Integrating Instructional Design for Artificial Intelligence Based Learning: A Literature Review

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Abstract. Artificial Intelligence has now become a media that is consumed massively in several sectors. The process efficiency features offered are one of the main factors provided by Artificial Intelligence, which is the main reason why the use of Artificial Intelligence is mushrooming among the public. However, this hegemony raises the risk of reducing the role of a teacher in the learning process. This study aims to describe the theoretical correlation between learning components and Artificial Intelligence, especially how the ideal instructional criteria are implemented in the context of Artificial Intelligence-based learning. This study used a systematic literature review method and bibliometric analysis by collecting data distribution in the form of the results of several studies. Research result shows that based on instructional design elements, independent learning concepts, and artificial intelligence in learning there are 3 internal principles that need to be upheld in integrating instructional design in artificial intelligence-based learning, namely: 1) understanding representative role in the learning process; 2) understanding aspects of instructional design and 3) practical implementation of instructional design principles in learning. Based on these findings it can be concluded that there are at least 2 problem formulations in implementing instructional design in artificial intelligence-based learning namely, 1) Formulate how instructional design correlates with artificial intelligence. 2) Develop ideal criteria for learning experiences based on artificial intelligence.

Keywords: Instructional Design, Learning Experiences, Artificial Intelligence.

1 Introduction

Artificial intelligence or AI is a technology that is quite shocking to humans. One of the features of AI that is very tempting for humans to use is the instant convenience it provides. This convenience does not happen by itself, sometimes there are cases or phenomena that cannot be answered by AI. This happens due to user or human errors in entering data or problems directed at AI. As stated by [1] which states that AI always uses data to answer or solve problems. This data is the input that the machine uses to study user-provided cases or problems. The problem is the incoming data is

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not necessarily objective data obtained based on certain standards. As stated by [2] who concluded that AI is still new in several ways that have not been explored by research, or social conditions.

This opinion is also supported by what was stated by [3] in his article which explained that the natural conditions of computer thinking are more biased to analyze than human thinking, this happens because AI only focuses on intelligence and is organized for maximum perfection, so that's why AI cannot tracking new anomalies from current facts. Even if it is studied further related to AI, [4] it has previously been explained that AI is interpreted as a good agent but does not guarantee that the agent or worker can "think" a phenomenon.

Based on some of these explanations, it can be concluded that in the application of AI, users cannot be used alone by users without proper assistance. Especially when it is related to the learning process, AI clearly needs additional companion models so that it can be used optimally. As stated by [5] which states that in implementing AI from the point of view of learning administration, a teacher needs to provide several learning scenarios, reference services to serve as a basis for adopting and selecting AI features. In line with what was stated by [6] that in the AI-based learning process it still needs to be accompanied by an introduction to the history of the discussion being discussed and the urgency of the material.

The overall opinion about AI is the starting point of the problem focus on research. First, implicitly it can be said that AI is a tool that can be used as an active solution tool in solving a given problem. In terms of the word think, because according to [4] the true meaning of the word think can be interpreted if there is brain function and empathy simultaneously in interpreting and contemplating a problem.

Based on these problems, the researcher tried to carry out a bibliometric analysis to see the novelty and newness of the topic being discussed and obtained the following description:

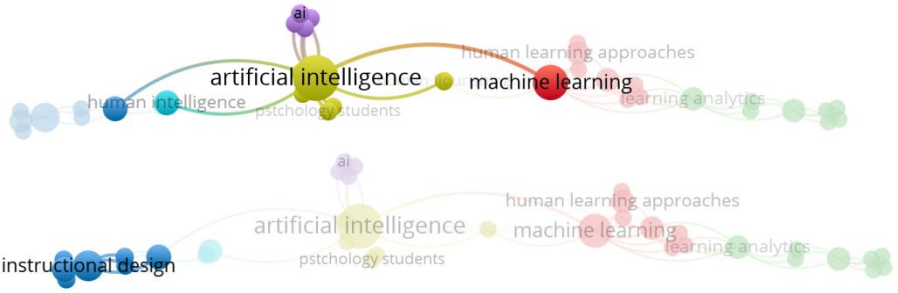

Fig. 1. Research Bibliometrics Analysis

Based on the description of the bibliometric analysis, it was found that by means of keyword coherence analysis, it was found that there was no research that examined both theoretically and practically regarding the linkage or correlation between instructional design and artificial intelligence. While there are many links between artificial intelligence and other learning activities, such as learning analysis, human intelli-

gence, and student psychology, this is a rationalization of why it is important to see how instructional design is applied in artificial intelligence-based learning.

2 Theoretical Reviews

2.1 Artificial Intelligence Concept

Artificial intelligence or AI is one of the world's tools today. According to [4] the terminology of artificial intelligence can be interpreted as a system that can think and act rationally. The application of Artificial Intelligence often occurs every day around us. If we return to the notion that Artificial Intelligence can think and act rationally, we can find this in the use of the Google Maps application, where when users input data about vehicles, Google Maps will automatically direct us to a road that is not affected. traffic jams, unaffected by the operation of odd and even vehicle numbers and indicating alternative roads with relatively short travel times. This analogy is in line with what was stated by [7] which revealed that AI does not only focus on the idea of complex intelligence from a machine but creates machines that resemble humans.

This phenomenon is a positive impact of artificial intelligence. As contained in the article written by [8] which explains that in fact the existence of Artificial Intelligence provides an additional role for brain performance which can help humans solve all problems instantly, precisely and accurately. This opinion is also supported based on the results of research put forward by [9] which states that artificial intelligence has an impact on the emergence of natural human habits for instant solutions for solving various aspects through machine learning. Other conditions were also found in research put forward by [10] which stated that the existence of AI which provides the ability to explain, interpretability and transparency of a concept becomes shorter, thereby creating an instant culture of instant implementation of scientific research and scientific findings.

All of these phenomena will automatically raise the issue of human trust in the information produced by scientists and academics through a long research process. How could it not be, the presence of AI has an impact on accelerating the discovery, resolution, and explanation of a phenomenon. This concern is quite justified, considering that the presence of AI itself is currently one of the experts who can solve various kinds of problems. Imagine, the functions offered by AI itself are quite diverse. Broadly speaking according to [11] states that AI has at least 4 kinds of functions, namely the search function, which can be described as follows:

Table 1. Description of AI Functions

AI Function	Function Description
Searching	The function of Artificial Intelligence is to provide systematic procedures to the user in achieving what the user wants to aim for.
Reasoning	The function of Artificial Intelligence is to conclude information based on facts or data received by AI
Planning	The function of Artificial Intelligence is to divide complex problems into sub-sections of problems to define complex problems
Learning	The Artificial Intelligence function is to learn about data patterns to be processed into information or knowledge for the user.

Then you could say what kind of AI is now rife as an issue if it is used in human life. As already mentioned, AI is all kinds of technology that resembles humans and aims to facilitate human work. The elevator machine in an apartment unit is also a form of AI where the machine facilitates or regulates the circulation of people going up and down in a building.

Is this the AI that is being discussed today, clearly different from the AI intent that is being discussed now. The use of AI which is now an international issue can disrupt the way of life of humans, such as ChatGPT, Bing Chat, Google Bard, Simplified and various other AI tools. It is used as a problem because of the way the tool works which solves the problem from a user given question or request instantly. According to [7] the concept of how it works is part of the machine learning function. He also mentioned that there are important dimensions that need to be considered in machine learning, namely:

Table 2. Essential Dimensions of AI According to [7]

Dimensions	Description
Input data	How the input data given to the machine must be standardized and validated both in terms of construct, content validity and criterion validity.
Type of learning	Machine learning has 3 types of learning algorithms, namely supervised learning, unsupervised learning and strengthening or updating learning algorithms.
Machine learning methods	In terms of timeline, the learning methods used in machine learning are static and dynamic.
Dimensions	Machine learning still considers the dimensions of a construct in providing information, because the actual machine will require a long process when dealing with several different data sets.

There are several principles that users need to pay attention to when they want to use AI as the main tool in solving their problems. These principles include (1) AI is a machine that still requires additional algorithms to handle data; (2) When the process deals with data, AI still needs humans as developers to supervise and provide additional treatment to the algorithm; (3) AI requires multiple data sets that are validated and properly categorized for processing.

2.2 Risk of Artificial Intelligence in Learning aspects

The presence of AI is a separate issue in the field of education and learning. It is feared that the fast and instant solution features offered will reduce and erode human ability to survive. As stated by [12] which explains that the existence of AI has a contradictory impact on the certainty of information content for humans, plus there has not been a single point that has emerged that is able to ensure the maturity of the substance of the data. used by AI in solving problems. This opinion is supported by research findings conducted by [13] which concluded that AI as a high-level machine intelligence has a bad or very bad impact on humanity if it is not balanced with strict investigations and high-level machine risk management. intelligence.

This risk is running in the world of education. [14] stated that the application of AI in tertiary institutions is considered very risky due to the lack of a relationship between AI and theoretical pedagogical perspectives, as well as the absence of critical reflection on the procedures for applying AI. This risk is also in line with the opinion expressed by [15] that education and information schemes sourced from Artificial Intelligence must work by emphasizing machines to be able to carry out learning with cultural and social values simultaneously through algorithms based on understanding the needs of aspects. human cultural and social values. According to [16] psychologically, it is necessary to have an identification process related to relevant factors in designing AI as a form of approach or learning in a curriculum. Based on some of these opinions in the application of AI in the education sector, it can be concluded that there are at least several risks which are divided into several related principles as shown in the following table:

Table 3. Principles of AI risk dimensions in learning

Principle	Implications
Information content	As a user, there needs to be awareness that the content presented by AI still depends on data processed by AI, and it needs to be known that not all processed data is data that represents a construct validly.
AI content validation standards	Every content provided by AI needs to be checked for standard validity, both in terms of criteria, constructs or content contained in the content.
Mapping social conditions	There needs to be a form of social engineering and classroom conditions that suit AI as a tool used in the learning process
AI implementation regulation	Procedures and stages of learning in using AI need to be legalized in a regulatory manner as one of the administrative parts of a teacher. So that the procedure is legitimized specifically and has an emphasis on teachers.

2.3 Domain Instructional Design in learning

Learning is a series of activities arranged in such a way as to achieve learning goals or outcomes. Each component in the learning activity itself will never be separated from the term instructional design. According to [17] learning design can be interpreted as the process of designing, planning learning activities, selecting, and distributing re-

sources, and creating instructional units, then determining the form of evaluation of a lesson. This opinion is in line with what was stated by [18] which defines learning design as making, planning, updating, or repairing, selecting, distributing, arranging, and evaluating all forms of learning activities and resources to achieve learning goals and outcomes. The concept of learning design is often misunderstood by the community, given the many roles that exist in the learning process. [18] explains what the roles in the learning process are, as follows:

Table 4. The role of supporting learning activities and improving performance according to [18]

Role	Representative activity
Teacher, Trainer, Coach	Implement learning processes, activities, and present information, provide feedback and handle quizzes and exams, and report learning outcomes
Instructional designer	Determine needs, design learning processes and activities, identify relevant materials and technology, create storyboards
Training manager	Select and support instructional designers and training developers
Technology specialist	Provide direction regarding media formats, tools and develop suitable media for instructional purposes
Instructional developer	Develop more specific instructional, learning and course materials
Assessment specialist	Provide direction regarding relevant assessment processes and help in implementing and analyzing the results and processes of assessment activities
Evaluator	Develop and implement formative and summative evaluation plans for learning courses, curricula and learning programs
Equipment specialist	Ensuring the relevant equipment is maintained in optimal condition, and managing various technical elements in the system
Program manager	Monitor the implementation of the instructional system
Facility manager	Ensuring the available facilities remain in good condition

If viewed from the role of the learning designer, [19] states that the scope of work of a learning designer is learning activities, learning content, learning resources and learning objectives to be achieved. So, when viewed from the role of the individual who implements it, instructional design can be interpreted as a form of activity that aims to support the learning process by determining learning activities, designing content, and learning resources, with the aim of being achieved in the learning process. Implicitly the work domain that needs to exist in an instructional designer has been mentioned in the role of an instructional designer. According to [20] there are at least several additional domains that need to be considered in the implementation of instructional design, namely:

Table 5. Domain of Instructional Design Theories

Domain Instructional Designer	Practical interpretation
The natural condition of what will be learned	Understand the difference in context between the material being discussed and the hard skills produced.
Natural conditions about students	Understand how learning strategies, learning activities, the main priority of knowledge to be developed, and student motivation
Natural conditions of the learning environment	Understand the implications of the number of students in a study, both large groups and small groups.
Natural conditions about forced learning conditions	Considering the time used and costs that need to be spent in implementing the learning process

Measurability of each learning element for instructional designers is also important in integrating instructional design in artificial intelligence-based learning. According to [21] states that clear, realistic, and measurable formulas in learning objectives are very vital and early in the learning design process. The absence of clear references is a common mistake that often arises in the process of implementing instructional design, teachers usually focus too much on the curriculum structure as the foundation. Meanwhile, according to [22] in principle, instructional design should focus on how to maintain the concept of human learning in a sustainable manner. As illustrated in the following interpretation of instructional design principles:

Table 6 Interpretation of Instructional Design Principles

Aspect instructional design	Basic mold	Example of process output
Analysis	Learning theory, theory of human psychology	Product analysis sheet, assessment sheet
Design	Learning message design, communication theory	Storyboard, program development outline
Development	Principles of media selection, principles of media development	Learning media, student worksheets
Implementation	Teaching methods, communication theory	Learning program implementation plan
Evaluation	Evaluation and measurement theory	Student performance and cognitive assessment sheets

Based on this explanation, it can be concluded that the existence of learning design is an important component in carrying out this form of learning. This learning design is a concept map that needs to exist in every implementation of learning using both conventional media and high-tech media. With an instructional design, the learning program will be more focused and provide meaningfulness that is quite effective for students or students in understanding and achieving the intended competencies.

3 Method

The research method used in this research is a literature review research method. According to [23] this model is carried out through several stages, namely (1) identification of literature related to the problem under study; (2) Analysis and synthesis (3) Presentation of research results. The data taken was in the form of literature in the

form of research journals in the last 3 years, and several main references. then the data is analyzed and illustrated theoretically to see how the ideal instructional design is implemented in artificial intelligence-based learning

4 Results and Discussions

The research findings will be described in several sections which can be explained as follows:

4.1 Correlation of instructional design with artificial intelligence in learning

Instructional design has a significant relationship with artificial intelligence in the implementation of learning. Based on the findings from research conducted by [24] who stated in his research that mapping in AI-based learning provides ideal instructions on how students can research further to solve problems found during the learning process and provide fresh improvisations for that learning. student experience.
Another fact was also found by [25] which stated that through the design of a form of diagnosis and feedback in the learning process can improve students' attitudes in accepting and adapting to the technology used. [26] further explained that implementing deep learning methods provides a significant cognitive presence in AI-based online learning discussions.Through this research it can be concluded that the learning design has an active interconnection with the application of AI in the implementation of learning. Learning can be done in more depth because of the technical learning experience that adapts to the learning media used, namely AI. In addition, through this terminology it can be interpreted that the more optimal and higher the position of AI as a learning medium, the more effective the instructional designs that need to be developed to create learning experiences in these AI-based learning activities.

4.2 The ideal criteria for learning experiences based on artificial intelligence.

Learning is generally divided into 3 processes, namely the initial process, the core process, and the evaluation process. Each of these processes produces a particular learning experience for students. In the initial activities, the learning experience in AI-based learning activities must be based on a strong theory of instructional design. One of them is as stated by [27] which explains that with expertise in providing learning suggestions, being able to create computer assisted learning (AI) provides quite positive improvisation on student learning achievement, also reduces the number of anomalies during the learning process. In line with what was found by [28] which stated that the process of analyzing data mining learning styles, learning resources and possible results obtained in the learning process, had a positive impact on students to understand the process they had to go through. go through to complete their studies.
The next process is the core stage of learning, [29] found that through the development of basic interviews about the use of chatbots in the learning process provides a strong involvement for students in the learning process, opportunities, and ethical implications in understanding the material. being studied. discussed. Another fact was

also found by [30] which stated that in the core activities of AI chatbots-based learning, the services provided by the teacher were a dependent factor that sufficiently determined how the condition of students' motivation in carrying out learning. Through the explanation of the criteria for the core process and the end of AI-based learning, it can be concluded that when the core activities take place, in addition to the design of specific instructions and learning services, they are determining factors in determining the motivational situation of students during the learning process. In line with what was stated by [31] which explains the need to strengthen technology skills to bridge student satisfaction and motivation in carrying out technology-based learning.

5 Conclusion

The ideal criteria for an artificial intelligence-based learning experience are divided into several principles, namely (1) There needs to be data that determines each need in the early stages of learning such as student conditions, how students adapt to technology, the possible results to be obtained; (2) The performance of students when carrying out the AI-based learning process must be determined and designed not only with various kinds of instructions, but the need for assistance and support services in its implementation. The future recommendations for implementing instructional design in artificial intelligence-based learning are; 1) explore several important roles and how these roles are represented in the context of implementing learning; 2) integrating important elements in the form of continuous learning activities with artificial intelligence as learning media.

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