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Role of Artificial Intelligence in Education: Peninsula College Central Malaysia

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Abstract
Artificial intelligence (AI) technologies have attracted the curiosity of academics and practitioners in recent years. However, few researchers have investigated the advantages of applying AI into the education industry. Artificial intelligence (AI) creates new possibilities and opportunities in educational processes with the development of computing and information processing techniques which can provide important insights to administrators and decision makers at the institutional level. Artificial Intelligence in Education (AIEd) in this paper base on three paradigms, AI-directed- learner-as-recipient, AI supported- learner-as-collaborator, and AI-empowered- learner-as-leader addressing the educational and learning. The study proposes the role of AIEd, intelligent tutor, intelligent tutee and intelligent learning tool to improve student's performance for logistics and supply chain course in Peninsula College Central Malaysia. As a result, the development trend of AIEd empower learners and tutors to personalize learning and teaching through application of AI systems to improve student's practical skills, cognitive skills, critical thinking skill and analytics skills and achieve greater student's performances. Future researcher could investigate the impact of robotics and automation application in the physical classroom to improve the quality of education, application of AI in other institutes and also investigate the impacts of the AI-supported learning designs on and the performances and experience of the students with different personal characteristics, such as varying levels of learning motivation or self-efficacy.
Keywords: Artificial Intelligences, Education, Intelligent tutor, Intelligent Tutee, Intelligent Learning Tool

Introduction

Artificial Intelligence in Education (AIEd) is primarily concerned with the creation of "computers that execute cognitive tasks, such as learning and problem-solving, that are often associated with human minds" (Baker et al., 2019). The innovation of AI in education has progressed from idealised laboratory scenarios to more complicated real-world learning scenario bringing unprecedented chances, potentials, and challenges for educational, such as the switch to personalised learning, the instructor's role challenge, and the development of complex educational systems. Artificial intelligence (AI) has been widely used in educational systems such as intelligent tutoring systems, teaching robots, learning analytics dashboards,

adaptive learning systems, and human-computer interactions, computing, and information processing techniques, with the current development and Industry Revolution (IR) 4.0 (Chen et al., 2020). It is expected that an increasing number of research will be undertaken that apply AI to educational settings and address various approaches to promote and teach AI expertise at all levels of education. Does the introduction of robots in classrooms, increase students' motivation and interest in learning especially logistics and supply chain management courses in Malaysian higher education institutes? How can AI technologies help educators improve their teaching method using the robotics and automation systems to enhance application on logistics course content? An AI application might function as a tutor, observing students' learning processes, analysing their performance, and providing immediate assistance based on their needs through an intelligent tutoring system on the probable needs of students that allows them to study, practise, and connect with peers or educators. Despite the fact that relevant work has reviewed AIEd categorizations (Holmes et al. 2019), approaches Hwang et al.,2020), research issues challenges (Baker et al., 2019); (Luckin et al., 2016) and future visions (Pinkwart., 2016) none of the studies explicitly examine what are the different roles of AI in logistics and supply chain management courses, how AI are connected to existing educational and learning theories, or what the future visions and how does the usage of artificial intelligence (AI) affect learning of logistics and supply chain management courses? To address this gap, this paper conceptualizes the role of AIEd by adapting to the three AIEd paradigms (Ouyang et al.,2021) that employ AI approaches in a variety of ways to address educational learning and practical implication to logistics and supply chain management courses.

Literature Review

This section will discuss the literature review of artificial intelligences in education.

Definition of Artificial Intelligence

Domain specialists may find it challenging to give a clear description of Artificial Intelligence (AI) due to primary factors. According to (Nix et al., 2011) several cutting-edge AI technologies have been integrated into universal software applications that aren't labelled as AI. Furthermore, AI is a multidisciplinary field in which academics and specialists from other fields, such as neurology, psychology, and linguistics, are continually contributing by bringing their own perceptions, expertise, and terminology to table the knowledge, as well as terminology. Many academics have attempted to define artificial intelligence, (Russell., 2018) stated that AI was used to describe machines or computers that imitated “cognitive” functions associated with the human mind, such as “learning” and “problem solving.” AI is the study of intelligent refers to capability of perceiving their surroundings as well as maximizing the chance of reaching a specific goal. According to (Kaplan et al., 2020) AI is defined as a system's ability to precisely comprehend and learn from inputted data, and then use what it has learned to achieve a specific objective. Although there is no universally accepted definition of AI, it is clear that it encompasses a wide range of fields in addition to computer science, including social sciences, information science, psychology, linguistics, neurology, philosophy, mathematics, and many more. As a result, AI is an interdisciplinary field with a broad scope (Kearney et al., 2018). AI has proved its ability to assist learners in identifying knowledge gaps and receiving specialised support, freeing instructors from routine work and

allowing them to respond more effectively to tasks (Jarrahi., 2018) and "learner bots" (Dubey et al., 2020)

Artificial Intelligence in Education

AI systems can provide important insights to administrators and decision makers at the institutional level, such as enrolment and attrition rates across disciplines or colleges (Chen et al.,2008). The application of AIEd continues to pique the interest of academics. In its early stages, AI in education referred to intelligent tutoring systems that aimed to automatically solve problems such as improving operator performance (Min., 2010). Currently, AI refers to using big data to perform complex tasks in numerous industries (Russell., 2018) including manufacturing industry, logistics industry, education industry and automotive industry. In this research, the author confines the concept of Artificial Intelligence to the educational context using the categorization of AIEd applications: AI-directed, learner-as-recipient, AI supported, learner-as collaborator, and AI-empowered, learner-as-leader adopted by (Ouyang et al.,2021) to improve the teaching and learning process for logistics and supply chain courses.

AI-directed, Learner-as-recipient

The AI-directed, learner-as-recipient paradigm is defined as follows: AI represents domain knowledge and guides learning processes on the logistics terms and operation process, while learners operate as recipients of AI service to follow specified learning routes to demonstrate the behaviorism theoretical perspective which emphasizes the creation of carefully organized content sequences that lead to the desired learning outcome. The learner sees learning as a process of reinforcing knowledge acquisition using pre-programmed instructions that present new concepts in a logical, gradual manner, provide immediate feedback on wrong replies, and maximize positive reinforcement (Ouyang et al.,2021). The learner takes on the role of a recipient, reacting to pre-determined knowledge sequences, following learning procedures and paths, and carrying out learning activities prescribed by AI in order to meet pre-determined course outline (Holmes et al.,2019). To create coherent presentations of related logistics topic information, AI systems acquire the properties of the teaching machine which is implemented through Intelligent Tutoring Systems (ITS). Although some systems collect information about the learner to diagnose their learning status, the system is in charge of defining learning content, procedure, and objective, while the learner is compelled to follow the AI system's recommended learning path (Mayr et al.,2018). The individual learners' qualities, needs, and goals are not taken into account, the system's or expert's perspective may result in a stereotype regarding the knowledge and skills the AI system could expect the learner to accomplish (Tsang et al.,2018). Therefore, addressing the challenge from paradigm one, learner is treated as collaborator in the second paradigm according to (Broeck et al., 2019).

AI-Supported, Learner-as-Collaborator

Learner-as-collaborator with AI, in which the AI system surrenders control to serve as a supportive tool, and the learner collaborates with the system to focus on the individual learner's learning process. Based on a cognitive and social constructivism view of learning, which represents the idea that learning happens when a learner interacts with other people, information, and technology in a socially situated environment contexts (Mayr et al.,2018). To maximise learner-centered, tailored learning, the AI system and the learner should have

active, mutual interactions (Baker et al., 2019). In particular, the AI system collects emergent, customised information from learners as input to adaptively enhance the student model, while learners serve as collaborators to communicate with the AI system in order to accomplish better or more efficient learning (Broeck et al., 2019). Through mutual engagement and ongoing collaboration between the learner and the AI system a major step toward learner-centered human learning a taken. In Paradigm Two, a variety of AI implementations, such as dialogue-based tutoring systems (DTSs) and exploratory learning environments (ELEs), were created to accomplish mutual interactions between the machine and the learner (Ouyang et al., 2021). The learner, on the other hand, can communicate with the system in order to better understand the system's decision-making process and make better learning decisions. For example, in the rule-based system, an exploration environment called QUE was created for learners to investigate disparities between a student's wrong responses and the system's understanding of the "right" line of reasoning (Russell et al., 2018). The amount to which and how learners' input is integrated in the AI system to maximise the student understanding reflect various aspects of the learning state, and generate adaptive, AI-supported learning and instruction which is a major challenge in Paradigm two. A lack of continuous communication or synergetic human-computer interactions is the general issue. Because neither the learner's information and data nor the system's state are static or straightforward, this interaction is complicated. Both have hierarchical, complicated structures that change dynamically during the learning process. To put it another way, it's vital for AI systems to provide real-time data analysis and fast feedback to learners, and for learners to use that input to improve their performance. As a result, it would be advantageous if the AI system collected and analysed learner-generated data on a continuous basis and provided learners with real-time, exploratory chances to make learning decisions in their learning process when adapting to the robotics or automation devices (Zhang et al., 2017). Therefore, in paradigm three, learners are considered as leaders to further promote learner ability.

AI-Empowered, Learner-as-leader

AI-enabled learner at the heart of AIEd and considers AI to be a tool for enhancing human intelligence (Wang.,2019). This highlights a complexity theory perspective on education as a complex adaptive system (Sung et al.,2016) where a synergetic relationship exists, multiple entities (e.g., the learner, the instructor, etc.) collaborate. In this complex environment, AIEd must be planned and implemented with the understanding that AI techniques are the components of a larger system. Learners, educators, and other humans make into a bigger system (Lai & Chen.,2019). To develop synergetic teamwork in a complicated system. Human-computer cooperation is an example of a notion (Mendiluze, 2016), the human-computer collaboration system, which combines advanced AI techniques with human decision-making, has the ability to realise paradigm that AI-enabled, learner-as-leader aim. On one hand, there is sophisticated approaches (for example, brain-computer interfaces, machine learning, and deep learning has the capacity to collect data indefinitely to assure data accuracy, transparency, and reliability of AI and machine learning systems that are focussed on humans (Lai & Chen, 2019). For instance, the advancement of advanced interaction techniques, such as Smart wearable devices, cloud computing, and the Internet of Things are all transforming the world, humans interact with artificial intelligence systems (Yang & Chen, 2010). As a result, the role of AI in the educational system evolves human-artificial cognition

development (Weismayer, 2017). On the other hand, with personalized information supported with the AI techniques, the human can make better decision about teaching and learning. For example (Zawacki-Richter 2016), build a deep learning model with the recurrent neural network classification to make a real-time MOOC predictive modeling and provide personalized communication affordances to allow direct communications between the instructor and learners. To advance the AIEd field in logistics courses, future AIEds should be designed and operated in such a way that they provide constant communication channels for gathering values and interpretations from all stakeholders, aligning AI models with human values throughout their operations, and aligning goals with learner-centered learning (Cretchley.,2010); (Dahman.,2019). Human-centered AI and machine learning systems, human-AI collaboration and human-centered artificial intelligence in education (Edirisingha,2009) are examples of emerging concepts of paradigm three which is framed by the years 2021 and 2022 in education context. Furthermore, a sustainable development of AIEd must address a variety of pedagogical, social, cultural, technical, and ethical elements, such as inclusion and equity in AIEd, teacher preparation for AI-enabled education, and data inclusion. In short, paradigm three intends to empower learners to take complete control of their learning, improve AI methodologies to deliver real-time insights on emergent learning, and rethink the way we think about learning AI-enabled learning changes in complex, interrelated learning systems.

Conceptualizing Artificial Intelligence in Education

This session will discuss the conceptualization of the role of artificial intelligence in education.

Role of Artificial Intelligences in Education

In terms of educational applications, AI can serve as an intelligent tutor, intelligent tutee and learning tool/partner as indicated in many AIED investigations that has been reported by researchers in recent decades. These studies will conceptualize three role of artificial intelligence that improve the student's performance:

Intelligent tutor

This could be the most popular AIED application area which teach the application method to the students includes intelligent tutoring systems, adaptive/personalized learning systems, and recommendation systems. Several meta-analytic studies have proved the usefulness of intelligent tutoring systems in promoting learning outcomes (Indulska et al., 2010; Krishna et al., 2018; Rienties., 2016; Zhang., 2018). Important intelligent works are exemplified by the following examples. Cognitive tutors are one type of tutoring system (Shakya, 2010) that were created to aid in the development of maths and science tutoring. Re-examining and redefining the existing educational theories by considering different roles of AI in education. Logistics and supply chain courses require application of new technologies which is used in the warehouse, transport, freight, customs operation to enhance the real time knowledge and practices of the students. Educational technologies often imply different pedagogical perspectives, for example through creation and innovating automated devices for interpretations or ideas on the training and the learning sciences steaming from AIED applications. Proposing innovative AI-supported learning or assessing strategies, incorporating new technologies into educational settings implies new concepts of learning design, example creating robots, automated retrieval system, autonomous car or vehicles for delivery (Sander et al., 2013). Consequently, it is a promising time to reconsider and revise

existing learning and assessment strategies for logistics and supply chain courses in higher education institutes. The most prominent example is that if automation competition-based learning (Zhang.,2018) is employed for classroom examining and assessment in a way of using existing learning tools in AI-supported learning content for student's greater analytics skills including the most technology-enhanced learning contexts, employing effective learning tools or strategies. Many existing learning tools (e.g., idea mapping tools or mind mapping tools) or tactics (e.g., problem-posing, gamification, peer-assessment, progressive prompts, and voting) may be appropriate. Therefore, this study hypothesized:

H1: Intelligent tutor improve student learning performances

Intelligent Tutee

Studies in this category are uncommon because most AI-based educational systems focus on assisting learners rather than giving possibilities for students to volunteer as tutors or advisors. Engaging learners in the context of assisting others (i.e., AI tutees) in understanding complicated concepts, on the other hand, could be a wonderful way to improve their higher order thinking skills and knowledge levels. Although no studies have specifically sought to generate intelligent tutees, many AI models and methodologies are capable of learning from the expertise and experience of others. AI models and methodologies' ability to learn can help the development of intelligent tutees in the future through smart project base learning, example innovating and design smartbin, smart refrigerators, automatic guided vehicles (AGV), automated storage system, RFID and etc. A smart tutee could be a chatbot with a natural language processing interface and artificial neural networks, such as Microsoft Tay (Saka et al., 2013). Developing ethical principles and practices for employing AI technologies and applications in education not only promote the learning effectiveness and augment the human intelligence during the learning process but may also raise potential skills (Shakya., 2010) such as digital hegemony in education, power relationships among learners, teachers, and AI systems, and digital device. It is essential for AIED researchers and practitioners to enforce the automated and artificial intelligences in logistics and supply chain courses to seek possible solutions from various aspects, including technological solutions (e.g., setting a constraint module in AI) and policy solutions (e.g., setting the principles and ethical codes for the use of AI in education) for the future of intelligence tutee. Therefore, this study hypothesized:

H2: Intelligent tutee improve student learning performances

Intelligent Learning Tool or Partner

Providing an intelligent learning tool or partner is an important issue from the standpoint of constructivism and student-centered learning. The device can assist learners in collecting and analysing data in a more efficient and effective manner, allowing them to concentrate on key topics or higher-order thinking (e.g., inference and prediction) rather of low-level assessment task to create future leader. Logistics and supply chain industry contributes to the sustainability of the country and the automated systems able to optimize the operation, some technologies can even analyze and show data in a "smart" fashion to assist learners in thinking deeply about the data and discovering significant implications. Traditional mindtools, such as concept mapping tools, assist learners organize their knowledge by passively linking the relationships between concepts or frameworks for AI-based learning are being developed. On different computer platforms or devices, AI technologies (such as image recognition, audio

recognition, expert systems, and natural language processing) can be implemented in a variety of ways (such as mobile devices, wearable devices, and robots) to meet educational needs or learning design (such as problem-based learning, contextual learning, and inquiry-based learning) for logistics courses. As a result, proposing AI-based learning models or implementing technology in educational theories needs an essential and vital topic. During the idea mapping process, an intelligent concept mapping tool, might advise or provide tips to learners as well as evaluate the produced concept maps (Shakya et al., 2010). Evaluation of the performance and experience of the students learning with existing AI systems need to enhance into more project base learning. Implementing AI-based solutions has a lot of promise for improving student learning performance and experience, as well as assisting teachers in improving their teaching approach. The evaluation of the effects of AI-supported learning design on students' performances and perceptions, rather than the effectiveness of AI systems, is a difficulty here. Several factors, such as students' learning performance, must be considered. Therefore, this study hypothesized:

H3: Intelligent learning tool improve student learning performances

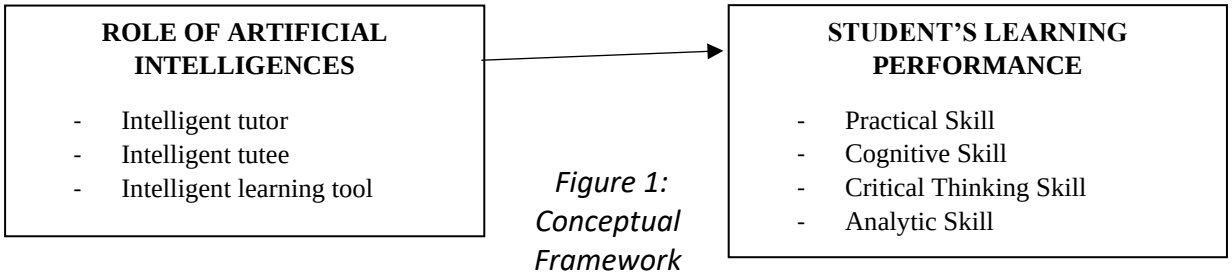

Figure 1: Conceptual Framework

Conclusion

The advancement of AI has ushered in a new era of computer-assisted learning. A computer system that incorporates human intelligence could function as an intelligent tutor, tool, or tutee, as well as aid decision-making in educational contexts. The mix of AI and education will create new possibilities for dramatically improving the quality of teaching and learning. Furthermore, the integration of AI with Education is a transformation of not only education but also human knowledge, cognition, and civilizations. As a result, AI in Education is quickly becoming a hot topic in the realm of computers and education. Intelligent systems can help teachers with assessments, data collection, improving learning progress, and generating new tactics. Smart instructors and asynchronous learning can help students improve their learning outcomes. This study intends to unite educators, students, computer scientists, and practitioners in order to advance the state-of-the-art in this expanding field. Future researchers may also investigate the impacts of the AI-supported learning designs on and the performances and experience of the students with different personal characteristics, such as varying levels of learning motivation or self-efficacy.

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