the convenience and security of financial transactions continues to increase, it is necessary to have a payment system that is quite reliable and makes it easier for users, especially in the field of education. Cryptocurrency technology by implementing bitcoin provides a rather complex technical alternative, so that if it is successfully applied to the education sector, efficiency can be achieved. However, nowadays it is difficult to obtain information as technology develops, the term digital transaction appears. Because many activities are carried out manually, such as searching for customer information, entering inventory items, and payment transactions, the required data display time becomes very long for users and in the process of recording reports including paper, notes, receipts, pens, filing cabinets, etc. . equipment when an error occurs during the input process, generally used simultaneously.

This system will store information on all providers who are members of the network to carry out the transaction validation process. Thus, the realization of the DLCS

(Digital iLearning Chain Scheme) blockchain does not require large expenditures. This DLCS (Digital iLearning Chain Scheme) research gave birth to a Bitcoin-based scholarship system. The technical realization, the results obtained, as well as a detailed description of the operational state are regulated in this work. Currently, the use of non-cash payment instruments for transactions has become a trend of needs that suppress citizens, where the role of digital is very much needed. Based on the characteristics of the DLCS (Digital iLearning Chain Scheme) system, the Slovin formula is used to analyze various aspects of system satisfaction, and the results of 0.840 > 0.6 are used for processing, which means if alpha > 0.6 then the system can be classified as "reliable".

The reliability test proved that the evaluation was based on the provided questionnaire. One of the drawbacks that may exist in this system is the lack of confidence because it is still a new category and has not been used by large educational institutions until now. Furthermore, this DLCS (Digital iLearning Chain Scheme) research will be continued at the implementation stage, which can be applied in the world of education on mobile applications so that students can receive information and access digital applications anywhere and anytime.

Acknowledgements

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