

CHAPTER II

THEORETICAL REVIEW

This part presents the literature reviews of the study, which concerns on fields theoretically related with the study conducted.

A. Artificial Intelligence

This explanation below are some points related to artificial intelligence. There are introduction to artificial intelligence, historical overview of artificial intelligence, and kinds of artificial intelligence.

1. Introduction to Artificial Intelligence

Before explaining the term of AI, it is important to go back to a very basic idea, and that is “intelligence”. Hung Nguyen (2019) made an example of this case as a dog. All kind of behaviors that dog do such as eat, sleep, breath, bark, run, are natural behaviors or so-called instinct. Meanwhile, all kind of behaviors that differ from instinct and aimed to achieve a specific goal are considered intelligence behaviors such as catch a ball, pick up a newspapers, sit down, jump to catch a flying stick, and get up when the owner say so. Then people will say dog can think. In short, dogs, or other things that can think, are intelligent subject. Because of human curiosity, they began to ponder and draw a thought, ‘can a machine think?’ This curiosity led them to delve deeper into computer science where they discovered the connection between a program and computer, much like the link between the mind and the brain. If animals and humans need to learn in order to achieve their intelligence behaviors, the same

principle should apply to machines. Scientists need to create machines with ability to learn and develop.

The foundation of AI came from machine learning. AI itself has many definitions, such as “a branch of computer science dealing with the imitation of intelligent behavior in computer”, the capability of a machine to simulate human’s action”, as well as “a computer system that is able to perform tasks as human intelligence, such as visual perception, speech recognition, decision-making, and languages translating.” (Nguyen, 2019).

Vinuesa et al. (2020), argued AI to be any software technology with capabilities such as perception (including audio, visual, textual, and tactile), decision-making, prediction, automatic knowledge extraction and pattern recognition from data, interactive communication, as well as logical reasoning. This view encompasses a large variety of subfields, including machine learning. In brief, then, Henrik (2022) defined AI systems as computer-based systems which capable to sense and respond on somewhat autonomous basis is key to its personal functions. The examples of AI include applications, computer software, robotic systems, as well as many internet of things appliances, that are used both in public and private sectors (Sætra, 2022).

In the book *Tomorrow’s Science: Artificial Intelligence*, Anne Rooney (2019) argued that AI encompasses all things related to machines that can think on their own, communicate, and act like humans. These machines have not been created yet, but researchers are still working on

developing this new generation of computing, in which people invests in these projects. One of these research projects is being conducted at the Massachusetts Institute of Technology (MIT). The Scientists are still in the process of creating a computing design that can study, see, listen, speak, and move based on sensory input. However, this is not just for research purposes, it is aimed at creating something useful and impactful for people (Rooney, 2019).

Walsh et al. (2019) were careful to define AI, however there is not agreement among AI researchers worldwide. AI is “not a specific technology” but “a collection of various technologies used to solve problems and perform tasks that spend human’ thinking if they do by their selves”. The component of AI include machine learning, as well as a range of techniques including natural language processing, speech recognition, computer vision and automated reasoning (Taylor & Francis, 2021).

According to Microsoft’s step into Artificial Intelligence course, AI is a type of tool that helps people work better and do more. It is important to understand that AI is different with robotics. Not all robots are built from AI, while AI can be placed within the body of a robot, it can also exist in a form that does not similar with any living creature at all (Zimmerman, 2018).

B. Historical Overview of Artificial Intelligence

The notion of machine intelligence is as almost old as the computer itself. In 1950, there was a seminar paper “Computing Machinery and

Intelligence” published by Alan Turing, known since as the “Turing test,” to assess whether a machine could respond tasks. The term *Artificial Intelligence* was early used by John McCarthy in 1956 to describe the research which focused on solving the problem of symbolic methods. Then the domain of AI separated to the world of business. Deep Blue and Watson both are examples of AI research and development outcomes (CRC Press, 2020).

The use of AI in education can be seen previously from the work of the psychologists, Sydney Pressey, who was a professor at Ohio State University in the 1920s, and B.F. Skinner, known as the father of behaviorism, who was a professor at Harvard University from 1948 until 1974. For Pressey, the challenge was to bring the multiple-choices tests for students’ evaluation. Based on Edward Thorndike’s law of effect, he stated that immediate learning was efficient to support learning which is not usually possible to be marked by hand. However, a mechanical approach could ensure that no learning opportunities were missed. Pressey made various version of his machine, with the latest one being based on a mechanical typewriter. The machine was configured so that students could know immediately whether they had made the right choice or not, and it prevented students to move onto the next question until they finish the first one. Interestingly, Pressey was also the one who proposed the case, which not only supported learning, but also eased teacher’s work by relieving them

of marking tests and giving them more time to enhance learning with the students (Wayne Holmes, 2019).

Pressey's approach was later extended by Skinner, who started his experiment about teaching machine by utilizing programmed learning in 1954 based on his theory of behaviorism. Skinner's teaching machine was the one of the first forms of computer-based learning (Bates, 2015). It was a wooden box with a windowed lid. Questions written on paper disks appeared in one window, and students wrote an answer on a roll of paper accessible through a second window for later graded by a teacher. Advancing the mechanism automatically covered students' answer, so they could not change it, and automatically appeared the correct answer. This teaching machine provided immediate innovation in learning. Students were required to make up their own answer rather than chosen from limited selections as multiple choices. Skinner did that because he found that learning can be reinforced more effectively by remembering the correct response rather than by simply recognizing it. This approach also gave the opportunity to the students to compare their answer with the given model answer, which could contribute to learning if designed by the teacher properly and undertaken by the students actively (Wayne Holmes, 2019).

By the end 1970s, University of Illinois early developed PLATO, generalized computer assisted instruction system, which involved several thousand connection around the world on nearly a dozen different networked computers. It was a successful system until almost 40 years, and

combined key online concepts: forums, message boards, online testing, e-mail, chat rooms, instant messaging, remote screen sharing, and multi-player games (Bates, 2015). In recent decades, thanks to three key improvements (the advent of faster computer processors, the availability of large amounts of big data, and advances in computational approaches) AI has entered a period of renaissance, in which AI has now become an integral, pervasive, and inescapable (Wayne Holmes, 2019).

2. Kinds of Artificial Intelligence

a. Personal Assistant

This kind of AI can listen human voice and respond to 40% and 80% of tasks. Some assistants are built-in features of mobile devices. New products of personal assistants are expanding rapidly. The most widely used personal assistant in U.S. includes Apple's Siri (34%), Google Assistant (19%), Amazon Alexa (6%), as well as Microsoft Cortana (4%). Personal assistants have the potential to impact students' improvement in learning. They can enhance learning by taking more tasks.

b. Chat Bots

Chat Bots are attempting to imitate human conversation such as text chats, voice commands, and both. Machine learning which is combined with Natural Language Processing (NLP), makes this an element of AI. Chat bots have the ability to recognizing the cadence in conversations, saving the patterns, filtering them to imitate human behaviors.

c. Language Translators

Natural language processing allows computer to translate human' speak into text, enabling language translators to more than translate one language. There is also a language translator that produces live subtitles and translates as long as human speak. Language translators can help students become global collaborators and allowing them to easily translate their contents for worldwide audiences.

d. Creative Applications

AI developers are inspired to cultivate more human ways of connection by drawing on expertise from comedians, novelist, poets, and animators. They are working to create personalities for AI tools. Computer scientists at Italy's Politecnico in Milano have designed an AI program such as a design of different levels of video game challenges that shoulders the majority of the difficult tasks.

C. ChatGPT

The explanations below are parts of ChatGPT. They are introduction to ChatGPT, using ChatGPT in the classroom, threats to learning and teaching with ChatGPT.

1. Introduction to ChatGPT

On November, 30 2022, OpenAI, artificial intelligence research laboratory, came out with a natural language processing model (NLP) called ChatGPT (Generative Pre-trained Transformer). ChatGPT is a sibling model to InstructGPT, which is trained on a vast amount of text data to

generate human-like responses to a wide range of queries and prompts (OpenAI, 2022). It can help answer questions, provide information, offer suggestions, and even engage in conversation on a variety of topics. It is designed to understand natural language and can communicate in several languages, including English, Spanish, French, German, and many others. While ChatGPT's primary function was to mimic human conversation, its capabilities extend far beyond that; it can literally create new things, such as a poem, story, or novel, or act like anything within its capability (Ahmed Tlili, 2023). It is also designed to generate text in response to a given prompt or context, and it can be fine-tuned for specific tasks such as language translation, summarization, and question answering. OpenAI itself, artificial intelligence research laboratory that released ChatGPT, is founded by Elon Musk, Sam Altman, Greg Brockman, Ilya Sutskever, Wojciech Zaremba, and John Schulman. The venture is supported by investors including Microsoft, Red Hoffman's charitable foundation, and Khosla Ventures (LTIMindtree, 2023).

To generate text, ChatGPT uses a technique called 'transformer architecture. The model is trained on a massive amount of text data, including over 8 million documents and over 10 billion words. The data allows it to understand the relationship between words and phrases. The model generates text by predicting the next word or phrase based on the given prompts or contexts. It can also be customizable for specific tasks by training it on a smaller, task-specific dataset (The Centre for Learning,

Teaching, and Development, 2023). The process is generated until the model has produced a complete text or the required number of words. While generating text, the model uses an attention mechanism that allows selective focus on certain parts of the input for more accurate and specific responses (LTIMindtree, 2023).

2. Using ChatGPT in the Classroom

Technology transforms education for years, so teachers should be upskilling their ability to integrate technology in their classroom. Using ChatGPT in the classroom has variety ways, including: generating lesson plans based on pedagogical designs, enhancing students' learning experience by providing more interactive material, such as gamified learning activities, creating interactive quizzes and exercises for assessments, and simulate debated and discussion to develop critical thinking skills (The Centre for Learning, Teaching, and Development, 2023).

OpenAI shared stories of how teacher are using ChatGPT to enhance students' learning based on additional resources from leading education organizations. According to Dr. Helen Crompton, Professor of Instructional Technology at Old Dominion University, encourage her students to use ChatGPT for role playing challenging conversation, such as a debate partner who will show weaknesses in their arguments, a recruiter who is interviewing them for a particular job, or a new boss who might deliver feedback to them. These conversational settings help students understand

their material with a new perspective and nuance. Meanwhile, Fran Bellas, a professor at Universidade da Coruña in Spain, recommends teachers to use ChatGPT as an assistant in creating quizzes, exams, and lesson plans from curriculum materials. He said to first share the curriculum to ChatGPT and then ask for unique quiz and lesson plan ideas. Bellas also turns to ChatGPT to help teachers make sure questions they write themselves are appropriate for each students' levels.

Besides, Dr. Anthony Kaziboni, the Head of Research at the University of Johannesburg, recommends his students to use ChatGPT as translation assistant for reducing friction for non-English speakers. He teaches students who do not speak English outside of the classroom, so the use of ChatGPT will improve their English writing and help them in practicing conversation. Kaziboni believes that mastery of the English language is a tremendous advantage in academic world, and that misunderstanding the small details of English grammar can hinder students from gaining recognition and opportunities. Meanwhile, Geetha Venugopal, a high school computer science at the American International School in Chennai, India, likens teaching students about AI tools to teach them how to be responsible in using internet. She advices students to make sure that ChatGPT give may not be credible and accurate data. Therefore, students should think critically wether is the best answer and confirm the information through primary resources (OpenAI, 2023).

3. Threats to Learning and Teaching with ChatGPT

While ChatGPT has many advantages for higher education, there are also challenges that may be faced by teachers when using it. According to the Centre for Learning, Teaching, and Development (2023), the challenge of using ChatGPT including:

- a. The use of ChatGPT may cause lack of developing students' critical thinking, creativity, and writing skills.
- b. ChatGPT may not be able to understand the given prompt and may thus provide overly simplistic or incorrect answers.
- c. The use of ChatGPT may cause plagiarism.
- d. Students may not understand that ChatGPT is not a replacement for human intelligence, and they may not understand the limitations of ChatGPT.
- e. Students usually use ChatGPT as a first port of call to generate responses to assessment without trying to directly engage or further engage with the AI thus limiting students from experiencing their innate potential.
- f. Students may not be able to distinguish false information.
- g. Bias and Discrimination: AI models like ChatGPT is trained with large amounts of text data and sometimes shows bias and discriminatory behavior learned from the training data.

D. Reading Comprehension

1. Definition of Reading Comprehension

Reading comprehension refers to the skill of interpreting and grasping the meaning of the text based on the reader's understanding. Activities aimed at reading comprehension are designed to extract detailed information and insight from what students read. Essentially, reading comprehension involves interpreting the meaning or purpose of a text through writing. To fully grasp the content of reading material, strong reading comprehension skills are essential. According to Snow (2002), reading comprehension is defined uniquely, with three key components: the reader, the text, and the activity. Comprehension is crucial in reading because understanding reading material not only enhances reading skills but also helps achieve specific objectives. Therefore, reading ability can be understood as the capability to comprehend reading material.

2. Strategies in Reading Comprehension

Students' reading comprehension skills necessitate the use of effective reading strategies. A strategy involves the systematic approach and techniques for utilizing available resources to achieve set goals. Pourhosein Gilakjani and Sabouri (2016), along with Brown (2001), identify several reading comprehension strategies, including extensive reading, intensive reading, skimming, scanning, silent reading, and semantic mapping or clustering.

a. Extensive Reading

Extensive reading involves engaging with long texts that are both interesting and easy to understand, aimed at developing reading speed and fluency. According to Day and Bamford (2004), this technique is particularly useful for language learners as it allows them to practice reading through enjoyable materials without focusing on detailed analysis of vocabulary, grammar, or phrases.

b. Intensive Reading

Intensive reading is a focused approach where students thoroughly understand and critically analyze the content of a text, including its facts, concepts, opinions, and messages. As described by Austin et al. (2017), this strategy involves detailed reading of short passages or texts with specific assignments and learning goals, requiring full concentration and often leading to mental fatigue. Intensive reading is typically used for short texts, such as news articles or essays, to achieve a deep understanding of the material.

c. Skimming

Skimming is a technique that involves rapidly scanning a text to quickly identify key information and get a general sense of its content. The main goal of skimming is to expedite the reading process and determine whether a text requires more detailed reading.

d. Scanning

Scanning is a strategy used to quickly locate specific information within a text. Common examples include searching for a word in a dictionary or finding a phone number in a directory.

e. Silent Reading

Silent reading relies on visual memory and involves reading without vocalizing the text. According to Tarigan (2008), the primary aim of silent reading is to gain information and achieve a deep understanding of the materials without producing sound.

f. Semantic Mapping or Clustering

Semantic mapping involves brainstorming and organizing associations related to a word to explore its meaning and connections. This technique helps in visualizing and understanding the relationships between words and their meanings.

3. Stages in Learning Reading Comprehension

Reading comprehension aims to deeply understand and analyze the material read. It is crucial for students to fully grasp logical arguments, identify the main ideas, thoroughly review the content, and rephrase it in their own words. According to Antoni (2010), there are three key stages in learning reading comprehension:

a. Pre-Reading

Pre-reading involves quickly surveying the organization and content of a text before diving into it. This technique helps students improve

their reading efficiency by providing a general overview of the material. Similar to reviewing a map before traveling, pre-reading helps students understand the structure of the text and prepares them to follow the author's arguments more effectively. The main goal of pre-reading is to identify the main ideas and structure of the text, allowing students to focus on the important parts as they read.

b. While/During Reading

During-reading activities are designed to help students focus on understanding the purpose and meaning of the text. These activities aim to make the reading process as intuitive as if the text were in the student's first language, facilitating easier comprehension of the material.

c. Post-Reading

Post-reading strategies involve responding to and expanding on the text. These strategies build upon pre-reading and during-reading activities but delve deeper into the material. Post-reading includes summarizing, asking questions, connecting the content with personal experiences or other literature, and critically evaluating the text. This stage helps students reflect on the material and apply it to broader contexts or future actions.

4. Integrating Technology in Learning Reading Comprehension

The concept of educational technology is concerned with the development, application, and evaluation of systems, techniques, and aids to enhance the process of learning and teaching. It is seen as a service to

facilitate better and more efficient learning system. According to G.O.M. Leith (1967), educational technology is defined as the systematic application of scientific knowledge about the condition of teaching and learning to make the teaching and learning more efficient. Then Shiv K. Mitra (1968) stated that educational technology is a scientific techniques and methods in order to realize the goals of education. D. Unwin (1969) argued the definition of educational technology, it is concerned with modern skills and techniques application as the requirements of education and training that includes the learning facilitation using media and methods, as well as the control of environment which reflects on learning. Scottish Council for Educational Technology defined educational technology as an approach to design and evaluate learning methods and methodologies as well as the media application and the current knowledge of communication techniques in education for formal and informal scopes. Based on the definitions above, it can be concluded that educational technology is the utilization of systematic application of scientific knowledge in order to design, evaluate, facilitate, and improve learning and teaching to be more efficient.

Integrating technology in learning is particularly relevant to connectivism theory that was developed by George Siemens and Stephen Downes. In this digital era, learning sources should not only come from textbooks or teachers, but also from networks, technologies, and social interactions. According to Siemens (2004), knowledge is created beyond the

level of students, and constantly changing. The significance of connectivism is that's its adherents argue that the internet changes the nature of knowledge. Downes (2007) argued that new technologies allow for learning deinstitutionalization.

When implementing technology in the classroom, it is crucial to ensure that the technology's features are suited with the learning outcomes. Ideally, the technology should be good for both teachers and students and include all necessary features to support effective learning (D'Angelo, 2018). According to Carle et al. (2009) there are researches show that students taught with technological enhancements tend to achieve higher academic results compared to those taught without such technologies.

It is evident that technology plays a significant role in influencing students' reading habits. Although the study did not conclusively prove that technology directly enhances students' reading scores, it did reveal that technology encourages students to become more independent, active, motivated, and collaborative (Rufaidah et al., 2021; Jaleel & Anuroofa, 2017). Tools such as text-to-speech apps, translators, electronic dictionaries, and various reading apps, along with certain educational websites, provide accessible reading materials for all students, including language learners, those with different learning styles, and students with specific learning needs, as highlighted in the 2017 National Education Technology Plan Update. The research also indicated that these technologies are generally well-received by students, teachers, and parents and can be valuable tools

for both educators and parents in supporting students' reading development (Diallo, 2023).

E. Previous Studies

This part focuses on prior research relevant to the implementation of AI in teaching English. These studies provide a theoretical and practical framework that have existed in this area. Through a comprehensive literature analysis, the researcher seek the groundwork for the research supporting the impact of AI in the context of English language education.

Previous research has examined the use of AI in language instruction. Tira (2021) discussed how the use of AI tools for teaching and learning process. She stated that AI has many advantages in education area. Besides, the existence of AI cannot replace the role of teacher in teaching and learning process, especially in developing students' character. AI cannot give feelings and emotions like human in common, for example in inspiring and providing motivation to students.

Prior studies have explored the effectiveness of AI in education. For instance, Hualiang Lin (2022) evaluated the influences of artificial intelligence in education on teaching effectiveness. It can be concluded that AI-assisted teaching allows teachers to use more personalized teaching plans. AI technology can help teachers provide more accurate teaching services to review the activities of learners. Teachers can offer more scientific practice suggestions to each learner according to their mastered knowledge and help them to master key and difficult knowledge points in the course.

Previous research has also investigated the impact of AI on foreign language teaching and learning, especially in discussing ChatGPT. Wilson (2023) stated that ChatGPT has powerful capabilities, as well as limitations and problems. Teachers and education institutes are encouraged to change their mentality to adapt teaching and assessments in consideration of the inevitable technology. After the initial wave of apprehension, teachers will begin to see the bright side of the changes, so that they can fully embrace the benefits and opportunities brought by new technology (Hong, 2023).

Another Study by Sayuti Rahman et al. (2023) investigated the introduction of ChatGPT to improve students' knowledge at SMK Negeri 1 Pantai Labu. Sayuti explained various uses of ChatGPT for students, including answering questions, summarizing documents, translating texts, and understanding programming codes. The study concluded that ChatGPT provides significant benefits to both students and teachers by helping students gain a better understanding, overcome problems, and enhance their critical thinking skills without relying on teacher guidance (Sayuti Rahman, 2023).

From the existing literatures, it is evident that AI technology and models like ChatGPT have the potential to enhance students' achievement. This study will build upon these previous findings and contribute to our understanding of the implementation of ChatGPT in learning English for students. This study focuses specifically on the effectiveness of ChatGPT in elevating students' achievement, with a particular topic on reading comprehension.