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# Education 4.0: Online Learning Management Using Education Smart Courses

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## Abstracts

*The number of students at tertiary and domestic universities rises as a result of evolving educational practices. However, in several Indonesian universities, this development has not been matched by an equalization of the course digitization system that can form soft skills and hard skills. As a result, there are gaps for instructors and students who want to form skills in these areas. Education Smart Courses (E-Scores) can solve the issues in education that arise when courses are gamified by developing a platform using sophisticated blockchain technology. The business model method of CANVA and TKT was then used in this study to systematically measure technological development. The advantages of Education Smart Courses (E-Scores), Blockchain-based innovations that academics can easily access, and gamification in educational courses, with the hope that prototypes will become more valuable and be developed in order to be able to provide better change.*

**Keywords:** Universities, Courses, Education

## 1. Introduction

Due to recent advancements in quantum computing and cryptography, technology is susceptible to security flaws. Peer-to-peer blockchain systems[1] are technically difficult, thus third-party intermediaries must be included to facilitate financial transactions across the blockchain network. A decentralized economy and financial markets are supported in secure education by blockchain smart-courses technology, which operates peer-to-peer without a centralized authority. However, blockchain technology is not secure in light of current developments in quantum computing[2]. Furthermore, the central government's desire for a decentralized economic structure determines the legitimacy of technology[3].

The purpose of smart-courses using blockchain is to investigate and evaluate the 'blockchain ecosystem' in the field of education politics that it aims to conceal as well as the legal and regulatory implications it enacts. Blockchain thus stands for all solutions to issues in the field of education. Instead, the difficulty lies in comprehending the conflicts between regulators and developers that arise when defining blockchain in the context of continual networking, digitalization, and social datafication. The TKT (Technology Readiness Level) hold that regulatory bodies and governments may retain on various strands of blockchain research, development, implementation, and implementation will be used to gauge the success of



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Education Smart Courses (E-Scores)[4][5]. Especially for users of courses that can be maintained along with regulatory issues that can provide changes to the wider field of network technology and still continue to evolve, mutate, have an impact, but do not always benefit the interests of society or the public in front of private and commercial forces. Understanding the extent to which users of the course platform and regulations will play a role in securing democratic accountability of this powerful and far-reaching technology should be a major concern for blockchain scholars and practitioners of all stripes[6].



Figure 1. Blockchain

Based on the graph in Figure 1, Indonesia had 4504 universities in 2017, the most of which offered education-related study programs[7]. As a result, it is recommended that the number of educational study programs be balanced with blockchain technology so that it can play a role. There is a gap between traditional education and job market skills according to demand in the process of creating soft skills and hard skills so as to provide positive personality changes and boost morale. However, the increase in the number of study programs has not been matched by evenly distributed smart-courses that use blockchain at several universities in Indonesia and around the world.

Naturally, the media on the smart courses in Figure 2 is accessible to everyone and at any time on a variety of devices. Where it is accessible to everyone, regardless of race, religion, or gender, with the goal of transforming the teaching and learning process in universities and schools into a digital one that is connected via blockchain-based internet technologies. On the other hand, some universities continue to lack expertise in specific scientific subjects, making it impossible to create the capabilities that each university needs to establish smart-courses in academics[8][9][10].

Article 31 Paragraph 1 of the Higher Education Act No. 12/2012 stipulates that distance education is a teaching and learning process conducted remotely using a variety of communication media. This means that the existence of legislation governing distance education can enable Education Smart Courses (E-Scores) to be able to become a platform in the field of education that uses gamification to increase users' motivation and productivity and develop both soft and hard skills. This must be accomplished in order for 4504 universities—a total of 20 universities—to implement online learning, which represents 0.4% of all universities—a far from 100%.

Based on the Smart-courses Platform Paradigm, it is clear that blockchain technology can be used to create online smart-courses that universities can use. Using e-learning as a form of teaching materials and combining them with other teaching materials from other sources and in different formats, media, and media types, along with gamification techniques. This can be created and packaged during the training process in a variety of ICT-based forms. utilizing a decentralized interactive learning environment where users and teachers may communicate and interact while exchanging cryptocurrency for digital goods and services[11] It has been demonstrated that the use of blockchain in the sphere of education is quite likely based on research conducted by the JRC and the EU.

Recognizing this need, transforming education by integrating a decentralized blockchain system with a digital learning platform. Research is done through Raharja University and incubation, specifically Alphabet Incubator, and is produced as Education Smart Courses (E-Scores) products.

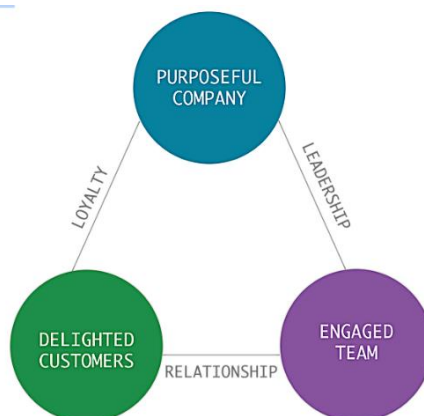


Figure 2. Education Smart Courses (E-Scores)

A breakthrough in the educational system, Education Smart Courses (E-Scores) allow students to "you understand, you profit" and receive cryptocurrency-based scholarships. These scholarships can then be exchanged for digital goods and services using a decentralized platform that cuts out middlemen.

## 2. Problem of Research

Education Smart Courses (E-Scores) based on applications as product innovations are unique in the form of an end-to-end solution. ESC provides starting from the information technology infrastructure needed to carry out the teaching process needed for students and the general public to get digital educational content, recommending the best courses based on the level of need and ranking displayed, gamification[12] to running and carrying out administrative processes as blockchain-based online courses. in Indonesia. Each output achievement and activity to be achieved refers to framework , 3 (three) methods are used in this research, namely literature study, business model canvas[13], and measurement of Technology Readiness Level (TKT). There are several literature studies that have been carried out on previous research on blockchain and Bitcoin and other existing but related research, including:

Ade Chandra Nugraha (2020) in the study explained that the use of Blockchain technology in education is not different from the application in commercial fields or transactions involving funds. Many artifacts and documents in the field of education can be used as useful assets so that they become capital for transactions in a safe context and meet the needs of all parties involved. This is because technology that functions to record data and mini transactions can be used for many sectors such as recording transaction processes, documentation, and even voting, especially data processing in universities. Audrey Watters (2016) on her blog website explains that there are at least three elements of this discourse that are relevant to the discussion of "Future Education World" so these elements are very instructive about the ideological form of the imagined future. This is the anti-institutional nature of blockchain; its dependence on decentralization (as a technology and a metaphor); and calls for trust (and mistrust) as the main social behavior mediated by technology. It could be argued that blockchain and its potential in application to education are much more clearly "ideologically transported" because of its association with the cryptocurrency. Heribertus Yulianton, et al (2018) discuss applying the technological sophistication of Blockchain, although there are still many things to be done, especially in terms of legality, the technology used can be studied and applied to other things. The technology that works behind the scenes of cryptocurrencies like bitcoin and the like

is blockchain[14]. In addition, blockchain can also be used on the platform to support the sharing economy[15].

This research provides several new things that arise from blockchain implementation, one of which is how to understand how to build, maintain, and improve trust as the context of users and providers changes. Dewi Sartika Nasution said that the development of fintech will open up wider job opportunities[16]. The financial industry will need skilled and innovative human resources in the digital finance industry. Therefore, it is important for universities as printers of human resources who are skilled in finance and competitive in the absorption of fintech in their curriculum. The development of fintech has pioneered Islamic business marked by the increasing growth of fintech, so universities also need to introduce sharia fintech in their educational curriculum.

Agus Winarno (2019) The application of blockchain technology in education includes blockchain, e-Portfolio, and book copyright. Blockcert is a tool created by MIT that can be used to create, issue, and verify blockchain-based certificates. Based on the idea of blockchain to create globally verifiable certificates that are stored in a decentralized manner. The author tries to design blockchain-based e-transcripts that can be used to support university transparency and accountability in issuing transcripts and diplomas. Nur'aini, et al (2018) that everywhere can be seen the fun of playing gadgets, especially for the younger generation and students so that a lot of time is spent playing online games[17]. Actually, there are many advantages that can be obtained in this era, but the disadvantages are far more numerous and dangerous if not regulated in its use. For this reason, a solution is needed in the form of collaboration between teachers and parents in educating children[18].

A lot of research has been done on Blockchain, especially in the world of education, especially in terms of its use, from some of the Literature Studies obtained, it can be constructed that the movement of the world of education is carried out digitally or in the technology industry 4.0 there are still improvements to be able to improve distributed systems. properly, immutable and transparent by using the sophistication of blockchain technology.

### **3. Result and Discussion**

In the world of education, especially in the form of managing courses on the application of Blockchain technology, it has not been widely applied, apart from the fact that this technology is still very new, as well as the initial pullers from this blockchain applied field that have emerged related to providing solutions to economic and business problems. This paper discusses the application of blockchain technology that does not lead to cryptocurrencies which have been widely reviewed in other articles. The application of blockchain in education in this paper refers to socio-technological indicators for implementing Blockchain technology, indicators of the proportion of social technology.

Integration Blockchain into the world of education with TKT, Education Smart Courses (E-Scores) are expected to be able to measure the level of technology readiness which is defined as an indicator that shows how ready or mature a technology can be applied and adopted by users/prospective users. Education Smart Courses (E-Scores) is a powerful blockchain-based online education platform and smart incentives that will revolutionize global education and gamification thereby increasing morale. The main objective of the Education Smart Courses (E-Scores) platform is to enable acceptors to acquire skills currently required by the labor market. Education Smart Courses (E-Scores) will instantly align incentives in the digital economy such as current or potential entrepreneurs, digital service providers, and sponsors. Smart-Courses are smart contracts for the Ethereum network that ensure the exchange of tokens between sponsors (Scholarship Sponsors) and acceptors (Scholarship Takers), who are committed to studying a specific subject in order to receive tokens (Courses). The Education Smart Courses (E-Scores) platform will offer a blockchain-based transparent reward system and achievement tracking.

As a web-based application, prototype testing on Education Smart Courses (E-Scores) is carried out by hosting the application with the website address <http://tkt.ristekdikti.go.id>. For users, an Internet connection is required to access and use this application. Testing of the

Education Smart Courses (E-Scores) prototype [19] has been carried out both internally within the team and externally by socializing the Online TKT Measurement system through workshops at universities and LPNK or being part of the socialization activities of the National Research Master Plan (RIRN). implemented by the Ministry of Research, Technology and Higher Education so that Education Smart Courses (E-Scores) can be at level 7 TKT.

Then with TKT, in order for this system to run, Canva's Business Model (in Figure 7) is needed to be able to develop completely new businesses, launch new products and services, or change existing business models and strategies. The Business Model Canvas on Education Smart Courses (E-Scores) consists of nine basic components of a business model. These components are placed on the canvas so that visualization of the relationship of different issues with Education Smart Courses (E-Scores) can be improved.

This helps Education Smart Courses (E-Scores) to map, discuss, design and create new business models. Everything can basically be divided into the product on the left and the market on the right, while the value proposition is clearly divided into half. The user value proposition is arguably the most important tool in the product marketer's toolset, it is the basis for understanding how the product will be judged realistically by the target user. Unlike benefit statements, the user value proposition is more balanced including the advantages a target user will experience. But to this benefit adds the tension of loss and parity experience. The sum of all these experiences provides a much more accurate assessment of the product in its market. In the absence of a user value proposition, the company is walking blindly in the market. Businesses underestimate the fact that their target users have other options and thus ignore the fact that the product still has flaws some of which may significantly hinder marketing efforts. value propositions can be made for new products that were not available before, this can be developed as a strategic planning mechanism for Education Smart Courses (E-Scores) at the formative stage so that they can be updated into products that can provide change. There are 3 Use Cases of using blockchain in education, especially in Smart-courses:

1. Education Smart Courses (E-Scores) as a blockchain-based online education platform in the world with tokens and learning experiences such as a game that focuses on teaching digital or IT skills and aims to connect acceptors with instructors and entrepreneurs around the world.
2. Smart-courses that are distributed as an educational field that will reduce the cost of sharing knowledge and assessing knowledge or skills in a decentralized manner so that the transaction process is transparent and secure platform.
3. Education Smart Courses (E-Scores) provides a blockchain-based information system and platform that develops and applies problem-solving skills that tokens will use to incentivize Acceptors, content providers, assessors, mentors and to cover marketing and other operational costs.

However, most of these initiatives are in the development stage and the application of blockchain technology for education management is clearly still at an early stage. One of the reasons is the simple use of blockchain-based educational technology that although blockchain technology research is at its peak it is still in its infancy. Likewise, the creation of blockchain-based business models is an upcoming new field in the field of education management. Because of this, the management of educational institutions may not yet be aware of blockchain-based educational technology and may not yet have the blockchain-based educational technology that would be required (i.e. some that are assessed to be blockchain-based technologies are still in beta phase). Another reason for the fairly simple reason for the adoption of blockchain-based educational technology is that education management is a very particular context[20].

#### **4. Conclusion**

The level of technical maturity must be assessed based on the findings of research using the TKT measurement; by knowing where a research and technology development are at, efforts to promote their advancement toward technology that is ready for application become

more targeted and focused. A canvas business model that is structured in the field of education, notably smart-courses, is needed for the system to operate after the TKT on Education Smart Courses (E-Scores) reaches level 7. The use of blockchain technology in education management is a good step for Indonesia to take because it will get a lot of benefits and interests so that it can form soft skills and hard skills. So that the education system is no longer an object of disruption and can turn it into a subject of disruption, which in the end be able to explore and critique the 'blockchain ecosystem' on the world of educational politics that it seeks to hide and the legal and regulatory consequences it enacts.

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