

AI-powered smart assistants: Your key to self-learning success

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Abstract: This research aims to develop a prototype of a smart assistant system for independent learning activities based on Artificial Intelligence. Web-based instructional design (WBID) approach is used in research to develop intelligent assistant systems. Artificial Intelligence-Learning Analytics helps students make important decisions and creates an effective and efficient learning environment while still building learning independence. The method used is a research and development (R&D) approach. The findings of this research are an intelligent assistant system in independent learning activities assisted by artificial intelligence in the form of the AILA ChatBot application. In the end, this research concludes that the ChatBOT application developed in this research is used to provide recommendations for using AI applications to students, which are then implemented and integrated into SPOC/MOOC.

Keywords: Artificial Intelligence, MOOC, Web-based instructional design, Learning Analytics

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INTRODUCTION

Learning through the Massive Open Online Courses (MOOC) or Small Private Online Courses (SPOC) platform is vulnerable to learners experiencing failure. (Otto et al., 2019). A Learning Management System (LMS) is software used to manage and deliver training and educational materials to the workforce or external users via the Internet. LMS allows users to create, upload, store, and set online courses for users to access efficiently and flexibly (Bradley, 2020; Green & Chewning, 2020). The Learning Management System (LMS), both MOOC and SPOC, has two main things, namely (1) learning activities; and (2) learning resources. Teachers generally construct the nature of learning activities and learning resources. So that activity rules are developed and learning resources are needed based on the wishes of lecturers. Lack of communication in LMS due to online will result in learners having biased perceptions of learning activities and resources. Learners who do not find solutions to learning activities and resources cause learners

to decide without consideration of critical thinking. As a result, learners decide to choose the wrong learning activities and resources or even leave the platform.

Autonomous learning is the most challenging learning characteristic in MOOCs and SPOCs. The system in MOOCs and SPOCs relies heavily on learning independence. (Torres & Beier, 2018). Independent learners must make academic decisions effectively and efficiently. In general, MOOCs have a short learning time, and full online SPOCs require interaction time for one semester, so learners indeed interact only with the help of information from the web and web-based search engines. Academic decisions made by learners can be said to need more educational foundation, just like search relies on keywords. Therefore, the implementation of autonomous learning becomes constrained by technical problems.

Assistance facilities often constrain learning and self-study activities. In general, learners only use search engines to provide solutions. So, the accuracy factor of the results is very dependent on the ability of learners to enter search keywords. Artificial intelligence is one of the fields of computer science that can solve cognitive problems associated with human intelligence, such as learning, problem-solving, and pattern recognition (Alomari, 2022). Artificial intelligence (AI) can involve robotic or futuristic scenes and artificial intelligence (AI) that goes beyond sci-fi robotics in modern non-human advanced computing. AI technology today has developed rapidly along with the development of technology to impact various fields, especially education (Adamu & Awwalu, 2019). In education, AI encourages the application of artificial intelligence education and promotes the development of cognitive and pedagogical skills—the impact of artificial intelligence on learning to reduce teaching workload and improve information literacy. AI brings many changes to the world of education, both as opportunities and challenges. At the same time, there are issues in artificial intelligence education, such as equity and inclusivity of AI education (L. Sijing & W. Lan, 2018).

AI is the focus of learning development and technological developments in the industrial era 4.0. Industrial era 4.0 integrates technology and collaborates with cyber technology and automation technology in various fields (Khan et al., 2017). In its development, AI technology provides many changes to learning activities, especially in online learning. Online learning is one of the learning strategies currently widely used along with digital learning transformation. In the process, a student experiences many difficulties when using online learning, such as finding information in online learning. The absence of recommendations on what information to access sometimes makes students confused. The behavior of previous learners and their current state as contextual information to create reinforcement agent policies to make optimal decisions (Intayoad et al., 2020). A promising way to provide assisted online learning is recommendations that direct learners to appropriate learning content at the right time. However, this is a nontrivial problem because the learning environment is considered to have a high degree of flexibility, and participants learn independently according to the characteristics and learning conditions they experience. The ever-growing offering of online learning materials to learners is increasingly making it harder to find specific information from data sets. Assistant systems seek to reduce this complexity through online learning systems and more adaptive recommendations (Khanal et al., 2020). Based on several previous studies, assistance in learning is one of the essential needs for students to be recommended in choosing appropriate learning content.

One of the online learning that currently prioritizes large-scale learning, free and accessible to anyone, is a MOOC. MOOCs bring the principle of openness and utilizing technology and open opportunities for the wider community to learn informally to enable the involvement of large numbers of participants (Ardchir et al., 2017; Buchem et al., 2020). With such

characteristics, MOOCs can be one of the reliable choices of online learning forms. The principles of this MOOC require students to be more independent. While MOOCs are a reliable form of online learning, the involvement of students in each learning session is often questioned. Learners who could complete all the learning in a MOOC could better self-organize their learning. (Kurniawan et al., 2023). They demonstrated significantly higher levels of perceived effectiveness and engagement with MOOC content than students who did not complete the learning process (Reparaz et al., 2020).

Smart assistants are needed to help learners decide (Decision Support and System), not provide instant decisions. So, it still prioritizes human intelligence, whereas artificial intelligence is part of its support. In the early stages of the DSS process, DSS will carry out activities that focus on identifying a situation, opportunity, and problem. The intelligence phase in DSS consists of continuous or intermittent environmental empowerment. Several activities included in this phase are identifying issues and opportunities, classifying problems, and determining ownership of a problem or situation. (Chang, 2014) This process will help provide an instant decision. Based on this, it can be seen that previous research has provided many findings regarding the reliability of DSS for learning. However, the research that has been developed does not discuss implementing chatbores in DSS much. Therefore, this research aims to develop a prototype of a smart assistant system for independent learning activities based on Artificial Intelligence.

METHODS

Artificial Intelligence Learning Analytics (AILA) is a program that can be embedded in SPOC (Small Private Open Course) / MOOC (Massive Online Open Courses). It will help students find effective and efficient learning resources and learning flows. Exploratory data analysis (EDA) analyzes a data set to summarize its essential characteristics. Exploratory Data Analysis (EDA) is a critical process in conducting initial investigations on data to find patterns and anomalies, test hypotheses (Uzhga-Rebrov & Grabusts, 2021), and check assumptions with the help of summary statistics and then visualization representations (Khanam et al., 2023).

Smart Assistant is not part of SPOC/MOOC. The system is connected through a link connected by the SPOC/MOOC. The Smart Assistant will choose whether the problem can be solved simply by Q&A if the problem is technical, frequently arises, and is simple, or through AILA if the problem is new and complex. AILA will provide solutions so that users can be assisted through artificial intelligence construction to select learning activities or learning resources supplied by MOOC/SPOC effectively and efficiently. The general framework of systems and programs developed in this study is generally shown in Figure 1. The system will perform initial profiling of learner data logged into the system. Student profiles are recorded and stored in databases stored in the cloud as a database center (big data), which will later be used to identify, correlate, and represent learner data and activities. Learner activities while using the system, both SPOC and MOOC, are recorded as learning process activities that are linked to the learner profile. The built-in system provides the main feature (DSS), which is intended as a forum for Questions and Answers (Q & A) to provide answers, instructions, and directions for learners during the learning process by utilizing the system.

AILA development is done through Web Based Instructional Design (WBID) developed by Hall, Watkins, and Eller (C. M. Chen et al., 2020; Hall et al., 2003; Zhao & Zhang, 2023). Development is carried out through the stages as in Figure 2.

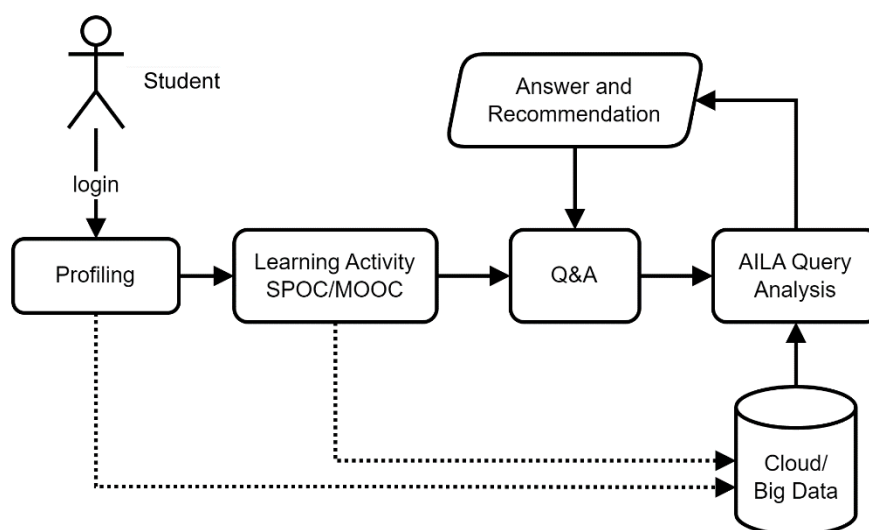


Figure 1. General Framework of the Program

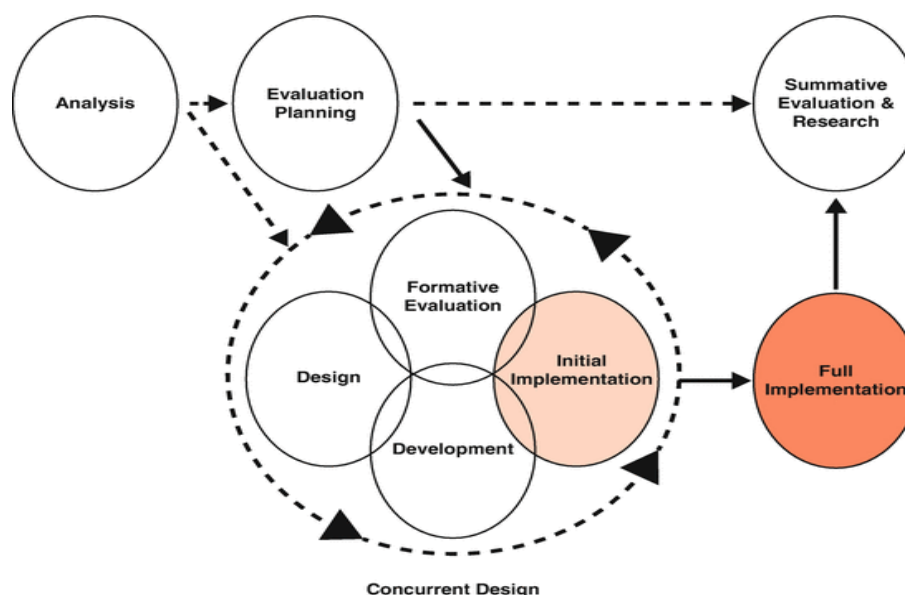


Figure 2. Diagram of WBID

The process of Web Based Instructional Design (WBID) is a systematic method for creating online learning that is both effective and efficient. The initial phase involves performing a needs analysis to comprehend the learning goals, audience, and context for the designed learning experience. Following that, the instructional designer outlines the general learning framework, which involves setting learning goals, identifying anticipated results, and determining teaching methods to utilize. This plan creates educational material based on the instructional design, encompassing text, images, videos, and interactive elements like simulations. Moreover, the educational material is delivered through an internet-based platform, allowing students to easily reach learning resources and use different educational tools. In the implementation stage, verifying that the technology being utilized operates effectively and satisfies user requirements is crucial. Following that, an assessment process is conducted to assess learning efficiency, focusing on student achievements and the overall learning journey. The findings from this assessment are employed to enhance the instructional design to better cater to requirements and deliver superior learning results. The WBID process involves multiple cycles of design,

implementation, evaluation, and iteration to continuously improve the lesson. WBID guarantees that online learning is relevant, efficient, and focused on the intended results.

RESULTS AND DISCUSSION

This research refers to the development approach carried out with web-based instructional design. This research is carried out to develop a smart assistant system for learning activities. The stages of the Smart Assistant System in Artificial Intelligence (AI)-assisted Self-Learning Activities are solutions to help students/learners increase learning efficiency and effectiveness. (Abalkheel, 2022; Bajaber et al., 2016). The DSS approach to smart assistants can provide personalized assistance, feedback, and learning resources tailored to individual needs. The prototype developed in this research output, <http://teknologipendidikan.org/>, allows the following: (1) Provide interactive solutions and explanations to questions or difficulties faced by users regarding AI applications needed in learning; (2) Provide instant feedback on work or answers provided by users; (3) Facilitate the search for additional information relevant to the learning material; and (4) Integrate systems on digital learning platforms and online resources to provide direct access to learning materials. The prototype developed in this study provides recommendations for choosing AI applications for the learning process. The research object used a system development approach that refers to problems to be solved with AI-based applications. Users are allowed to fill in keywords according to the needs of the application to be used.

The result of AILA's smart assistant is a virtual assistant. The smart assistant program is a software program that uses artificial intelligence to provide information to students and translate certain assignments entered as input. Smart assistants can understand text input considered user speech and produce decision-support systems responses. (L. Chen et al., 2020; Dexler information Solutions Pvt Limited et al., 2021). AILA smart assistants are developed to have the advantage of performing various tasks, such as answering questions and considering the user. The Smart Assistant set has the disadvantage of requiring large amounts of data to support the AILA platform, including machine learning, natural language processing, and adaptive to the platform. (Shaw, 2016). While AILA smart assistants can do the simple job of directing user knowledge, they are only suitable for some applications and may struggle with complex tasks outside their programming scope. So, the construction of AILA Smart Assistant is different from GPT chat. AILA Smart Assistants have an essential role in the field of education. The development of AILA Smart Assistant carried out in SPOC / MOOC, provides various benefits to learners, teachers, and administrators. The benefits of AILA Smart Assistant for learners are as follows: (1) AILA Smart Assistant can perform Personalized Learning reinforcement: Smart assistants can provide personalized learning experiences tailored to individual needs and learning styles.; (2) 24/7 access AILA Smart Assistant provides full learning support: Smart assistants can give students 24/7 access to support, answer questions, provide feedback, and help with their learning (Winkler et al., 2021).; (3) AILA's Smart Assistant provides increased engagement. Smart assistants can make learning more engaging and interactive, helping learners stay motivated and focused—improved web accessibility by AILA's Smart Assistant. Smart assistants can make education more accessible to learners in an inclusive manner. AILA's smart assistant program is designed to provide students with information and translate specific tasks entered as input. It uses artificial intelligence to understand text input, perceived as user speech, and generate decision support system responses. Smart assistant programs are developed to perform various tasks, such as answering questions and assisting users. However, large amounts of data are needed to support the AILA platform, including machine learning, natural

language processing, and adaptive capabilities. Although AILA smart assistants can handle simple tasks, they may need help for more complex tasks outside their programming scope. Although AILA's intelligent assistant can handle simple tasks, it is limited in scope and may require assistance for more complex tasks. The construction of AILA Smart Assistant differs from GPT chat, because AILA Smart Assistants have an important role in education. They are designed to support students' learning process and provide them with the information and assistance necessary to complete their assignments. However, they may not be suitable for all applications and require additional support for tasks outside their programming scope.

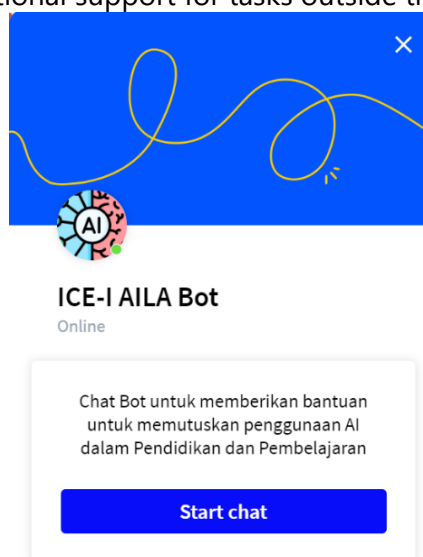


Figure 3. Smart Assistant AILA

Figure 3. shows the AILA smart assistant developed in this study using keyword commands based on the application searched. The Smart Assistant will provide recommendations for the keywords searched, while the answers given refer to the library of the smart assistant that has been added, as shown in Figure 4.

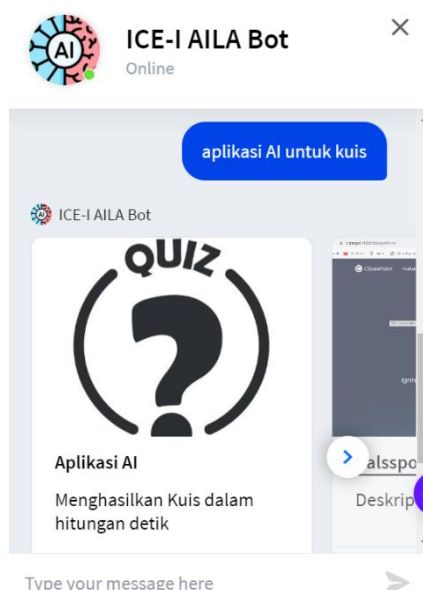


Figure 4. Respon command smart Assistant

Figure 4 shows the results of AI-based quiz application recommendations according to the keywords given to the smart assistant system. AILA Smart Assistant provides important benefits

for teachers with space in MOOCs or SPOCs, including: (1) AILA Smart Assistant helps with teacher tasks. AILA's Smart Assistant can automate much help with the tasks teachers have to do, freeing up their time to focus on teaching and interacting with learners.; (2) AILA's Smart Assistant builds personalized Feedback (Moussalli & Cardoso, 2020). AILA's Smart Assistant assists teachers in providing personalized feedback to learners, helping them identify strengths and weaknesses and improve their learning.; (3) AILA's Smart Assistant builds data-driven insights. AILA's Smart Assistant can provide teachers with data-driven insights into learner learning, helping them make better teaching decisions.; and (4) AILA's Smart Assistant can improve communication. AILA Smart Assistants can help teachers communicate with learners more effectively inside and outside the classroom. It is believed that AILA Smart Assistant can help the learning process by providing comments on decisions. Decisions taken in learning are one of the considerations why smart assistants are the choice for determining recommendations. AILA Smart Assistants can help education units save money by automating tasks and providing personalized support to learners. AILA's Smart Assistant is capable of better data collection. AILA's Smart Assistant can collect learner learning data, which can be used to improve teaching and make better decisions about resource allocation. AILA's Smart Assistant can revolutionize how we teach and learn. They can provide learners with personalized learning experiences, teachers with automated support and data-driven insights, and administrators with cost savings and better data collection. As AILA's Smart Assistant library continues to grow, we expect to see more innovative ways to use it to improve education for everyone. This research provides findings that AILA's Smart Assistant can function as a ChatBot that provides recommendations to students regarding using artificial intelligence-based applications that suit students' needs.

CONCLUSION

Learning independence on this platform requires the ability of learners to make academic decisions effectively and efficiently. Limited interaction and resources can cause academic decisions needing more grounding, mainly when learners rely on search keywords. The implementation of autonomous learning in MOOC/SPOC is constrained by technical problems, especially related to the limitations of keyword-based search results. In this case, learners tend to rely on search engines and the web, which can limit the accuracy of the results obtained. The availability of assistance facilities often constrains independent learning and learning activities. Learners' understanding is often limited to using search engines, and the accuracy of results depends mainly on the learner's ability to enter search keywords. With an understanding of these constraints, there is a need for efforts to develop more effective learning strategies, both in terms of communication in the LMS, strengthening autonomous learning capabilities, or increasing the assistance facilities available to learners. This conclusion demonstrates the importance of addressing these challenges to improve learning effectiveness and efficiency through MOOC/SPOC platforms. Suggestions for further development are how this system can be implemented in MOOCs with a large number of students and measure the effectiveness of its use.

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