ChatGPT Artificial Intelligence Integration in Science Learning Media: Systematic Literature Review

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Abstract: Artificial Intelligence technology enables organizations to support and improve knowledge management practices. From an AI perspective, knowledge representation defines organizational processes that are familiar with this knowledge. In this era of digitalization, the presence of ChatGPT technology opens opportunities to utilize AI chatbots for education in Indonesia, especially in developing student competencies (skills) needed in the 21st century. Where the purpose of the research is to explain ChatGPT Artificial Intelligence Integration in Science Learning Media. A review is conducted on the state-of-the-art methods using the preferred reporting items for reviews and meta-analyses (PRISMA) guidelines. We review literature from several publications and analyze the Era of Education 4.0 with the help of computers to improve quality in the industrial sector and also in the field of computer-assisted education. Many innovations can be proposed to improve the quality of learning implementation. GPT chat is a search engine like Google with a form of chat or dialogue. GPT Chat is an information search tool and scientific communication tool.

Keywords: Artificial intelligence; ChatGPT; Industrial revolution 4.0; Learning media

Introduction

Era 4.0 is known as the Age of Knowledge where in this era all alternative efforts to fulfill life's needs in various contexts are more knowledge-based. Both in the fields of education, economy, society, and in the industrial sector. This was triggered by the birth of computer science and technology. Artificial Intelligence technology enables organizations to support and improve knowledge management practices (Taherdoost & Madanchian, 2023). From an AI perspective, knowledge representation defines organizational processes that are familiar with this knowledge. In fact, AI began to develop in 1940 when the book Principia Mathematica by Bertrand Russell and Alfred North Whitehead was published. This book discusses the early stages of artificial intelligence. Then, in the 1990s, AI began to develop along with the development of the application of psychology in computer science.

AI has a broad concept and is divided into two types, namely ANI (Artificial Narrow Intelligence) and AGI (Artificial General Intelligence). ANI or limited artificial intelligence is a system that can work if it has been programmed to do a job. Meanwhile, AGI is an artificial intelligence that can do what humans do or even more.

In general, knowledge management has three main elements namely people, technology, and process (Yuliyanto, 2018). People are considered a core component of knowledge management because they account for 70% of its success. Humans are the source of knowledge because they develop and transmit it. Knowledge management includes several different processes. Technology is a key component in enabling people to execute processes and make knowledge available anywhere and anytime. A journal also presents several opinions regarding the 4.0 revolution, some of which are of the opinion that the 4.0 revolution is an

overall change in all aspects of industrial production through the merger of digital and internet technology with conventional industry (Bai et al., 2020). Meanwhile, according to, explains that the 4.0 revolution is an era that emphasizes the element of speed in the availability of information which in an industrial environment is always able to connect and share information with one another. From some of these explanations, it can be concluded that the industrial revolution 4.0 is an era of change in various sectors of life which is marked by rapid developments in the field of technology which accelerate the spread of information or better known as the digitalization era.

In this era of digitalization, the presence of ChatGPT technology opens opportunities to utilize AI chatbots for education in Indonesia, especially in developing student competencies (skills) needed in the 21st century. In November 2022, an artificial intelligence research laboratory (AI/Artificial Intelligence) named OpenAI in the United States released a chatbot application called ChatGPT (openai.com, 2022). This machine is a natural language processing technology capable of responding to questions. There are six competencies they need to have in Era Education 4.0, namely critical thinking, collaboration, communication and creativity plus two other supporting competencies, namely character education and citizenship (Martini et al., 2020).

According to the writer, these six competencies can be honed and developed. Among college professors, 72% of them are worried about their students using ChatGPT for cheating, but only 58% of school teachers are worried about it. There are about 34% of all professors and teachers who want to ban the use of ChatGPT in colleges or schools. But many more of them support granting access to ChatGPT. Among college students, 72% of them support banning access to ChatGPT on their campus network. As many as 89% of students admit to using ChatGPT to complete homework from their teacher. There are 48% of students who use ChatGPT to complete tests or quizzes from home, 53% use it to produce writing and 22% use it to design their writing outline. Based on the background described above, it is necessary to study ChatGPT Artificial Intelligence Integration in Science Learning Media.

Method

We conducted this research as a systematic review by following the PRISMA guidelines. The PRISMA guidelines provide several items that need to be considered in preparing a systematic review. In this study, we will mainly focus on several key items:

Artificial Intelligence; ChatGPT; Industrial Revolution 4.0; Learning media. This helps form the basis of our assessment. Initially, we collected the latest studies on ChatGPT Artificial Intelligence Integration in Science Learning Media, based on a few selected keywords. Then, we apply eligibility criteria to the collection. We only selected literature published in 2017 or later to provide an overview of recent trends. In addition, we limit the types of literature, namely only literature in the form of journals and proceedings.

Result and Discussion

Preferred Reporting Items for Systematic Review (PRISMA) is the preferred reporting technique used in this study. The research was conducted methodically over the course of the necessary research stages. The information offered is thorough, and impartial, and attempts to combine pertinent study findings. The steps of a systematic review of the literature involve developing research questions, searching the literature, screening and choosing relevant articles, filtering and choosing the best research findings, analyzing, synthesizing qualitative findings, and composing a research report. Writing background and study objectives, gathering research questions, scanning the literature, choosing articles, extracting articles, evaluating the caliber of basic studies, and synthesizing data are all steps in the systematic literature review research process.
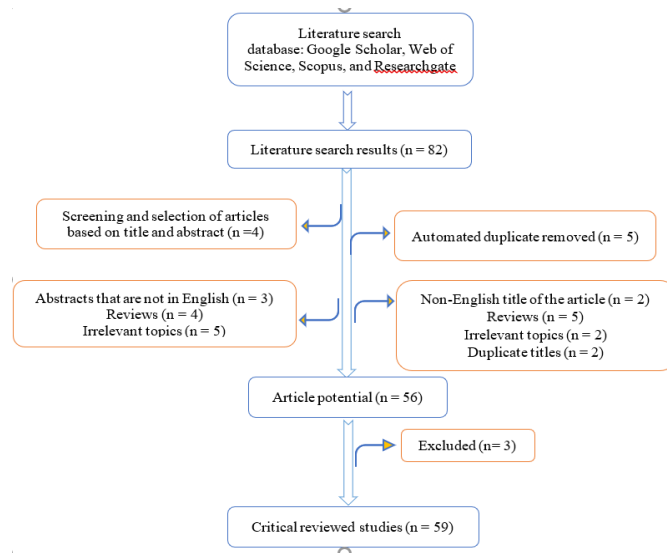

Figure 1. Flow process literatures search base on PRISMA guidelines

Complete articles published in international journals from 2017-2023, indexed in databases, and themed ChatGPT Artificial Intelligence Integration in Science Learning Media.

Table 1. Industrial Revolution 4.0

Sources	Five technologies in the Industrial Revolution 4.0
(Vaidya et al., 2018); (Gamil et al., 2020); (Khan & Javaid, 2022)	Internet of things
(Witkowski, 2017); (Papadopoulos et al., 2022); (Özdemir & Hekim, 2018)	Big data
(Özdemir & Hekim, 2018); (Javaid et al., 2022); (Mishra et al., 2023)	Artificial intelligence
(Adel, 2022); (Rosário & Dias, 2022); (Ajayi et al., 2023)	Cloud computing
(Dilberoglu et al., 2017); (Haleem & Javaid, 2019); (Prashar et al., 2022)	Additive manufacturing

From the table above it can be explained each of them namely in the Industrial Revolution 4.0, there are at least five technologies that are the main pillars in developing a digitally ready industry, namely: Internet of Things, Big Data, Artificial Intelligence, Cloud Computing and Additive Manufacturing. Internet of Things (IoT): IoT is a system that uses computing devices, mechanical devices, and digital machines in an interrelated connection. to carry out its functions through data communication on the internet network without requiring human interaction or human interaction and computer. Big Data: Big Data is a term that describes large volumes of data, both structured and unstructured. But it's not the amount of data that matters, it's what organizations do with data. Artificial Intelligence (AI): AI is a computer or machine technology that has human-like intelligence and can be adjusted according to human desires. Cloud Computing: Cloud computing is a technology that makes the internet a center for managing data and applications, where users the computer is given access rights (login) to use the cloud to be able to configure servers (servers) via the internet. Additive Manufacturing: Additive manufacturing is a new breakthrough in the manufacturing industry by utilizing 3D printing machines or often known as 3D printing.

Table 2. Artificial Intelligence

Sources	Main field in artificial intelligence
(Asemi et al., 2021); (Matsuzaka & Yashiro, 2023); (Wulansari et al., 2022);	Expert system
(Mah et al., 2022); (Khurana et al., 2023); (Callister, 2020); (Nijhawan et al., 2022);	Natural language processing
(Khan & Javaid, 2022); (Prijs et al., 2022); (Mahadevkar et al., 2022)	Computer vision
(El Khatib et al., 2019); (Mohammed et al., 2023)	Cloud computing
(Schijven & Kikkawa, 2022); (Sousa et al., 2022); (Zhang et al., 2022)	Game playing

From the table above it can be explained each of them namely expert System is a software that saves knowledge of an expert thus the computer will have expertise like an expert. With this Natural Language Processing, it is hoped that in the future humans can communicate with computers using everyday language. Speech recognition is With this technology, it is hoped that humans will be able to talk to computers. Computer Vision: This technology is an attempt to recognize images or visual objects in computer. By using a sensor or scanner as a sense, then the computer can recognize what objects are captured by its senses. Game Playing: Develop various forms of interactive games intelligent. It is assumed that this technology can attract the interest of the gaming fans.

Table 3. ChatGPT

Sources	The main function of ChatGPT
(Roumeliotis & Tselikas, 2023); (Dwivedi et al., 2023); (Gao et al., 2023)	Generating text
(He & Garner, 2023); (Ray, 2023); (Moqbel & Al-Kadi, 2023)	Language understanding
(Pan et al., 2023); (Lewis, 2023)	Dialogue systems
(Jiao et al., 2023); (Lyu et al., 2023); (Siu, 2023)	Language translation
(Hassani & Silva, 2023); (Patel & Lam, 2023)	Text summarization
(Kung et al., 2023); (Thorp, 2023); (Sallam, 2023)	Text completion

From the table 3 above it can be explained each of them namely Generating text: ChatGPT can be used to generate text that fits the given context. For example, it can be used to write short stories, articles, or answer questions in text form. Language understanding: ChatGPT can be used to understand the natural language spoken by the user and extract relevant information from the received text. Dialogue systems: ChatGPT can be used to develop chat systems, such as virtual assistants, that can answer questions and complete tasks assigned by users. Language translation: ChatGPT can be used to translate text from one language to another. Text summarization: ChatGPT can be used to simplify long and complex texts into easy-to-read summaries. Text completion: ChatGPT can be used to complete missing or incomplete text rendered.

Table 4. Learning Media

Sources	Types of learning media
(Diplan & Putra, 2019); (Agustina & Maharani, 2021);	Graphic media
(Prasetya et al., 2021); (Oktaviani et al., 2022); (Nasir et al., 2018)	Three dimensional media
(Yuti et al., 2021); (Nera Afriyose et al., 2022); (Muis & Priawasana, 2022)	Projection models
(Kusuma & Arifin, 2021); (Khasanah et al., 2022); (Setiyowati et al., 2020)	The use of the environment as a teaching medium

From the table 4 above it can be explained each of them namely graphic media including visual media as well as other media graphic media function to convey messages from the source to the recipient of the message. The channel used concerns the sense of sight and the message to be conveyed is poured into visual ommunication symbols. Examples of graphic media are pictures, photos and graphics. Three-dimensional media is media in the form of models such as: Models cross sections and stacking models. Projection models such as: slides, film strips and the use of OHP.

Conclusion

Era of Education 4.0 with the help of computers to improve quality in the industrial sector and also in the field of computer-assisted education. Many innovations can be proposed to improve the quality of learning implementation. GPT chat is a search engine like google with a form of chat or dialogue. GPT Chat as an information search tool and scientist communication tool.

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