



## Utilization of ICE Institute as one of the MOOCs for universities in Indonesia

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### ABSTRACT

The current popularity of online education provides certification opportunities by utilizing strategies such as blockchain, micro-credentials, and digital credentials for degree-awarding. Recognizing the seriousness of this, the Indonesian government has established the Indonesia Cyber Education Institute (ICE Institute) under the auspices of the Ministry of Education and Culture and the Ministry of Research and Technology, managed by the Open University to improve and guarantee the quality of online education incorporating blockchain, technology to issue certificates, ensuring a transparent registration and verification system. This significant step is transforming higher education in Indonesia, aligning it with the demands of Industry 4.0. This research focuses on exploring the architecture and functionality of ICE Institute, emphasizing its role as a quality assurance facility for online education in Indonesia. It also examines the user experience, enrollment process, and the impact of ICE Institute on the competency development of Educational Technology students based on an interview with a student. The research method used a qualitative descriptive approach through interviews. The findings of this study show that despite the challenges, ICE Institute is a crucial player in shaping the landscape of online education in Indonesia, positively contributing to accessibility, quality, and relevance in higher education.

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### ABSTRAK

Popularitas pendidikan online saat ini memberikan peluang sertifikasi dengan memanfaatkan strategi seperti blockchain, kredensial mikro, dan kredensial digital untuk penganugerahan gelar. Menyadari keseriusan tersebut, pemerintah Indonesia telah mendirikan Indonesia Cyber Education Institute (ICE Institute) di bawah naungan Kementerian Pendidikan dan Kebudayaan dan Kementerian Riset dan Teknologi, yang dikelola oleh Universitas Terbuka untuk meningkatkan dan menjamin kualitas pendidikan online yang menggabungkan teknologi blockchain untuk menerbitkan sertifikat, memastikan sistem pendaftaran dan verifikasi yang transparan. Langkah signifikan ini mentransformasikan pendidikan tinggi di Indonesia, menyelaraskannya dengan tuntutan Industri 4.0. Penelitian ini berfokus untuk mengeksplorasi arsitektur dan fungsi ICE Institute, menekankan perannya sebagai fasilitas penjaminan mutu pendidikan online di Indonesia. Selain itu juga menggali pengalaman pengguna, proses pendaftaran, dan dampak ICE Institute terhadap pengembangan kompetensi mahasiswa Teknologi Pendidikan berdasarkan wawancara dengan seorang mahasiswa. Metode penelitian menggunakan pendekatan deskriptif kualitatif melalui wawancara. Hasil temuan penelitian ini menunjukkan bahwa terlepas dari tantangan-tantangan yang ada, ICE Institute menjadi pionir dalam membentuk lanskap pendidikan online di Indonesia, memberikan kontribusi positif terhadap aksesibilitas, kualitas, dan relevansi dalam pendidikan tinggi.

**Kata Kunci:** ICE Institute; MOOCs; pembelajaran terbuka

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## INTRODUCTION

The rapid advancement of information and communication technology (ICT) has led to a significant transformation in higher education in Indonesia. The utilization of this technology not only expands accessibility to learning but also creates new opportunities for delivering innovative educational programs. One innovation that has gained considerable attention is Massive Open Online Courses (MOOCs), which serve as an attractive alternative to conventional learning methods. In Indonesia, the Indonesia Cyber Education Institute (ICE Institute) stands out as a prominent MOOC platform, offering a range of courses across various disciplines, including educational technology. Its presence helps accelerate access to diverse learning fields in an easily accessible manner.

Data from the Ministry of Research and Technology/National Research and Innovation Agency (Kemenristek/BRIN) in 2022 indicates that internet penetration in Indonesia has exceeded 70% ([Suhardjono et al., 2022](#)). This figure reflects a significant level of connectivity within society, including among university students. With this increased connectivity, there is great potential to leverage MOOCs, such as the ICE Institute, as flexible and affordable learning tools. During the COVID-19 pandemic, Indonesia experienced substantial changes in technology use, alongside the ongoing advancements of the Fourth Industrial Revolution, which presented new opportunities in education ([Indrawati, 2020](#)). However, the transformation of higher education is not solely influenced by technological development. MOOCs, in this context, can redefine the concept of university education by providing students with new learning opportunities to acquire essential skills and foster their development ([Agustina & Aini, 2023](#)).

The education sector is expected to balance the development of both hard and soft skills ([Hudianto et al., 2023](#)). Dynamic changes in labor market demands are a critical factor that pressures universities to align curricula with industry needs. Moreover, given the current scarcity of quality employment opportunities in Indonesia, available jobs should provide adequate income to ensure a decent standard of living ([Guritno & Muljaningsih, 2024](#)). Higher education, therefore, must offer greater opportunities in terms of employability, career stability, income level, and personal growth ([Raitano & Subioli, 2022](#)). For this reason, in-depth observation is required regarding the integration of MOOCs into the higher education system, as it represents one of the strategic efforts to enhance the ICE Institute, an online education center certified by the Ministry of Education and Culture. It features a variety of online courses offered by multiple learning providers across Indonesia. The ICE Institute aims to provide high-quality education, enabling users to select the best online courses for career development in the digital era. Established under the auspices of the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek), the ICE Institute was created to meet the growing demand for online education in Indonesian higher education institutions, including public universities (PTN), private universities (PTS), and foreign universities offering virtual programs in Indonesia. The institute was officially launched in August 2019 and is managed by Universitas Terbuka. In its initial phase, the ICE Institute focused on evaluating the launch of online education, online study programs, and online higher education institutions (HEIs). Moving forward, the ICE Institute aims to enhance the quality of online education in Indonesia through accreditation and certification. The presence of the ICE Institute is expected to create a new ecosystem for higher education and employment, integrating advanced labor market information systems supported by Artificial Intelligence (AI) between universities and industry, as well as providing AI-assisted career guidance to enhance students' employability. This initiative aims to prevent labor market mismatches.

Ensuring the quality of online education in Indonesia requires commitment and effort from multiple stakeholders. The establishment of the ICE Institute represents an initial step in developing online education in Indonesia. The presence of this platform, which supports online-based learning activities, serves as a tool to enhance the quality of education by enabling broader access to learning materials. Contemporary educational transformation refers to fundamental changes in approaches, methods, and the use of technology (Verawati et al., 2023). Therefore, fostering ethical values in the use of information and communication technology is crucial to raising awareness among learners. Utilizing various educational platforms facilitates knowledge transfer supported by discussion techniques and other methods (Ashary & Komara, 2022).

ICE Institute offers open access to knowledge and technology. Distance learning experiences that allow students to access materials from universities worldwide provide significant benefits in knowledge transfer. With these conveniences, institutions can maximize knowledge management potential (Wahyudi & Sunarsi, 2021), particularly for students pursuing higher education, as learning is no longer confined to the classroom. The internet enables the implementation of distance learning, along with its accompanying positive and negative impacts (Thohir et al., 2021). As a result of technological advancement, the internet serves not only as a gateway to understanding local cultures but also as a medium for the exchange and enhancement of skills and competencies.

The ICE Institute serves as a gateway, opening broader opportunities for education in Indonesia. The current shift in trends and societal needs is increasingly leaning toward the use of technology in all aspects of life, presenting both opportunities and challenges that must be addressed. Preparing for these advancements is crucial; education in Indonesia must be ready to embrace the digital trend. Strategies include equipping students with the necessary skills and raising public awareness about information technology developments to remain competitive internationally (Cahyani et al., 2024; Mega, 2022). Technological acceleration can be achieved by bringing knowledge closer to everyday life, which requires competent guidance and support.

Several studies have examined the use of MOOCs in education, including research on MOOCs for Public Speaking (Windrati et al., 2023), the role of MOOC learning models on student learning outcomes (Pambudi & Wibawa, 2020), and mentoring using MOOC learning methods (Suharso et al., 2021). Unlike previous studies, this research investigates explicitly the utilization of the ICE Institute as one of the MOOCs for universities in Indonesia.

Based on preliminary study data, the participation of UPI Educational Technology students in extracurricular self-development activities is relatively high. This reflects the intense enthusiasm of Educational Technology students in exploring and innovating the use of the internet as a learning resource. However, it is necessary to identify the extent to which students are ready for and receptive to the use of MOOCs such as the ICE Institute as a substitute for conventional classroom learning. This data is expected to provide an empirical basis for formulating more effective and relevant curriculum development policies. Thus, using a qualitative descriptive analysis approach, this study aims to explore students' perceptions of the ICE Institute as a learning medium and to assess the extent to which this MOOC can be considered an effective alternative to support their learning. By integrating facts and data from reliable sources, this research is expected to make a substantial contribution to understanding the challenges and opportunities of utilizing MOOCs in the context of higher education in Indonesia, particularly within the Department of Educational Technology at Universitas Pendidikan Indonesia.

## LITERATURE REVIEW

### **Massive Open Online Courses (MOOCs)**

MOOCs are a new model of education and online learning that utilize the internet to provide information on course materials at universities and other educational institutions (Oksatianti et al., 2022). MOOCs are an evolution of cMOOCs, or Connectivist Massive Open Online Learning, which focuses on the social aspects of learning by guiding learners to engage in self-directed learning activities that emerged about a decade ago. The term MOOCs stands for Massive Open Online Courses, recognized as a contemporary learning method worldwide (Khalid et al., 2021). MOOCs can be described as online courses open to anyone who wishes to enroll, often offering free registration, publicly shared curricula, and open access to outcomes. They integrate social networks, accessible online resources, and are facilitated by leading practitioners in the field of study. MOOCs offer interactive user forums that facilitate the development of communities among students, professors, and teaching assistants (Husna, 2019). Learners manage their own participation according to their existing knowledge, skills, and shared interests (Windrati et al., 2021). MOOCs represent the latest development in distance education and are still undergoing transformation and refinement. They have become a large-scale, free, and easily accessible method of distance learning, provided there is stable network connectivity (Dari et al., 2024).

The rapid growth of MOOC users across various countries has impacted multiple fields of knowledge (Dewi & Rahmawati, 2023). MOOCs are closely related to learning methods, as they are designed to provide more open and easily accessible education for anyone. The term “Massive” in MOOCs refers to the large scale of students, courses, course content, and materials used, which are essentially unlimited (Lathifah et al., 2024). In practice, not everyone can fully engage with MOOCs due to their learning concept, which is not directly supervised by instructors, allowing learners the freedom to access courses at their own pace (Widiawati et al., 2023).

### **Connectivism and Learning Transformation**

Connectivism, introduced by George Siemens, offers an innovative perspective on how learning occurs in the digital era. This theory is highly relevant to MOOCs, as they are designed to facilitate learning through extensive networks of connections. Learning no longer occurs solely within a classroom or through direct interaction between instructors and students (Howe et al., 2019). Instead, contemporary learning involves interactions with multiple sources of information, including online materials, peer-to-peer discussions, and other digital platforms (Ala et al., 2023; Chandra & Palvia, 2021). Within the MOOC environment, students can access and connect with information from diverse sources, expanding their networks to build more comprehensive and up-to-date knowledge (Mellati & Khademi, 2020). Connectivism emphasizes the importance of individuals' ability to navigate and integrate multiple streams of information. In today's information-rich era, where data and knowledge evolve rapidly, the capacity to connect and evaluate information from various sources is critical (Gupta & Rani, 2019). MOOCs support this principle by providing access to a wide range of learning materials, such as videos, articles, and discussion forums, enabling students to develop the connectivity skills necessary to manage information effectively (Weinhardt & Sitzmann, 2019). Thus, connectivism provides a framework for understanding how MOOCs can help students cultivate the information literacy skills required to succeed in digitally connected environments.

Learning Transformation, developed by Jack Mezirow, is also highly relevant to MOOCs. This approach focuses on the process by which individuals undergo profound changes in their understanding and response to the world, often through critical reflection and new experiences (Morris, 2019). In MOOCs,

learning transformation occurs when course participants engage in deep reflection on the learning materials and consider how these materials can be applied in their personal or professional contexts ([Marta-Lazo et al., 2019](#)). MOOCs provide diverse learning experiences that stimulate critical reflection, including case studies, collaborative projects, and discussions with fellow learners ([Razmerita et al., 2020](#)).

## METHODS

This study employs a qualitative descriptive approach. Data collection was conducted through interviews and document studies, focusing on fifth-semester Educational Technology students at Universitas Pendidikan Indonesia who were enrolled in courses using the ICE Institute MOOCs. In-depth interviews were conducted to explore the experiences and perceptions of students while participating in classes through the ICE Institute MOOCs platform. The collected data were then analyzed to identify the main themes emerging from students' experiences related to the learning content at the ICE Institute. The interviews aimed to gather information about the utilization of the ICE Institute as an educational platform that promotes equitable access to higher education in Indonesia. This study also incorporates secondary data obtained from relevant literature sources.

## RESULTS AND DISCUSSION

### **Indonesia Cyber Education Institute (ICE Institute)**

Online education must ensure quality. Today, online education has gained significant interest in providing certification opportunities and degree-awarding strategies that utilize blockchain, micro-credentials, or digital credentials. Blockchain is a technology designed to verify certificates through an e-certificate system that utilizes blockchain to authenticate the originality of certificates ([Sunarya, 2022](#)). Meanwhile, micro-credentials are processes used to assess and verify qualifications, experience, professionalism, and competencies ([Mardhatillah et al., 2023](#)). Thus, the quality assurance of online education must be continuously improved to be transferable across higher education institutions. The Indonesian government has undertaken various efforts to ensure the quality and standard of online education, as online education is considered a serious solution to challenges in higher education, particularly in developing human resources. Accordingly, the government established the Indonesia Cyber Education Institute (ICE Institute). All forms of online education in Indonesia must meet quality standards through the ICE Institute. ICE Institute needs to integrate blockchain technology to issue certificates recognizing students who have completed credential programs in the online education era, including registration and verification systems. Through this mechanism, blockchain-based certificates will be awarded to students participating in online education programs. Blockchain also enables the formal recognition of prior learning. These certificates will be recognized by all stakeholders within the ministry. The ICE Institute was established to transform higher education in Indonesia, presenting a new face in response to Industry 4.0.

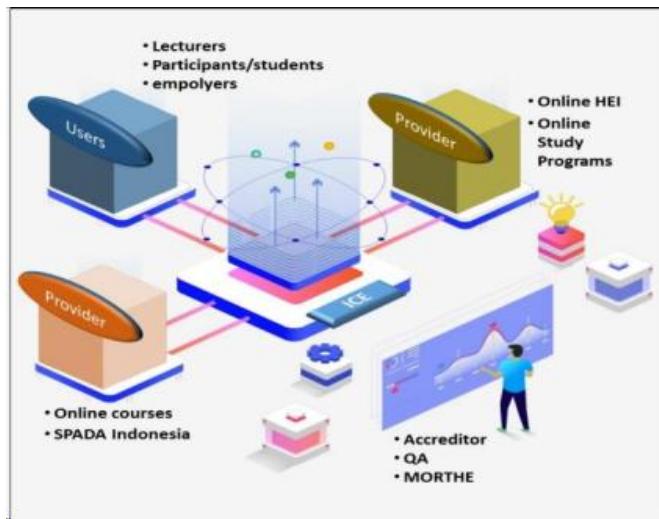


Figure 1. Architecture of the ICE Institute

Sumber : [\(Pannen, 2021\)](#)

The architecture of the ICE Institute, as shown in Figure 1, illustrates the interaction among various stakeholders within Indonesia's online education ecosystem. The "Users" category includes lecturers, students, participants, and employers who utilize the services provided by ICE Institute. On the provider side, two groups are offering online courses: Higher Education Institutions providing online study programs and SPADA Indonesia. This system is supported by quality assurance (QA) bodies, such as accreditors and organizations like the Ministry of Research, Technology, and Higher Education (MORTHE), which ensure the standards of the educational offerings. The flow of information and services between users, providers, and the ICE Institute is facilitated by digital infrastructure, enabling efficient online learning and accreditation processes.

ICE Institute has a primary function of providing quality assurance for online education in Indonesia, particularly for e-learning courses offered by Indonesian universities and internationally-based online courses. Each institution is assigned a unique registration number once it passes the quality assessment, allowing all study programs within that institution to participate in MOOC-based online education with various courses. This procedure applies not only to universities in Indonesia but also to foreign higher education institutions. The online course marketplace currently offers approximately 217 open courses that can be accessed by students from institutions that have completed registration and verification. ICE Institute also serves as a supporter of the "Merdeka Belajar Kampus Merdeka" program, which has been introduced to universities across Indonesia.

## Usage of ICEI

ICE Institute serves as an online learning marketplace in Indonesia, offering online courses for higher education institutions. To utilize the ICE Institute platform, a user guide is provided and can be accessed through the official ICE Institute website. The initial step for students is to register through their respective universities. After registration, the ICE Institute will carry out a selection process.

The learning process at ICE Institute is structured as follows:

1. Completing Personal Data
2. Students participate in the learning process at ICE Institute by clicking on the "Dashboard" and then selecting "View Course." Upon completing the course, students are entitled to receive an official certificate from the ICE Institute.

3. To obtain the certificate, students click the “Generate Certificate” button and then select “Claim Your Certificate.”

The ICE Institute provides a seamless learning experience, encompassing registration, verification, the learning process, and the issuance of official certificates. These certificates can be valuable for students participating in online courses, as they support their competencies and readiness for the workforce.

### **Educational Technology Students' Experience Using the ICE Institute as a Substitute for Lectures**

Based on interviews with a student of Educational Technology at Universitas Pendidikan Indonesia, the respondent shared various experiences during one semester (4 months) of taking online courses at the ICE Institute. The student stated, “ICE Institute is interesting because it makes the learning environment more varied and adaptive.” The courses available at the ICE Institute are indeed diverse and tailored to students’ needs. The Educational Technology student enrolled in three courses at ICE Institute: Metaverse, Gamification, and Augmented & Virtual Reality. These courses help students develop their professional skills and competencies for the workforce. Educational Technology goes beyond designing and delivering learning; it also requires proficiency in developing learning media. Therefore, these courses are highly suitable for improving students’ competencies before entering the professional world. The respondent also added, “By using the ICE Institute, I have gained a lot, including an implicit understanding of the importance of technology integration in education. I also experienced more flexible learning, which stimulated me to explore further what I was studying.” As times continue to advance rapidly, this presents a challenge for Educational Technology graduates to provide adequate education aligned with current demands. Developing human resource skills is crucial to prepare for these changes, and such skills must be nurtured from early childhood education. The ICE Institute is considered quite helpful in enhancing students’ knowledge and skills through its online courses.

Fifth-semester Educational Technology students utilize the ICE Institute as part of their participation in the Merdeka Belajar Kampus Merdeka (MBKM) program, with course outcomes converted into credit for subjects such as Educational Technology Innovation. The respondent stated in the interview, “So far, lectures on the ICE Institute are quite effective as long as they are accompanied by clear and measurable monitoring from the relevant lecturer.” Based on the interview results, learning at the ICE Institute is considered adequate if it is supported by structured and transparent monitoring, which can help maximize learning outcomes. Without active involvement from the supervising lecturer in overseeing assignments at the ICE Institute, students may face difficulties completing tasks, and some may even fail to submit assignments provided by the ICE Institute.

### **Advantages and Disadvantages of Using the ICE Institute**

The ICE Institute is recognized as an online education platform with a strong focus on technology. Like other platforms, ICEI has both advantages and disadvantages. The advantages of the ICE Institute are as follows:

1. Up-to-date Educational Content – ICE Institute typically provides materials on the latest developments in technology.
2. Time Flexibility – The platform can be accessed anytime and from anywhere, which benefits learners with busy schedules.

3. Courses and Certification – ICE Institute offers numerous courses that allow users to obtain certifications in their fields of interest, which is valuable for career development.
4. Diverse Learning Materials – It provides a variety of learning resources, such as videos, articles, quizzes, and assignments, which help students understand topics more effectively.

However, the ICE Institute has specific weaknesses, similar to other online education platforms. The disadvantages of using the ICE Institute are as follows:

1. Limited Interaction: The learning experience can be reduced if students do not have direct interaction with instructors or fellow students.
2. Variable Content Quality: The learning materials in specific courses may not be as comprehensive as expected.
3. Dependence on Internet Connection: If the internet connection is disrupted, it can become an obstacle for users.
4. Challenges in Monitoring and Evaluation: The platform may require careful monitoring and assessment to measure students' understanding and progress effectively. When choosing an online education platform like ICE Institute, students' goals and needs should be taken into consideration.

### **Learning Content on ICE Institute**

Based on an interview with an informant, a student of Educational Technology at Universitas Pendidikan Indonesia, the informant stated: "If viewed for too long, the content can be boring; perhaps the UI/UX design could be improved to be more engaging and to increase interactive learning experiences for students." The Educational Technology student shared their experience using the ICE Institute for courses such as Gamification, Metaverse, and Augmented Reality (AR) and Virtual Reality (VR). In these courses, the video-based learning content can become monotonous due to long durations and limited interactivity during the lessons. On the other hand, the ICE Institute provides a varied learning experience due to its wide range of available content, allowing students to enroll in courses that interest them. The ICE Institute offers a variety of learning content, including images, text, audio, and video, to facilitate comprehensive learning. One of the primary advantages of the ICE Institute is its ability to accommodate diverse learning styles. Each individual has a unique way of learning, and ICE Institute can present content in multiple formats, enabling students to choose the method that suits them best. For instance, some students respond better to visual learning, while others comprehend material more effectively when supported by audio or interactive content.

With a variety of content available on the same platform, students can easily access these materials from anywhere and at any time as long as they are connected to the internet. This allows for flexible learning according to each student's schedule and even supports remote or blended learning. However, while the ICE Institute offers numerous benefits, several challenges need to be addressed. It is also essential to ensure that the design of learning content on the ICE Institute aligns with practical learning principles. Content should be designed with appropriate difficulty levels, provide constructive feedback, and integrate interactive elements that stimulate active student participation. By considering the strengths and challenges of using the ICE Institute as a learning environment, the development of high-quality learning content, provision of easy access, and attention to proper pedagogical principles become key to ensuring that the ICE Institute can serve as an effective tool in supporting sustainable and inclusive learning processes.

### **ICE Institute for Enhancing Student Competence**

The use of the ICE Institute provides easy access to education in Indonesia. The country has introduced alternative and supplementary means of delivering distance education through online learning technology to achieve the goals of accessibility, quality, and relevance in higher education. Online learning is believed to increase participation rates in higher education, achieve equity, enhance overall educational quality, provide rapid access to knowledge and global Industry 4.0 innovations, and support lifelong learning opportunities to expand knowledge and improve workforce skills.

Based on interviews with Educational Technology students regarding this matter, one student stated, "It is sufficient for improving competence, but not very significant because there is no clear monitoring of the learning process." From these interviews, it can be explained that the use of the ICE Institute has a considerable impact on the development of individual competencies. The platform allows access to relevant modern knowledge, enabling students to acquire new information and develop new skills.

## Discussion

The use of MOOCs in higher education highlights both the advantages and the challenges faced by users. MOOCs have enabled broader access to learning, particularly for those with geographic or financial limitations (Deng et al., 2019). This model offers flexibility in terms of time and location, which significantly benefits independent learners. MOOCs offer courses across multiple disciplines, featuring diverse materials such as videos, articles, and quizzes, enabling students to tailor their learning to their individual needs and interests (Voudoukis & Pagiatakis, 2022). However, challenges in using MOOCs are also significant. One major drawback is the limited direct interaction between students and instructors. In traditional learning, such interaction is considered important for providing immediate feedback and monitoring student progress. In MOOCs, students must rely on discussion forums or asynchronously provided materials (Yoon et al., 2020). This limitation often results in students feeling less engaged or struggling to understand the material thoroughly.

From the perspective of transformative learning theory, MOOCs offer opportunities for deep reflection. Learners can reflect on the knowledge gained from courses and connect it to their professional or personal needs. This process helps them develop new perspectives or relevant skills. MOOCs, by providing various collaborative projects and discussions, encourage critical reflection, which is central to transformative learning (Sharma et al., 2022). However, the effectiveness of this transformation heavily depends on students' ability to independently explore and comprehend the material presented without strict supervision. In Indonesia, platforms such as ICE Institute have attempted to utilize the MOOC model to enhance student competencies. Based on interviews with students, although benefits are gained, many participants feel that the lack of monitoring or oversight from instructors becomes a barrier to achieving optimal learning outcomes. Therefore, integrating the flexibility of MOOC learning with more supportive structures, such as guided supervision or regular evaluation, is essential to ensure that learners not only access information but also understand it well and can apply it in real-world contexts.

## CONCLUSION

Online education through ICE Institute has emerged as a progressive solution to meet the needs of higher education in Indonesia, particularly amid the challenges of Industry 4.0. The implementation of blockchain technology ensures that certificates obtained are verified and widely recognized, fostering transparency and integrity in the realm of online education credentials. Based on students' perceptions, some of the courses they enrolled in include Metaverse, Gamification, AR, and VR. These courses highlight the integration of technology and education, serving as a central focus for students in the Educational Technology program. By providing easy access and flexible learning schedules, the institution enables

students to enhance their competencies more effectively. The presence of ICE Institute under the auspices of the Ministry of Education, Culture, Research, and Technology represents an initial step toward addressing the demands of the Industry 4.0 era and transforming the landscape of higher education in Indonesia.

## AUTHOR'S NOTE

The process of writing this article involved a series of literature studies as a form of foundational understanding, followed by interviews to provide further reinforcement. This research aims to present the obtained information as accurately as possible. On this basis, the author asserts that the entire content of this article is the author's original work. While acknowledging the possibility of shortcomings or errors within the article, the author has endeavored to deliver the best possible outcome. Therefore, the author expresses sincere gratitude to all parties involved in the writing process of this article..

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