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Child-friendly e-learning for artificial intelligence education in Indonesia: conceptual design

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ABSTRACT

Due to the widespread use of smartphones, most children in Indonesia are now engaged in playing video games. To make these games more exciting and challenging, video game manufacturers often incorporate artificial intelligence (AI). While various studies have highlighted the benefits of playing video games for children, this research has revealed some significant negative impacts that need to be addressed, as they can affect children's prospects. One of the major detrimental effects is the growing negative perception towards robots and AI, with concerns that they will replace human jobs. To counteract these negative impacts, educational institutions in Indonesia need to proactively plan and prepare for the consequences of gaming through formal learning. Given Indonesia's vast territory, consisting of islands, and its large population, it is crucial to implement appropriate learning technology. This article presents the architectural design of a child-friendly e-learning system that focuses on teaching children about AI. The design considers the available technology in Indonesia, based on our experience. The child-friendly e-learning model for AI education is expected to cultivate an interest in learning about technology, thus diverting children's attention from video game addiction.

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1. INTRODUCTION

Today, users can run most video games on electronic devices such as computers, laptops, tablets, or mobile phones. Video game software allows players to interact with a virtual environment. Playing video games creates an immersive and interactive experience. Video games combine audio and visual elements. Most modern video games have players controlling characters or objects. Players must complete tasks to achieve certain goals, such as reaching the highest level, winning matches, and completing scenarios. Players will get achievements in the game. Video games come in various genres, such as action, adventure, strategy, sports, and life simulation. Users can play alone or with other people (multiplayer). Playing video games can provide many benefits for children, including potential in the field of education [1]–[3]. However, addressing the negative impacts of video games [4], including children's negative perceptions of robots [5] and artificial intelligence (AI), is also crucial.

The sophistication of video games causes children to spend more time in front of screens, rarely play outside the home, and reduce social interactions [6]. Many children like video games because they are interesting, touch emotions, and foster imagination [7]. The use of AI further enhances the capabilities of video games so that they can provide cognitive, motivational, emotional, and social benefits [8]. Our initial

research in Denpasar, Bali, Gresik, and East Java obtained data showing that almost all 6th-grade elementary school students played games for 2 hours daily. The duration playing games becomes longer during the holidays. Games cause addiction and negative impacts such as forgetfulness, irritability, and antisocial behavior [9]. This research reveals the increasing negative influence of gaming in Indonesia. The research showed that AI can enhance the quality and accessibility of education in Indonesia, supporting adaptive learning and personalized student experiences [10].

When developing AI education through video games, we must be careful not to cause problems such as addiction, reduced physical activity, and exposure to harmful content. A child-friendly e-learning system should combine the appeal of video games with safe educational features. Indonesia's cultural and technological context is critical to designing a system that is acceptable to children and meets their educational needs. Even though e-learning, introduced in 2003, has developed, we still need to make technical improvements to overcome existing challenges [11], [12].

Integrating AI into everyday life is widespread, from household appliances to children's toys [13]. Many industries produce AI-based children's toys, such as robots, chatbots, and video games. This software has facial, voice, and autonomous movement recognition features to help children understand AI and robots. Industry continues to try to reduce costs and improve robot capabilities to make them more attractive and affordable [14]. Conditions like this please children. However, if this is not accompanied by proper education, AI will hurt children [15]. If we introduce the concept of AI to children from an early age, it will reduce the negative risks while increasing the benefits [16]. Research shows that studying AI can improve children's understanding of concepts, including machine learning and robotics. Learning AI can foster creativity, emotional control, collaboration, and computational thinking [17]. Implementing the AI curriculum in schools can improve students' understanding and perception of technology. Educators are important in realizing an AI curriculum [18]. Research also shows that AI-based tools have the potential to enrich the learning experience and improve the quality of teaching, especially in primary and secondary education in Indonesia [19].

Much research has been carried out in Indonesia. Among other things, learning AI to improve students' critical and creative thinking skills. Even though much AI-based software has been developed and proven useful, we need to develop technology, content, and methods appropriate to the educational context in Indonesia. We propose a child-friendly e-learning design for AI education that combines gamification, educational content, and digital environments by exploiting the appeal of video games. This system helps Indonesian children develop AI literacy from elementary school to ensure their success in the future. The main challenge is attracting children's interest by considering their preferences for entertaining games. Adaptive e-learning environment based on learning styles and its impact on development of students' engagement [16]. The goal of this research is to make AI learning fun and effective. This research contributes to discussions about the impact of video games, the application of AI in education, and the development of child-friendly e-learning systems. This research also provides evidence on how video games influence learning, develop AI-based educational tools, and design engaging and accessible e-learning platforms for children.

2. METHOD

Electronic learning (e-learning), is carried out electronically or online using electronic media and devices such as the internet, computers, tablets, mobile phones, and CD-ROMs. This method provides high flexibility because it can be done by anyone, anywhere, and anytime. An e-learning can be formal or informal, depending on the learning objectives and materials. The concept of e-learning is closely related to using electronic devices (computers) and internet networks in learning, such as distance learning, computer-based training, web-based training, synchronous learning, and asynchronous learning. E-learning continues to develop because there are opportunities, but new challenges continue to emerge, including: technical problems [20], student motivations, lack of student engagement [21], and limited interaction with teachers [22].

Digital technology in the classroom has various benefits, such as reducing repetitive tasks for teachers, automating day-to-day operations, teaching student's responsibility and self-discipline, preparing students for lifelong learning, and enhancing the learning environment and performance [23]. In this digital age, e-learning has become a popular alternative to traditional education. Advances in technology and increasingly easy internet access allow students to learn flexibly without being bound by time and place. E-learning systems allow students to access learning materials, interact with teachers or fellow students, and complete assignments online through learning platforms. With diverse geographical conditions in Indonesia, e-learning is a more flexible and affordable option for students and teachers [24].

E-learning architecture design is the structure or framework of an e-learning system that determines how the components of the system interact and function. E-learning architecture design can facilitate distance

learning by providing an e-learning platform that is easily accessible and easy to use, provides learning content that follows the curriculum, standards, and needs of students and teachers, provides features that support the learning process such as assessment, feedback, collaboration, and personalization. In addition, it provides security, management, and evaluation mechanisms for e-learning systems.

E-learning has many aspects or branches that continue to develop along with technological advances and needs. Technology [25], content [26], and methods [27] are experiencing developments concerning e-learning. These three elements are inseparable from the e-learning architecture [28]. The design approach of the e-learning model combines technology, content, and method. We integrate all these components to build an interactive, adaptive, and accessible system. Understanding how these components interact allows e-learning research and development to achieve optimal results.

2.1. Technology

The development of e-learning technology refers to advancements in information and communication technology that enhance the creation and delivery of interactive, effective, and flexible online education. Since its inception in the 1990s, e-learning has evolved with technological progress, resulting in more advanced online learning platforms, applications, and supporting technologies. These include animated videos, interactive simulations, augmented reality, and virtual reality [29].

Technological advancements have facilitated the integration of mobile devices, cloud computing, and AI technology in e-learning, making education more accessible and flexible. In addition, recent developments in big data analytics and machine learning have been utilized in e-learning to personalize the learning experience, track learners' progress, and offer more effective feedback. The continuous evolution of e-learning technology presents opportunities for the creation and delivery of improved, easily accessible, and highly effective online education.

2.2. Content

Content development in e-learning involves creating and enhancing digital learning materials on e-learning platforms. These materials can include text, images, audio, video, and interactive simulations designed to help learners acquire new knowledge through online learning. There is a need for innovative teaching materials, such as e-modules, to enhance physics learning [30]. As e-learning technology advances, so does the content, with new technologies like augmented reality, virtual reality, and AI being used to enhance the quality and effectiveness of online learning. Additionally, e-learning content is becoming more personalized, catering to individual learning needs and preferences, and accessible on various devices such as computers, laptops, tablets, and smartphones. E-learning content development allows for more interactive, effective, and enjoyable online learning experiences while creating new opportunities in online education, such as mobile learning and massive open online courses (MOOCs).

2.3. Learning method

The development of learning methods in e-learning refers to improving and enhancing the techniques and strategies used on e-learning platforms. These methods include learning videos, interactive simulations, online discussions, and automated tests. As e-learning technology advances, new technologies like augmented reality, virtual reality, and AI are being incorporated to enhance the quality and effectiveness of online learning [31], [32]. Furthermore, learning methods in e-learning are becoming more personalized and tailored to individual learning needs and preferences. They can be accessed on various devices such as desktop computers, laptops, tablets, and smartphones. This development allows for a more interactive, practical, and enjoyable online learning experience for students. It also creates new opportunities for the provision of online education.

E-learning is a significant change brought about by the internet. It allows users to acquire knowledge and education effectively, using both synchronous and asynchronous methods. This is especially important in today's fast-paced world in which staying updated is crucial. E-learning delivers content through electronic information and communication technology, utilizing various methods such as feedback systems, computer networks, video and audio conferencing, websites, and computer-aided instruction. This method of delivery opens opportunities for lifelong learning for employees. In conclusion, we believe that integrating synchronous tools into the asynchronous environment is necessary to create a learning model that is accessible at any time. The primary environment will be asynchronous, with discussions, tasks, and assessments taking place and managed through synchronous tools integrated into it [33].

The accessibility of augmented reality as an educational medium for both young and professional learners is increasing. Augmented reality combines ubiquitous, tangible, and social computing, offering unique advantages by merging the physical and virtual worlds and allowing users to control viewpoints and interact. This paper provides a brief introduction to augmented reality technology and e-learning, along with

examples of its critical applications and technologies in an educational context. Additionally, the paper presents a systematic review of the literature on augmented reality in education, highlighting the benefits and disadvantages of augmented reality for e-learning. It also discusses current trends, future visions, and opportunities for further research in augmented reality for educational settings [34].

2.4. Design approach

E-learning architecture is fundamentally intertwined with technology, content, and methods [27]. There are several types of e-learning architectures used for developing new e-learning systems, including web-based, distributed, cloud-based, learning management systems (LMS), and mobile learning. In this study, we focus on an LMS-based architectural approach, where we adapt and combine LMS architecture to meet the specific conditions and situation in Indonesia. Additionally, we have added necessary components to enhance performance and quality.

System development begins with identifying the requirements of an interactive e-learning system. Next, we select open-source, popular, and practical technologies. The most used e-learning system is an LMS, and we have chosen Moodle for its widespread use in Indonesia and ease of installation. In addition to being open source, Moodle offers comprehensive features for managing learning. One crucial feature considered in this study is Moodle's content distribution capability. Interactive e-learning is essential for elementary school students as it sparks interest in learning, enables diverse teaching methods, actively engages students, and fosters critical, creative, and collaborative thinking skills. Moreover, interactive e-learning can be adaptive, significantly enhancing student engagement and improving learning retention [35].

Figure 1 illustrates an e-learning approach to teach AI to elementary school students. The main objective of the research is anticipating the negative effects of video games, including the misconception that computers or robots will replace human work in the future. It is important for the government, schools, parents, industry, and researchers to address these negative impacts. There is also concern that student may prioritize social science over technology. Given Indonesia's demographic and geographical conditions, it is necessary to design an e-learning architecture that is easily accessible, user-friendly, and affordable. This architecture should also incorporate engaging features, such as video games and interactivity, while introducing the concepts and benefits of AI for the future.

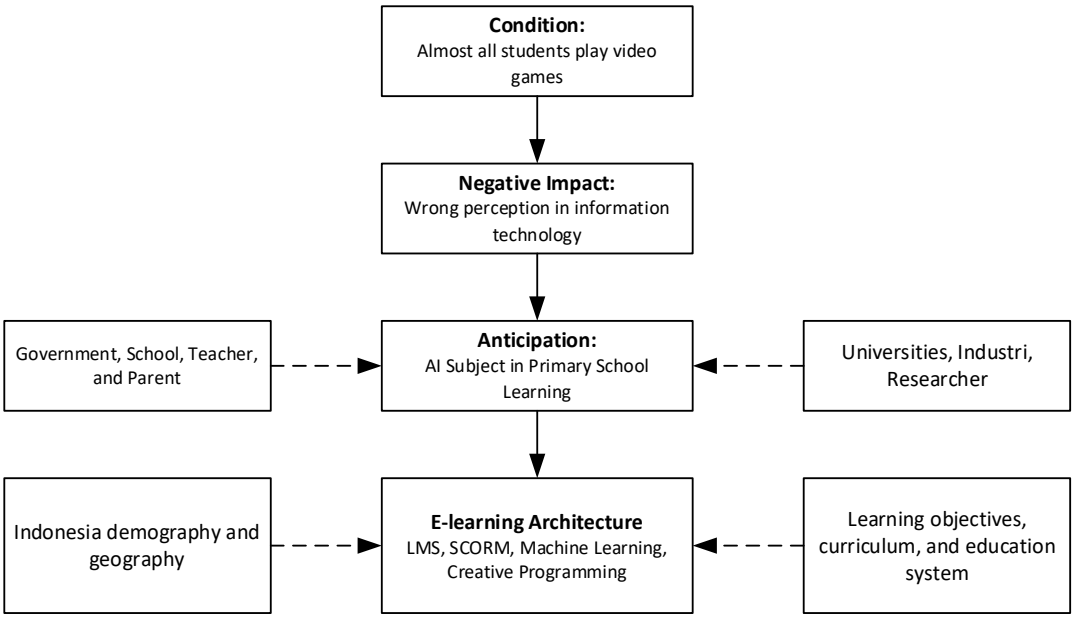

Figure 1. E-learning architecture development approach for primary school AI subject

We designed an e-learning architecture for child-friendly AI learning with a technology, content, and learning method approach. We also consider geographical conditions, school conditions, research contributions, and the role of the government. Understanding that Indonesian students are accustomed to using games, we incorporate gamification elements to stimulate their interest and enhance the enjoyment of learning. We want to anticipate the negative impact of using games by providing educational and useful content. This architecture enables the widespread and rapid dissemination of learning materials, allowing

students in various locations to access high-quality educational resources. We anticipate the successful implementation of this design in schools, which will foster the enhancement of technological literacy from a young age. Figure 1 summarizes the structure and key components of the e-learning architecture we developed.

3. RESULTS AND DISCUSSION

This research has designed an e-learning platform that is both child-friendly and AI-based. The goal is to have an e-learning platform that can attract students like video games. While previous studies have explored the impact of video games on learning, they have not explicitly addressed the effect of gamification integration in e-learning platforms on children's AI literacy.

The architecture of e-learning refers to the arrangement or framework of information systems that facilitate e-learning procedures. It includes various elements such as content, platform, application, network, and standards, which deliver e-learning services and functionalities [36]. A well-defined architecture not only helps with system design but also allows for the development and reuse of components [37]. Creating a new e-learning architecture is a complex task that requires careful planning and analysis. There is no one-size-fits-all solution for e-learning architecture as different projects may have different objectives, requirements, and limitations.

The first step in developing an e-learning architecture is to conduct a needs analysis. This analysis considers the specific requirements of Indonesia's education system, demography, and geography. Based on this analysis, we establish the boundaries for the architectural design as: i) the AI learning modules are packaged so it is easy to distribute and use them; ii) AI learning modules can work with poor internet quality; iii) an interactive e-learning model can integrate LMS and learning modules to attract students; iv) the system can be accessed using a Windows or macOS-based computer/laptop; and v) AI modules can run on computers with not high specifications.

3.1. Constituent components

The e-learning architecture in this paper consists of five main components that interact with each other synergistical: i) the AI module provides AI that allows personalization and adaptation of learning content according to user needs; ii) the industry standard sharable content object reference model (SCORM) ensures easy integration of learning content with various LMS, which is vital to ensure well-monitored student activities; and iii) the LMS becomes a central platform that enables the management, delivery, and tracking of learning content and interactions between teachers and participants. The internet and browsers are critical infrastructures that enable access to online learning content and provide flexible and affordable learning experiences. These five components work together in the architecture to create an effective and efficient e-learning environment.

Figure 2 illustrates this comprehensive final e-learning architecture, which includes the LMS, the SCORM, internet connectivity, web browsers, and the ml5.js and p5 libraries. By integrating these components, this e-learning architecture offers AI learning experiences, interactivity, and improved retention. The p5 library.js is utilized to create interactive modules that introduce concepts related to data sets. The use of SCORM plays a crucial role in this architecture. It enables the module to function even with poor internet quality. Additionally, the module can operate offline when accessed through the Moodle App. This feature makes this architectural design suitable for the unique educational, demographic, and territorial conditions of Indonesia.

3.1.1. Artificial intelligence module

The AI module is an e-learning content that utilizes various components such as p5.js and ml5.js JavaScript libraries, HTML5, and CSS. These components work together to create AI learning modules that introduce the concept of machine learning. These modules also have interactive properties. The ml5.js is a JavaScript library specifically designed for developing machine learning applications in the browser. It is flexible, open, and integrates well with TensorFlow. It also has a strong community support and a complete ecosystem. The ml5.js supports popular machine learning models and is compatible with modern browsers. On the other hand, p5.js is a JavaScript library that focuses on creating interactive artwork, animations, and visualizations in the browser. It is particularly useful for building interactive modules. The p5.js utilizes modern web technology standards like HTML5 and JavaScript. Both p5.js and ml5.js libraries can easily interact with HTML elements such as buttons, inputs, and other DOM elements. They can also be seamlessly integrated with other web elements.

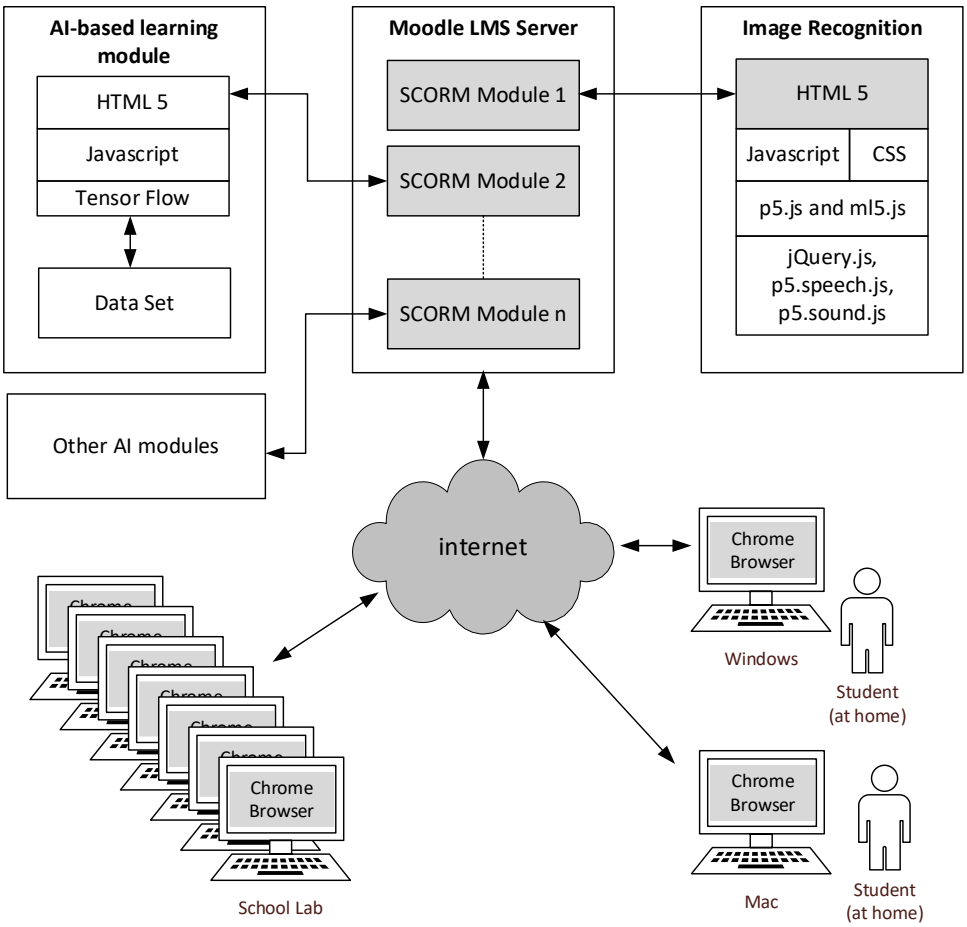

Figure 2. The result of the e-learning architecture design for AI education in Indonesia

3.1.2. Sharable content object reference model

SCORM is a technical standard for e-learning software that enables the sharing, reuse, and integration of learning content with various e-learning platforms and tools. It offers benefits such as interoperability, reusability, accessibility, and durability of e-learning content. This study specifically uses version 1.2 of SCORM. The reason for choosing SCORM is that it allows the MS to track student learning activities. Additionally, SCORM modules can be downloaded and used with limited internet connectivity [38]. It's important to note that SCORM is primarily a framework for content delivery, and it is the responsibility of developers to design content that is appropriate for children's age and follows proper pedagogy.

Child-friendly e-learning refers to the development and delivery of online learning content specifically designed for children [39]. This involves considering their unique needs, characteristics, and developmental levels. To achieve this, several elements should be considered [40]. Firstly, the interface should be visually appealing and engaging for children. This can be achieved by vibrant colors, attractive graphics, and intuitive navigation. Secondly, the language used in the content should be simple and easy for children to understand. Complex concepts should be broken down into smaller, more digestible pieces of information. Thirdly, it is important to encourage active engagement from children. This can be done through interactive activities, such as quizzes, games, and puzzles, that allow children to actively participate in the learning process.

Furthermore, the content should be age-appropriate, ensuring that the material is suitable for the target age group. This can be achieved by considering the cognitive abilities and interests of children at different developmental stages. Incorporating multimedia elements, such as videos, animations, and audio, can also enhance the learning experience for children. These elements can help to reinforce concepts and make the content more engaging and memorable. Providing positive feedback throughout the learning process is crucial to motivate and encourage children. This can be done through rewards, badges, or virtual points that children can earn as they progress through the content.

Lastly, privacy protection is of utmost importance when developing child-friendly e-learning content. Measures should be taken to ensure that children's personal information is kept secure and that their online activities are monitored and supervised. To create child-friendly content, SCORM can be used to package interactive learning modules, educational games, quizzes, learning videos, and other multimedia elements that appeal to children. There are several SCORM-compatible e-learning development tools available, such as Adobe Captivate, Articulate Storyline, or Lectora, which can be used to develop this content. In this research, we utilized CourseLab to create prototypes for child-friendly e-learning content.

3.1.3. Learning management system

LMS is a platform that offers various features to support online learning, including materials, assignments, discussions, quizzes, and reports. It provides advantages in terms of management, development, assessment, and tracking of e-learning. In Indonesia, where internet quality and speed vary, it is crucial to have an LMS that can adapt to limited or slow connectivity. The LMS should allow for offline use or have caching features to access content with limited connectivity. Popular LMS options in Indonesia include Moodle, Blackboard, Canvas, and Google Classroom. When selecting an LMS for e-learning, it is important to consider how the system architecture aligns with pedagogical goals and learner needs [41]. We chose Moodle because it is open source, easy to install, widely used by schools, and user-friendly. The main reasons for choosing Moodle are its easy customization and support for SCORM 1.2. Moodle is completely free and transparent about user data. In May 2023, there are 165,667 Moodle sites worldwide, with 44,278,576 courses, 361,952,855 users, in 242 countries. Indonesia ranks 5th out of 10 countries with the most Moodle installations, with 5,913 Moodle sites owned by educational institutions, individuals, or companies. This demonstrates Moodle's popularity in Indonesia.

3.1.4. Internet and browser

The internet is a global network that connects various communication and information devices. In Indonesia, the internet has become an essential tool for education, especially after the COVID-19 pandemic. It offers advantages such as availability, flexibility, diversity, and collaboration in e-learning. However, slow and unstable internet connections can lead to delays or failures in accessing learning materials, affecting the overall quality of learning. Moreover, the quality of the internet can also impact learners' motivation in e-learning systems [42]. If the connection is excellent or unstable, learners may struggle to access materials or interact with educators and classmates, leading to frustration and a loss of motivation. Additionally, limited internet access can hinder students' ability to attend online sessions and utilize all the facilities provided by the e-learning platform. Therefore, it is crucial to ensure a good internet network to maintain or increase student motivation in the e-learning system. Internet service providers in Indonesia should focus on distributing high-quality and reliable internet access evenly across the country. Currently, the quality of internet service on the island of Java is relatively good and evenly distributed. Considering this, we adopt a distributed system approach in designing the e-learning architecture, considering the effect of internet quality [43].

3.2. Model development examples

Testing the feasibility, performance, and security of a designed e-learning system is referred to as e-learning architecture testing. This type of testing involves utilizing methods such as prototyping, usability testing, security testing, performance testing, and functional testing. In this study, we will focus on testing the architecture using prototyping methods. This approach involves creating prototypes based on the e-learning architectural design before developing the final version. We implement the architecture in form of learning model. The goal of e-learning model testing is to ensure system functions properly and user-friendly. We have developed and tested modules as prototypes, namely image recognition as shown in Figure 3 and AI Tic-Tac-Toe game as presented in Figure 4.

The objective of the first experiment is to test the system usability scale (SUS). There are a total of 61 students participating in the experiment, and the average score obtained is 83.5, which falls into the category of "very satisfactory". It is important to note that the SUS score is only an indicator of elementary school students' satisfaction level with the tested system. However, this score alone does not provide highly reliable results, as the outcomes may vary when tested in different settings. Conducting SUS testing with elementary school students comes with certain risks. These include the need for assistance in understanding the questions, inconsistent results, the requirement of companions for help, and limited generalizability of the findings. To mitigate these risks, we have developed a SUS questionnaire with simplified and easy-to-understand questions. It is worth mentioning that the system has been performing well in various areas, despite differences in internet quality.

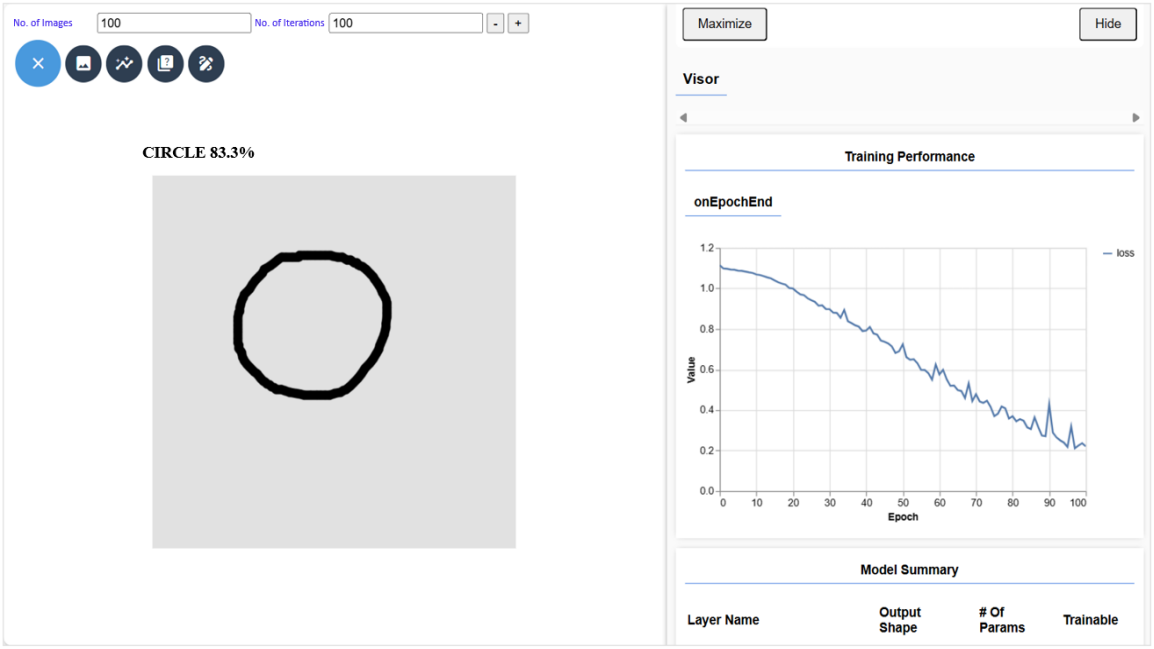

Figure 3. Image recognition module sample interface

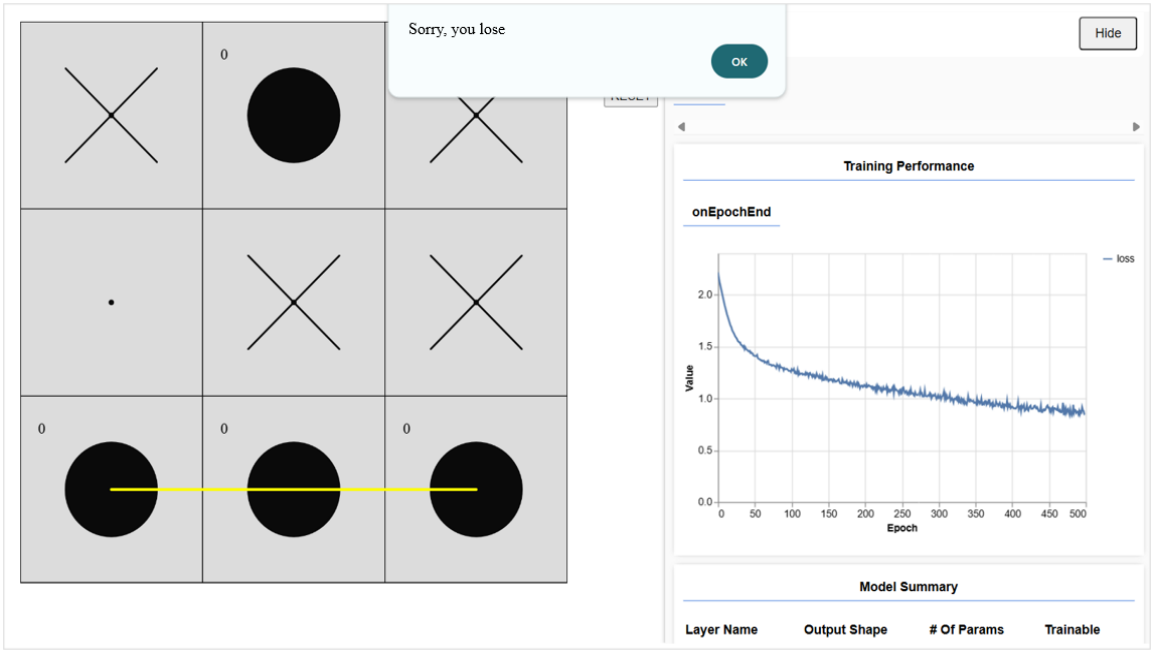

Figure 4. AI Tic-Tac-Toe game interface

3.3. Implication and development directions

The architectural design aligns with the chosen approach. The implementation demonstrates that we can realize the architecture in the form of an e-learning model that includes e-learning technology, content, and learning methods. The use of e-learning for AI subject has proven successful. We can use this architecture to create e-learning-based AI learning models with various themes. In addition, because it is based on e-learning, this architecture allows for the widespread and rapid dissemination of learning materials, reaching more students in various regions of Indonesia. We have great potential to develop and apply this architectural design to real learning in schools.

This study has several significant practical implications. This study shows that e-learning architecture can be realized in the form of a e-learning model. The experimental results show that the model is also proven to be able to increase student engagement and understanding of AI. Schools may consider adopting a similar e-learning model to improve the quality of their education, especially in a complex field like AI. This architecture allows for the widespread and rapid dissemination of learning materials, so that schools in various locations can access quality educational resources without geographical restrictions. Schools can customize these platforms to accommodate various learning themes, resulting in flexibility in teaching different subjects. E-learning can help schools provide more engaging and effective learning, as well as increase technological literacy among students from an early age. The development and adjustment of this architecture enable its use not only in Indonesia but also in other countries with similar conditions, rendering it a global solution for technology-based education.

This study explored a comprehensive e-learning architecture with integrated gamification and educational content. However, this research has several limitations that need to be considered. The research sample involved a group of students from certain schools in Indonesia. This sample is not representative of the entire student population. We need to conduct further and in-depth studies to confirm the effectiveness of these e-learning architectures, especially on their impact over longer periods of time. The variations in internet infrastructure and students' technological skill levels can have an impact on implementation results. This suggests that the study's results may differ elsewhere due to different technological conditions. Finally, we still need additional research to explore the effectiveness of e-learning models. We still need research with various conditions and learning environments.

This research supports the results of previous studies on the integration of gamification in e-learning, as described by Fajri *et al*. [44] which gamification features enhance user engagement in LMS. However, we are expanding our focus by applying AI in basic education in Indonesia, which has rarely been discussed in the previous literature. The application of AI is one of the keys to the development of e-learning in the future [45]. In this research we provide AI learning modules that can be accessed in areas with limited internet connectivity. We contribute to the literature by proposing an architecture that combines SCORM standards and AI technologies to create sustainable learning environments in developing countries. This architecture can be applied in other developing countries with similar geographical and infrastructure conditions, such as in some regions of Africa and Southeast Asia. The research offers a flexible, scalable approach to support AI-based education in different regions. Future research needs to examine the long-term impact of AI-based e-learning, especially in improving AI literacy among children. We also suggest a more in-depth evaluation through longitudinal studies to understand how AI-based learning affects children's interest in STEM fields in the future.

In future research, this focus will be on evaluating the effectiveness of architecture-based e-learning systems in addressing the negative impact of video games on children's perceptions of robots and AI. We will use surveys or interviews to assess students' attitudes and understanding of AI topics before and after using these e-learning systems. Additionally, exploring the long-term effects of these systems on children's career choices can provide valuable insights into Indonesian education. Furthermore, researching the scalability and adaptability of these e-learning systems to other regions or countries with similar geographical characteristics would be an interesting topic for future studies. It is important to improve and refine this research architecture to develop child-friendly e-learning systems and foster interest in learning technology, particularly AI.

4. CONCLUSION

We designed a child-friendly e-learning architecture for AI learning using a technology, content, and learning method approach. We considered geographical conditions, school conditions, research contributions, and the role of government in this design. We added gamification elements to make learning more interesting and reduce the negative impact of game addiction. This architecture facilitates the distribution of materials widely and quickly so that students in various regions of Indonesia can access quality learning resources. We hope this design can be applied in schools to improve early technological literacy. Further research is needed to optimize the implementation and examine the impact of gamification in AI learning.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors state no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

ETHICAL APPROVAL

Not applicable.

DATA AVAILABILITY

Data availability is not applicable to this paper as no new data were created or analyzed in this study

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