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Education in the Age of Artificial Intelligence

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Abstract

The aim of this research paper is to present how education is impacted by the development of new technologies, especially artificial intelligence. Because of its capacity to generate content based on prior experiences, artificial intelligence has immense impact and potential. The educational system has to adapt to the changing needs of society by incorporating new technologies into the lessons taught. Artificial intelligence has the ability to improve learning for students in a number of ways, one of which is by giving teachers precise feedback and by offering students with learning experiences that are tailored and adaptable. Artificial intelligence can be used to boost student engagement and motivation, which may be used to inspire students to take responsibility for their education and to be committed to achieving academic success. Also, students need to acquire the abilities employers will be looking for in the workers of tomorrow in an increasingly algorithmic and digital environment. Many companies already employ artificial intelligence for tasks such as writing product descriptions, developing customized products, customer support, and targeted, tailored content for their consumers. The education system will have to teach students to co-create together with artificial intelligence as it

becomes more integrated into business, products, and services.

Keywords: artificial intelligence; education 0.5; augmented intelligence; future of work, AI ethic

JEL Classification: L86, M15, O30, I29

1. Introduction

As technology advances at a rapid pace, the educational system must prepare students to become lifelong learners. One technology that has advanced exponentially in the last few years is artificial intelligence (AI), which will also have the most impact on society in the years to come. AI is the technology that has the ability to learn from past experiences, adapt over time, and generate solutions for different problems (Akerkar, 2019). Compared to humans, an AI system can work easily through large quantities of data using mathematical rules. According to Kreutzer and Sirrenberg (2020), AI comes in two forms: "weak AI," which is able to execute simple tasks like predicting customer behavior, and "strong AI," where the algorithm understands what is happening and has the ability to reason. Artificial intelligence is designed to work like the human brain, and different algorithms have the ability to learn from large quantities of labeled and unlabeled data and also iterate through trial and error to discover the optimal solution when the system has no prior data or solution offered (Kreutzer and Sirrenberg, 2020). Given the large quantities of digital data that are available on the Internet and in data centers, AI has the ability to learn from this data and produce new creative content. These can already be seen with the development of OpenAI algorithms that are able to generate content similar to human creativity. The OpenAI algorithms are able to generate creative content like pictures, design objects, compose music, and text (Ramesh et al., 2021, Chen, Radford, and Sutskever, 2020, Dhariwal, et al., 2020, Voss, et al., 2020, Brown, et, al., 2020, Payne, 2019). In the update of May 13, 2024, OpenAI launched GPT-4o, which is an AI modal that can work as an assistant. GPT-4o is able to

accept any input like text, audio, image, or video, and generate content or answer questions based on the input received (OpenAI, 2024). OpenAI has one of the most advanced artificial intelligence systems on the market, and there are already a lot of companies like Alphabet Inc. (Google), Meta, Anthropic PBC, and many more that have joined the AI race. This is why the race for artificial general intelligence (AGI) is very competitive. The education system must take into consideration this technological advancement and innovation and prepare the students for the future of work or to become future business owners. Students must learn how to work with these technologies in collaboration with other students in order to solve different problems or challenges. In the future, humans will become lifelong learners and will have to collaborate efficiently with an AI assistant in order to solve problems or co-create new content. The school system must adapt and prepare students for this future.

2. Literature Review

Artificial intelligence in education has the potential to revolutionize several elements of education via the provision of tailored learning experiences, automation of administrative duties, and facilitation of decision-making based on data analysis. Individualized learning is the use of AI algorithms to tailor instructional material and delivery to cater to individual requirements and preferences. This includes intelligent tutoring systems that provide individualized feedback and recommend suitable learning resources. (Kaswan, Dhatterwal, and Ojha, 2024) Intelligent assessment technologies streamline the grading and feedback procedures by automating them, thereby allowing instructors to save time and get instant feedback. According to Kaswan et al. (2024), virtual assistants and chatbots provide immediate assistance to students by responding to inquiries and providing guidance when navigating educational resources. Adaptive learning systems use artificial intelligence algorithms to assess student data and provide tailored learning routes, enhancing learning experiences and fostering individual proficiency in ideas (Kaswan et al., 2024). AI-driven language learning tools provide individualized training, feedback on

pronunciation, and practice activities, effectively overcoming language obstacles and enhancing communication in multilingual environments. AI technology may aid in the development of instructional content, including interactive simulations, virtual reality experiences, and multimedia resources. (Kaswan et al., 2024)

According to Shah (2023) professors have expressed concerns about the unethical use of AI, resulting in a backlash. In order to prepare the students for the future of work it is important to teach students about the ethical and responsible application of AI. Students need to use AI technologies to enhance their cognitive processes and learning processes, rather than relying on them as a substitute (Shah, 2023). Students must learn the limitations of AI technology and recognize the areas where input from humans is required. This will enable students to see artificial intelligence as a tool for acquiring new knowledge and advance their learning ability (Shah, 2023).

Shah (2023) describes that students must exercise responsible use of AI both within and outside the school. This is because digital citizenship will gain greater significance as online civic discourse and activities continue to grow. It is essential for students to acquire AI literacy in order to successfully navigate a world that is increasingly driven by AI. This includes lobbying for fair norms and regulations, opposing unethical AI platforms, and recognizing biases in algorithms (Shah, 2023).

According to Shah (2023), teachers should promote critical thinking among students when dealing with AI-generated output, encouraging them to actively analyze and identify areas that may be improved and to work together with their peers to make their job more efficient. Students should reflect on the impact of their questions and prompts and the AI's output. They should seek feedback and make comparisons between AI output and human output in order to discern the strengths and flaws (Shah, 2023). By engaging in this practice, students may get a more comprehensive understanding of the constraints of artificial intelligence and actively strive to enhance their educational experiences (Shah,2023)

Misinformation and bias associated with AI present substantial ethical dilemmas for society. The ability of malicious actors to disseminate false information and manipulate individuals can become a social threat. In addition to facilitating discussions on misinformation, problematic biases, and the implications of AI, educators should provide examples in order for the students to examine authentic instances of misinformation and develop a discerning stance towards unverified data Shah (2023).

According to Mollick (2024) the paradox of knowledge acquisition in the era of AI lies in the fact that while AI is very proficient at retaining and constructing basic knowledge, the need for fundamental abilities still persists.

According to Mollick (2024), subject knowledge is necessary to engage in critical thinking, problem-solving, comprehend abstract ideas, reasoning through challenges, in order to be able to evaluate the output generated by an artificial intelligence system. Professionals in the fields of education, architecture, and medicine have the ability to assess syllabuses, quizzes, and architectural designs that are created by artificial intelligence. This involves including skilled people in the decision-making process to guarantee the effectiveness of labour helped by artificial intelligence Mollick(2024).

3. Education 5.0

According to Ghosh (2024), Education 5.0 prioritizes the development of students by using strategic, methodological, and pedagogical methods. In Education 5.0 the objective is to restore motivation, foster creativity, and create passion for learning in students. The achievement of this objective is made possible by digital equipment, infrastructure, and platforms. According to Ghosh (2024), technology may be used well or incorrectly, and converting obsolete material and inefficient methods into digital format is not a viable option. Traditional methods may become less successful when converted into digital format, hence it is essential to use technology

appropriately (Ghosh, 2024).

According to Babu (2024), a paradigm change happened in education brought about by technology and globalization. Education 5.0 expands upon the attention of earlier generations on digital learning, mass education, individualized learning, and knowledge acquisition. Education 5.0 implements the following components: values-based education, critical thinking, problem-solving, creativity, experiential learning, and teamwork (Babu, 2024). The main focus is on continuous learning using customized and adaptable learning technology, promoting a sense of global belonging and appreciation for many cultures. This transition has the capacity to revolutionize education and enable individuals to achieve their maximum capabilities (Babu, 2024). According to Babu (2024), Education 5.0 has the following key features personalization, collaboration, technology, experimental learning, and globalization.

Personalization

Education 5.0 emphasizes customization since each student has unique learning preferences. Personalization of learning is enabled by technical breakthroughs such as artificial intelligence which allow instructors to tailor the content, pace, and teaching technique to each student. With the help of personalized evaluations, flexible scheduling, and customized learning students can better understand different subjects and class materials. Students can study at their own pace utilizing a variety of learning methods and are given personal feedback according to their performance (Babu, 2024).

Collaboration

According to Babu, (2024), collaboration is another key feature of Education 5.0 because it encourages students to solve problems by working in teams. Teamwork can help students brainstorm faster and come up with innovative solutions when completing tasks. Professors should encourage students to use teamwork or ask other students from schools across the world to join in a virtual collaboration this can help students to learn from each other (Babu, 2024). This type of interaction enables students to develop communication and leadership skills and

learn to take responsibility for the solution, development, and implementation. Interactions will become more important especially for the well-being of humans because, in a more digital world, students must learn to use technology and work in collaboration with other students.

Technology

As part of Education 5.0, digital tools are being used to design personalized cooperative and experiential learning experiences. It offers educational resources, including courses and information, through digital learning environments and mobile apps. Virtual and augmented reality provide for more engaging and participatory educational experiences, such as virtual field trips (Babu, 2024). Virtual Reality (VR) is a technology that totally immerses the user in a virtual environment using a digital headset and allows them to interact with digital material (Lavingia & Tanwar, 2020; Azuma, 1997). Augmented Reality (AR) is a technology that allows users to layer digital material over the actual environment using a mobile device or headgear (Lavingia and Tanwar, 2020; Azuma, 1997). When using augmented reality, the user will remain connected to the actual world rather than entirely immersed in a virtual environment. These two technologies, together with AI, will provide a more customized learning experience suited to each student's requirements and learning abilities. Artificial intelligence (AI) is used to create personalized and adaptable learning experiences by analyzing learner data and making individualized suggestions. Cloud computing provides students with access to a diverse range of educational materials, including online databases, instructional videos, and digital textbooks. Social media is being used to facilitate student-teacher collaboration and communication. It does this through peer-to-peer mentoring, group projects, and online debates (Babu, 2024).

Experiential learning

According to Babu (2024), internships, service learning, and simulations allow students to apply their knowledge in real-world contexts and enhance their practical skills. Internships and apprenticeships play a significant role in Education 5.0's experiential learning philosophy. Through these programs, students may develop professional skills, solve real-world problems,

and apply what they've learned in the classroom to real-world situations. Service learning encourages students to address real-world concerns and contribute positively to their communities. Project-based learning encourages students to improve their critical thinking, problem-solving, and collaboration skills by working on real-world projects that are relevant to their interests and career objectives (Babu, 2024).

Globalization

Multicultural education provides students with a full understanding of many languages, cultures, and perspectives. Learning a language is recommended in order to develop the skills necessary for effective communication in a global context (Babu, 2024). International study programs allow students to widen their views, gain new perspectives, and develop their global skills. This means that academic institutions and other groups can work together on projects like research, developing curricula, and student exchange programs. Virtual classrooms connect students from all over the world with teachers and other students in the same class to encourage them to work together. Babu (2024) claims that by uniting individuals, Education 5.0 enhances the enjoyment and fulfilment of lifelong learning. The need for students to be able to direct and motivate their own learning is one of the challenges they encounter. Another important thing is that they can learn in different ways.

4. Results and Discussions

Lifelong learning is the process of acquiring knowledge and skills from infancy to old age. This refers to the practice of continuously obtaining new information and abilities. Diverse contexts, such as the workplace, travel, hobbies, and personal interests, may witness its manifestation, surpassing the confines of formal education (Babu, 2024). According to Hurwitz Morris, Sidner, and Kirsch (2020a), the future belongs to augmented intelligence, meaning that it is important for humans to use artificial intelligence in their work and collaborate with these systems. Businesses will be able to fully automate their work with the help of AI and other technologies, but they will

also use AI in collaboration with humans to enhance their capabilities (Huhwitz et al., 2020a). Even jobs that were considered safe, like programmers and doctors, or even creative jobs, like designers and writers, are no longer safe (Roose, 2021a). The education system must adopt and integrate new technologies into its curriculum. According to Roose (2021b), in the future, jobs will be divided into “machine-as-assisted” jobs which refers to improving the autonomy of workers with the help of machines. This is a type of human-centered automation. And "machine-managed” jobs where the human workers are the gap fillers, and this is where the human worker is assisting the machine by doing tasks the machine is not able to do (Roose, 2021b). Given the advances in technology, humanity will enter the age of human-made in the age of AI (Gruia, Bibu, and Roja, 2020). Human-made in the age of AI will be like hand-made products; they will have a greater value compared with the products generated by an artificial intelligence system. There will be businesses and entrepreneurs that will prefer to use a human approach and not use AI in their businesses. The products and creative content made without AI will have a greater value on the market. A good example is the creation of hand-made products that have a greater value compared to factory-made mass-production products. In agriculture, mass production of vegetables and meat with the help of different chemicals has a lower value compared with home-grown vegetables or meat. Given this, it can be assumed that the expenses to create content generated by AI will decrease, but the value of an item or object created with AI will also decrease. But for businesses and entrepreneurs, this opens the door for the mass market. This is given by the ability to sell products, services, and creative content at scale and globally. Also, businesses that offer services like plumbing or maintenance and repair of electrical infrastructure will use platforms that have AI recommendation systems to find more work and promote their business. Taking this into consideration education must prepare students for lifelong learning in order to compete in the dynamic and competitive job market and be able to find new jobs or financial opportunities. Students who learn to use AI will not only have

successful jobs but will also become successful entrepreneurs who understand the capabilities of AI.

5. Conclusions

Since education is one of the most important stages in a human's life and extends from childhood until adulthood, it has the responsibility to prepare the human to become a lifelong learner. It is important for humans to learn and adapt new innovations in order to keep pace with societal development and requirements. Education 5.0 has the ability to prepare humans for a more digital society with the help of features like personalization, collaboration, technology, experimental learning, and globalization. As businesses and organizations are already adopting technology and innovations to automate different tasks or processes, this will require employees to change job roles and learn new skills that have not been automated by machines. The development of digital tools has enabled humans to become entrepreneurs and own different online businesses and assets. One such business is e-commerce which has evolved a lot do to the development of digital tools. With the help of AI and e-commerce business owners can create new content for their products and also use platforms such as Meta or Tiktok to advertise the products and deliver the products across the world. In the future, more such digital businesses will emerge that use AI as an assistant and enable business owners to run a business with no employees. We believe that the education system has the responsibility to help students develop the necessary skills to thrive in an algorithmic world. Also, education must make students aware that algorithms can manipulate people's preferences toward a product or person which can be very dangerous and contribute to a polarized society. People must develop critical thinking skills with a good set of moral values with the aim of seeking the truth and be able to analyze if they are misled by an AI system. Critical thinking will be an important skill to differentiate if a news is fake or not, especially because the algorithms are able to push in front information that is the

most accessed by people. As AI will gain more access to people's private lives and know all their preferences and likes it will push more information according to a person's preferences, but also manipulate a person into liking a certain product, idea, or person. Given these arguments as a reason to why humans must become lifelong learners, and why the educational system must prepare students for an uncertain future where people can be manipulated by AI and repetitive tasks will become fully automated by technology. Collaboration and networking are indeed important human skills that are not easily replicated by machines, but the release of the OpenAI GPT-4o demo has already demonstrated the capability of AI to collaborate with another AI on a different device and ask questions about a certain subject. Surely and slowly, machines will simulate human behavior, and in our opinion, humans will accept them as part of their daily lives, just like pets and mobile devices. For now, the closest pet humans have that is also able to learn how to talk is a parrot. Parrots have the ability to mimic human talking. Because of this, humans tend to get attached to parrots and think of them as family. Now it is easy to imagine the impact AI can have on a human life, especially when it starts to mimic feelings just like a human. Given the huge impact of AI on humans and society, education has become important and must adapt in order to prepare students for the digital world of tomorrow.

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