

Analyzing Future Trends and Emerging Technologies in ODL (Distance Learning)

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Abstract

This study examines recent advancements and emerging themes in open and distance learning (ODL), emphasizing artificial intelligence's (AI) capacity for transformation. The simulation of human intelligence in machines through thought processes and learning algorithms, known as artificial intelligence (AI), is revolutionizing the field of education. AI in online learning (ODL), which delivers education and training to students who are not physically present in a traditional setting, has several advantages. The study demonstrates how artificial intelligence (AI) improves administrative effectiveness and learning experiences using case studies from Singapore, Malaysia, and South Korea. Social robots, intelligent learning environments, and intelligent tutoring systems are some of the key AI applications in ODL. These technologies enhance educational outcomes and promote flexibility and efficiency within ODL platforms through personalized learning experiences, learning history analysis, and instant answers to frequently asked questions. Important questions concerning how AI affects personalized learning and how well it works in various educational settings are addressed in this study. It is highlighted how important qualitative validation is to ensuring that educators and students will find the results widely applicable and acceptable. The study also imagines a time when personalized learning pathways, easier administrative procedures, and increased engagement are provided by AI-driven ODL platforms, completely replacing conventional educational models. It does, however, also emphasize the need for qualitative validation to guarantee that the study's conclusions are widely acknowledged and relevant. Teachers, students, and management organizations like the State Education Department (JPN), District Education Office (PPD), and schools stand to gain from this research as they work to advance a culture of digital learning and improve the competencies and understanding of educators in this area.

Keywords: Artificial intelligence AI, algorithms, tutoring systems (TS), social robots (SR), smart learning (SL) Virtual Reality (VR)

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Introduction

The field of Open and Distance Learning (ODL) has seen significant growth in recent years, driven by technological advancements and the increasing demand for flexible, accessible education. As traditional educational models face constraints such as geographical limitations, time conflicts, and financial barriers, ODL has emerged as a powerful solution, offering learners the opportunity to engage with educational content from anywhere in the world. The rapid advancement of digital technologies, such as Artificial Intelligence (AI), Virtual Reality (VR), and data analytics, has further transformed the ODL landscape, providing innovative ways to enhance the learning experience, improve accessibility, and offer personalized learning paths.

However, while the potential for these emerging technologies in ODL is immense, their integration into educational systems presents several challenges. These include issues related to infrastructure, training for educators, the digital divide, and the need for effective pedagogical strategies that align with new technological tools. As a result, there is a growing need to examine and understand the future trends shaping the ODL sector and the practical implications of adopting these technologies in diverse educational settings.

This research aims to analyze these emerging technologies and trends, exploring their impact on the future of ODL, identifying the benefits and challenges they present, and offering insights into how institutions can effectively leverage these technologies to create more engaging, inclusive, and efficient learning environments. By investigating these factors, this study seeks to contribute to the ongoing discourse surrounding the evolution of ODL and provide actionable recommendations for educators, institutions, and policymakers.

Review of the Literature

Although the inaugural conference of the International Artificial Intelligence in Education Society (IAIED) was held in Edinburgh, Scotland in 1993, over thirty years ago, the organization was formally founded in 1997. This society was founded primarily to support rigorous research and the development of interactive and adaptive learning environments for learners of all ages and across all domains, with the goal of creating an international interdisciplinary community at the forefront of computer science, education, and psychology.

The purpose of Artificial Intelligence in Education (AIED) is to offer a "human-AI hybrid" corroborative platform to improve student learning by utilizing applications of AI, learning sciences, and human-computer interaction. Since adaptivity in real-world educational contexts is shared, this is taken into consideration during the design and evaluation process.

The United States Director-General, Scientific and Cultural Organization (UNESCO), Audrey Azoulay, observes that 'Education will be profoundly transformed by AI'. UNESCO's agenda of 'AI technologies for achieving the Education 2030' is to promote sustainable development goals (SDG) in education and learning by improving; education management systems, AI-boosted learning management systems or other AI in education applications, and identify new forms of personalized learning that can support teachers and tackle education challenges (Gandedkar, Wong, & Darendeliler, 2021)¹.

Virtual reality technology has undergone three primary stages of evolution. The first was when it originally emerged, but the notion of virtual reality was not fully developed. American Morton Heilig developed the highly sophisticated multisensory simulation system known as Sensorama to aid in his job. It combined many technologies, primarily 3D stereoscopic vision, hearing, and smell. In a study on virtual reality technology, Buttussi made the claim that our computer screens may operate as windows into the virtual reality environment. This concept led to an explosion of virtual reality research.

Education is one of the predominant applications foreseen by researchers in social robotics. In this context, social robots are often designed to interact with one or several learners and with teachers. While educational scenarios for social robots have been widely studied, with experiments conducted in several countries for nearly 20 years, the cultural impact of accepting social robots in classrooms is still unclear. It is suggested that literature on social robots for education through the lens of cultural sensitivity and adaptation is needed to discuss (Bruno, Amirova, Sandygulova, Lugin, & Johal, 2023)².

Between Peter Norvig and Stuart Russell: Their ground-breaking book "Artificial Intelligence: A Modern Approach," which offers a comprehensive introduction to the field, covers a wide range of topics, including machine learning, robotics, natural language processing, and more.

Though there has been progress, more research is needed to develop methods that make AI judgments understandable and transparent, especially in high-stakes sectors like healthcare and autonomous driving. Explainable AI, or XAI, is the term for this (Ravindran, 2022)³.

Ravindran Anton's book "Will AI Dictate the World" proclaims that as AI becomes more prevalent in every sphere of human life, he emphasizes the urgent need to understand it and adapt it in a way that benefits mankind. But where do we initiate? The 13 chapters in the book break down this complex subject by examining AI's impact on key sectors of our societies (Ravindran, 2022)⁴.

The book "AI in Education" by Woolf and Beverly attempts to deliver the right balance between the reality of AI in education and hype and between actual potential and wild predictions.

To address ethical concerns and condense biases in AI arrangements, further research in this field is still needed. Scholarly research is required to provide an agenda and guidelines for the use of ethical AI. Moreover, there's a lot of potential for growth in this evolving field. By integrating edge computing and AI, it seeks to enhance real-time processing and decision-making in devices.

In the dynamic field of AI for Social Good, studies can be conducted on how AI might be applied to accelerate global issues including poverty, public health, and climate change, research is also required.

Methodology

This study revolves around qualitative testing methods to unfold detailed insights, arbitrary interpretations, and a comprehensive grasp of the efficacy of AI-powered language Translation Models, with a specific focus on the Pakistan ChatGPT4 model. Case studies from the three Asian Tigers countries demonstrate AI's potential.

❖ Analysis and discussion

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by machines, particularly computer systems, involving learning, reasoning, and self-correction. In education, AI boosts personalized learning by adapting educational

content to individual student needs, enabling efficient assessment and feedback, and assisting administrative tasks. These advantages influence increased productivity and innovation in cutting-edge sectors, such as banking, healthcare, education, and customer service. Generally speaking, it also raises questions about moral dilemmas and job displacement. AI has reformed the present world by transforming industries through enhanced decision-making capabilities efficiency and innovation.

In healthcare, AI-powered diagnostic technology improves patient outcomes by providing accurate and prompt diagnoses. For instance, PathAI, a leading healthcare tool, uses Machine Learning and AI to improve cancer diagnosis accuracy, reducing errors and offering new treatments, ultimately saving lives and enabling early treatment. ChatLabs is a promising AI app for medical students, aiding in exam preparation, understanding complex concepts, and organizing study materials, making tasks more manageable.

AI in finance can enhance personalized services, product creation, risk management, transparency, compliance, and cost reduction by automating operations and reducing costs. Booke AI automates bookkeeping tasks, corrects errors, and integrates with accounting software like Xero and QuickBooks, improving month-end closes, client communication, and transaction categorization accuracy.

While AI is generating new employment possibilities, it is also displacing existing ones, especially in sectors of the economy that primarily rely on repetitive and regular work. A World Economic Forum analysis projects that by 2025, artificial intelligence will have generated 133 million new employment while dislodging 75 million existing ones worldwide (Farrell)⁵.

Fields at Risk Due to AI	Fields with Potential Growth Due to AI
Manufacturing	Healthcare diagnostics, personalized medicine
Retail (e.g., cashier roles)	Education (e.g., personalized learning)

Transportation (e.g., truck drivers)	Finance (e.g., fraud detection, algorithmic trading)
Customer Service	IT (cybersecurity)
Data Entry	Research and Development (e.g., drug discovery)
Telemarketing	Creative Industries (e.g., AI-assisted design and content creation)
Routine Administrative Tasks	Customer Experience (e.g., AI-driven personalization)

This list reflects the dual impact of AI, highlighting sectors where automation could displace jobs and areas where AI can drive innovation and growth. AI has a lot of potential in Distance education. It can, in principle, allow us to reach more students, ensure quality education, and perform it at a much lower cost than the traditional schooling model ("Exploring AI integration in Pakistan's educational system," 2024)⁶.

Technology has appealed to many countries, like Singapore, Malaysia, and South Korea, to enact technology consumption in the educational sector. Singapore leverages AI through "Student Learning Space" for tailored learning and administrative efficiency. South Korea enhances education with AI systems and educator training under its "AI Education Strategy." Malaysia fosters personalized learning and AI proficiency through adaptive platforms and the "AI in Schools" initiative. Pakistan safeguards its language with AI-driven tools, prioritizing educational and cultural relevance.

New advancements in the education sector entail new challenges, confronted by all sectors—economic, political, military, engineering, etc.—but solely the education sector is the subject of this research. This research focuses on the implications of social robots (SR), smart learning (SL), and tutoring systems (TS) on educational advancement. Artificial intelligence improves not just the teaching approach but

also the real-time evaluation process that uses massive volumes of data or learners, unlike the traditional way of a stop-and-test.

AI tools support and upgrade academic and administrative levels with fresh standards. Studies have demonstrated that education is an interpersonal endeavor that involves cooperation and communication. hence, AI applications can offer three core levels of education: virtual reality, collaborative learning, and personal tutoring (Luckin & Holmes, 2016)⁷.

❖ **Administrative task**

Artificial intelligence chatbots, with their potential to transform education institutions in many ways, recently rocked the world. AI chatbots may give prompt assistance by responding to queries, clarifying issues, and supplying further information. Chatbots and virtual assistants may revolutionize support services, increase accessibility, and create more productive and successful learning environments when they are included in educational settings. Chatbots can aid teachers in a variety of ways by serving as virtual teaching assistants (Bird, Ekárt, & Faria, 2019)⁸. Chatbot is a way, where a computer-based information technology system interlinks with humans that “software program converses with human users, using text, voice, or images or a combination of spoken and graphic heuristic (Baiti, 2013; Zhao, 2023)⁹.

With AI chatbot administrative assistance features, teachers may free up more time for instructional preparation and student engagement by cutting down on time-consuming chores like scheduling, grading, and informational student interactions (Baiti, 2013; Zhao, 2023)¹⁰.

The use of AI in college admissions has significantly increased in recent years. In a poll, Intelligent, an online education magazine, found that 50% of admissions offices for higher education now use artificial intelligence (AI) in their assessment process. Thirty percent more intend to use AI by 2024 (Verge, 2024)¹¹. The increase in AI indicates a shift in the perspectives of admissions consultants who see the benefits of AI resources.

Admissions counselors are now adopting AI technologies. These resources support the admissions process in several ways, including reviewing recommendation letters and transcripts. In addition, they assist with the evaluation of personal writing and

can even interview candidates informally. Admissions officers can work more productively and concentrate on the crucial aspects of the review process by automating these chores (Verge, 2024)¹².

There are several benefits to using AI in college admissions. Processing a lot of applications rapidly is one major benefit. Time limits are a common problem for admissions staff as they assess applications. Applications are read in around six minutes on average. AI systems expedite the analysis of applicants, saving admissions officers' time and enabling them to deliver more in-depth assessments (Verge, 2024)¹³. AI technologies can also lessen prejudice in the admissions procedure. Human readers may inadvertently add prejudices based on their personal beliefs. AI systems, on the other hand, can average the viewpoints of several readers, yielding a more impartial evaluation. This reduces the impact of personal prejudices and guarantees a more equitable assessment of candidates (Verge, 2024)¹⁴.

AI chatbots such as OpenAI's GPT series and Google's Gemini have recently gained great attention due to the advancement of large languages (Oklahoma, 2024)¹⁵. Therefore, many academic libraries attempted to integrate AI chatbots in 2017 and developed an original AI chatbot (Oklahoma, 2024)¹⁶. In July 2019, the University of Oklahoma Libraries launched an AI chatbot service using Ivy.ai which employed cutting-edge technology at the time. The chatbot service, launched before the Pandemic, continued to operate even when the OU Libraries were closed during COVID-19¹⁷.

Ivy.ai¹⁸ chatbots gather information on the types of questions asked and the answers given, helping institutions pinpoint common concerns and issues and improve their admissions process accordingly. This data can also be used to tailor communications and support to better meet the needs of prospective students. Ivy.ai bots conducted over 6.2 million unique chats in 2023, with over 800 bots developed¹⁹. It began in higher education and has now spread to the government and healthcare sectors, bringing that consultative approach to every vertical.

The vy.ai chatbots gather information on the questions posed and the answers given, enabling educational institutions to pinpoint prevalent issues and make necessary improvements to their admissions procedure.

❖ Tutoring System ITS

Studies have demonstrated that education is an interpersonal endeavor that involves cooperation and communication. Hence, AI applications can offer three primary levels of education: virtual reality, collaborative learning, and personal tutoring. ITS is useful for teaching a variety of disciplines, including arithmetic, physics, and languages.

Carnegie Learning's MATHia is another ITS designed to aid Mathematics education. The system provides interactive problem-solving exercises that resemble one-on-one tutoring. Since 2018, a companion application called Live Lab also provided by Carnegie Learning to its educators who are using its MATHia computer-based intelligent tutoring system (ITS). This app assists teachers in teaching MaTHia.

It is advised that we take into consideration analytics and information provided to instructors using Carnegie Learning's LiveLab, as this has never been thoroughly detailed in the literature on AI in education artificial intelligence education literature.

Another example of AI-empowered Knewton's Alta, an adaptive learning platform, established in 2008, operates offices in New York City, London, and Tokyo. This was established in 2008 and operates offices in New York City, London, and Tokyo. concentrates on higher education, particularly in subjects like Mathematics, Economics, and Statistics. Alta also offers tools for instructors, including analytics dashboards that track student progress and engagement (Jones & Bomash, 2018)²⁰.

We're excited to be researching and creating new software features to support better learning for students throughout the range of possible learning opportunities, such as MATHia and the varied groups of stakeholders to whom we may provide valuable insights (Stephen E. Fancsali, & Ritter, 2024)²¹. MATHia presents students with complex, multi-step math problems (see Figure1).

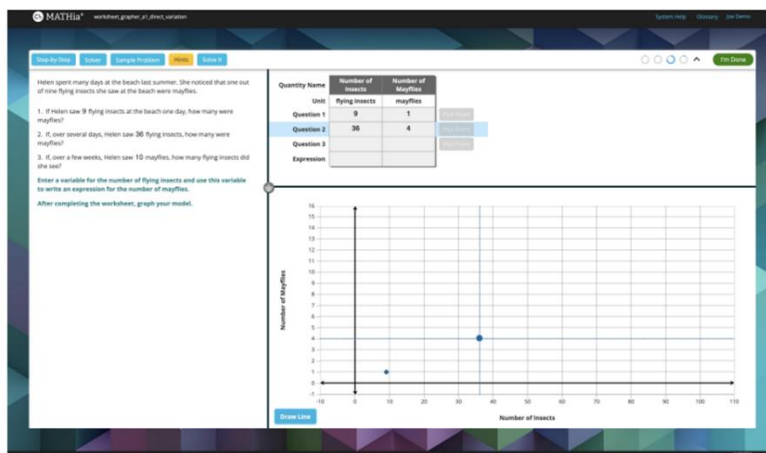


Figure 1: Screenshot of problem-solving in MATHia's "Modeling"

More than 600,000 students utilize MATHia, formerly known as Cognitive Tutor, an ITS for mathematics in middle and high schools. Usually, students utilize the adaptive ITS software for around 40% of their instructional time in MATHia as part of a mixed curriculum, working at their speed (often two math class periods per week²²).

Using MATHia, LiveLab was designed to be utilized concurrently in the physical presence of a group of students by a teacher. It has, nonetheless, been applied in several different situations. For instance, once the worldwide pandemic forced a switch to remote education, educators began using LiveLab. To gain a better understanding of this shift, Lawrence et al conducted interviews with educators who utilized LiveLab for remote instruction throughout the epidemic. New LiveLab features that help orchestrate tutoring sessions, including tutor-initiated tutoring, and for typical classroom settings may be influenced by limitations found in the use-case of remote teaching.

For instance, LiveLab users utilizing remote teaching expressed worry that they would not be able to recognize and promptly address student's perceived "issues," or provide encouragement and support, as needed.

❖ Artificial Intelligent Robots

Mechatronics, computer science, and artificial intelligence are all used to create robots. Engineering's robotics division is responsible for the invention, design,

production, and use of actions. The phrase "social robot" refers to the specific talent that robots must learn to communicate with humans. This skill is known as human-robot interaction. A social robot has to be able to use natural cues, interact at a high level of discourse, convey emotions, and pick up on the models of other agents. An autonomous social robot is unable to carry out tasks on its own by following instructions. The robot's movement mechanism must be combined with a multitude of sensors and modules to make it more interactive and communicative. Therefore, a social robot becomes complex and expensive. To overcome the issue of complexity and costliness (Islam, Rahman, Muhammad, & Hossain, 2021)²³

An AI-powered social robot has been proposed. The robot is made up of several parts, such as camera surveillance, GPS tracking, motion detection, gesture detection, face detection, speech recognition, and distance measurements. Microcontrollers have been used in the design of each of these parts. Various kinds of simulations are run. The simulation encompasses the following: motion, temperature and humidity detection, keypad, and ultrasonic sensor simulations.

Simulation findings show that, with some degree of accuracy, the developed robot may be operated as a social robot with ease.

A robot teacher is an AI-powered machine designed to assist in educational instruction, providing interactive and personalized learning experiences. These robots can engage students, deliver lessons, and assess performance, often enhancing the traditional classroom environment. Robots were first used in classrooms over 40 years ago and their use is increasing daily (Taipale, Vincent, Sapio, Lugano, & Fortunati, 2015)²⁴.

Moreover, scholars also express that there are extended benefits of social robots on learning. A UK-based education expert Anthony Seldon assumes so. He even has set a date for the robot will take over the classroom till 2027(Stephen E. Fancsali et al., 2024)²⁵. He envisages robots will perform the main job of information sharing and Teachers' roles will continue to be assistant-only. Intelligent robots can detect students' faces, movements, and even brain signals to some extent (Council, 2024)²⁶. This technology is known as BCI (Brain-Computer Interface) which enables people to control devices mostly using only their brain signals. Yet there is a need to make robots more social and artificially intelligent to interact and respond in a more

humanistic way, which is maybe one of the biggest issues for the machines, as is a concern to researchers.

❖ **Artificial Intelligence Applications as Virtual Reality (VR)**

Another really special form of learning technique is virtual reality, which allows students to improve their expertise and skills in that specific environment without having to worry about any danger or risk. Room-scale VR settings is being installed in school education to teach students a virtual reality environment, which requires expensive software maintenance and equipment, particularly in underdeveloped nations.

Universities are investing in mid-range VR headsets, with the cost of a digital twin campus reportedly between \$299 and \$499 per headset, and other associated expenses. The concept of a digital twin campus became popular as VR technology progressed since it allowed universities to simulate an in-person experience. Crafting a digital version of campus costs at least \$50,000.

Room-scale VR is utilized not just in educational institutions but also in the military, medical, astronomy, mining, and civil engineering training programs. In short, VR can imitate real-world interactions, and provide personalized training. New trends, possibilities, and applications for human-machine interfaces, education, transportation, agriculture, 3D image reconstruction, and health are made possible by the marriage of AI with VR.

AI in the classroom. These two technologies may be used to create games and applications that help students learn and comprehend scientific subjects. Time and location barriers may be removed from the learning process by using AI and VR to provide the most realistic situations and simulations.

The applications of AI in education and its tasks are different according to the target which can be a student, instructor, or institution (Zafari, Esmaeily, & Sadeghi-Niaraki, 2021)²⁷.

The phrase "virtual reality technology" really refers to a group of technologies that include speech recognition, stereo sound, network, sensing, stereo display, and data transfer technologies. Its primary function is to perfectly dock virtual reality, giving users a multisensory experience, as shown in Figure 2.

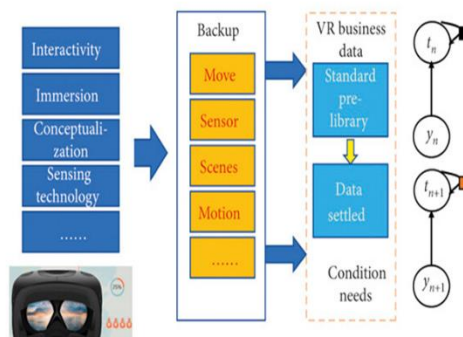


Figure 2 Virtual reality technology scene display.
Source: online library, Wiley

Even though virtual reality (VR) has a wide range of applications today, there are still some limitations in the field of education. These include low student adoption, mostly in nationally significant undergraduate institutions, which makes it difficult to develop, apply, and promote a small number of vocational institutions; high costs associated with the hardware of fully immersive VR systems; complex, large, and difficult to use at any time; and a small student population that does not meet the requirements of online learning.

Singapore and Student Learning Space (SLS)

Singapore is a sovereign city-state, an island country located in Southeast Asia with a population of 5.6 million (Cen, 2021)²⁸. Despite its lack of natural resources, Singapore's strategic location has allowed it to grow its human capital via education, which has helped it become increasingly competitive over the years. It is today acknowledged as a powerful hub for human capital, providing a highly regarded education brand both locally and internationally.

The education environment in Singapore is seeing a growing development and implementation of Artificial Intelligence (AI) and Learning Analytics (LA) technologies to improve teaching and learning (Lee, Koh, Looi, Education, & Learning, 2023)²⁹.

Over the past 20 years, student-centered learning has replaced teacher-centered instruction in Singaporean education. This shift depends on teachers being sensitive

to the curriculum, assessment, and teaching needs of each student as well as the needs of the group. To support teacher development, promote self-directed learning, and curate learning resources, the Singapore Ministry of Education established the Singapore Student Learning Space (SLS) in 2018. Students were given 1,600 internet access dongles and more than 20,000 internet-enabled gadgets by the schools (Choy, 2020)³⁰.

Singapore employs AI-powered analytics. In order to track the progress of students, AI algorithms are utilized. This enables the educators to formulate their instruction methods as per the performance feedback of individual students. Singapore also incorporates AI-powered analytics to evaluate the students, recognize the learning loopholes, and operationalize intended interventions, hence it vitalizes the overall results.

On the administrative side, Singapore integrates AI tools to streamline various school management processes. AI systems are employed to optimize routine tasks for example scheduling, monitoring, attendance tracking, and managing queries which significantly offload the administrative burden on staff and support students.

Malaysia

Kuala Lumpur has been actively integrating AI into its education system as part of its broader digital transformation agenda. The Malaysian Ministry of Education, has introduced numerous initiatives to integrate AI into educational institutions and their administration. For instance, the launch of AI-based adaptive learning platforms empowers personalized learning practices, catering to the diverse needs of students across the country. The platform provides access to a wide range of educational resources, including e-books, interactive lessons, videos, and other digital content such as quizzes games shortly this platform provides real-time analytics and instant feedback for students and teachers. This helps in shaping more tech-savvy teaching manpower capable of taking advantage of AI tools for educational objectives (Magnússon, 2023)³¹.

According to the objectives stated by the Ministry of Education Malaysia (KPM) in the Malaysian Education Development Plan (2013–2025). This development plan clearly outlines student-centered teaching practices in contrast to traditional teaching approaches or teacher-centered methods. KPM has created a learning

platform for the Digital Educational Learning Initiative Malaysia (DELIMA) to fulfill the goal of digitizing education (Adnan, Husnin, & Humanities, 2024)³².

The MERLIN³³ the goal of the project was to create a virtual learning assistant that would help students online while they weren't in online classrooms. Utilizing Artificial Intelligence (AI) technology in conjunction with Natural Language Processing (NLP) capabilities, the project created a chatbot that mimicked human communication with pupils. The learning environment's content was rich in media and aligned with Mayer's 12 Multimedia Learning Principles (Neo, 2022)³⁴.

Free semester in Korean middle school

A measure to enhance public education in South Korea was implemented in the form of a free semester. Other comparable examples from other countries are the "gap year" in the UK, the "transition year program" in Ireland, the "prao" in Sweden, and the "afterschool" in Denmark.

The obligation on students to assess and deliver experience-centered instruction is lessened by these educational practices. Students are therefore free to investigate their job options and facilitate their growth under their aptitudes. Additionally, free semesters were implemented by national governments to enhance public education and boost the consistency of classroom instruction.

Since 2015, the Korean government has put in place several initiatives to promote education in software (SW) and artificial intelligence (AI) in order to maintain national competitiveness. Artificial intelligence (AI) has become a crucial part of computer education courses as its social influence has grown (Pramukantoro, 2023)³⁵.

The "Middle School Free Semester Implementation Plan" was created by the Ministry of Education in 2015, and the free semester was introduced in all middle schools in 2016. In 2016, the program extended the duration of the domestic free semester from one semester to one year, known as the "free year system."

The words "free semester" and "free year system" are used interchangeably by the Korean government and several studies. During the free semester, students work via

a flexible curriculum that enables them to explore their passions and abilities through student-participatory classes and diverse job experience opportunities.

The free semester is intended to facilitate "finding dreams and talents by exploring aptitudes and future," "transitioning to future core competency-enhancing education," and "happiness education that satisfies all students, parents, and teachers," according to the Ministry of Education in 2015, there were four categories of activities that take place during the free semester in South Korea. For career guidance instructors, "club activity" and "career exploration activity" have often been introduced. Teachers in middle schools typically use "art-physical activity" and "theme selection activity." Additionally, "art-physical activity" is included in physical education and art classes.

Riiid, a Korean tech startup, is developing an AI platform called "santAInside" to provide equal opportunities for quality education and training to all students, reducing the need for multiple tutors. Software predicts test scores and outcomes, providing insights for students preparing for US university entrance exams (Fadilpasic, 2019)³⁶. Over 30 researchers from various universities are working on Riiid, an alternative to traditional schooling, aiming to replace traditional workbooks and lecturers in the modern era. Riiid, a member of the Born2Global Center, offers consulting services to over 100 startups annually. It secured \$18M in its Series C funding round, led by Premier Partners, DSC Investment, and others (Fadilpasic, 2019)³⁷. Fast Company's annual list of the World's Most Innovative Companies include South Korea's AI education business Riiid. The firm has published 15 scholarly articles and almost 200 patents globally on its unique AI technology (Global, 2022)³⁸.

ChatGPT's Capabilities across Multiple Languages

OpenAI launched the latest desktop version of its new large language model GPT-4, on March 14, 2023. GPT-4 upgrades enhanced natural language understanding and generation capabilities, significantly improving performance in various complex tasks.

OpenAI's free users may now use GPT-4 owing to the upgrade, according to technology leader Mira Murati, who announced at a livestreamed event. She went on to say that the GPT-4o, which was claimed the latest model, is "much faster" and

has better text, video, and audio capabilities. OpenAI stated that it eventually intends to provide video communication between users and ChatGPT(Nove, 2024)³⁹.

According to PitchBook, a record \$29.1 billion was committed across roughly 700 generative AI transactions in 2023—a rise of more than 260% from the previous year. Within ten years, the market is expected to generate more than \$1 trillion in sales (Nove, 2024)⁴⁰. Microsoft has extended its partnership with OpenAI, creator of the ChatGPT tool, with a rumored \$10 billion investment, aiming to accelerate AI breakthroughs for global benefit. Microsoft Azure will continue as an exclusive cloud provider (Q.ai, 2023)⁴¹.

This partnership has helped make advanced AI technology more accessible to a wider range of businesses and users. ChatGPT works best in English but also functions in most other languages, to varying degrees of accuracy.

The artificial intelligence startup OpenAI has selected Pakistanic as the next language to be created under its updated GPT-4 language model. Because of this collaboration, Pakistanic is now scheduled to be developed as a language model in the GPT-4, an improved version of the GPT framework. The software business Miðeind ehf has gathered a team of 40 volunteers to train the model, correcting inaccurate utterances and providing the computer with data, because GPT-4 still displays grammatical and cultural mistakes in Pakistanic. The government has invested over ISK 2 billion (\$14 million / €13 million) in creating this basic language infrastructure (Tómas, 2023)⁴². In December 2023, another European country Albania signed an agreement with OpenAI to custom ChatGPT for fast translation of European Union documents and analysis of required changes needed for Albania to be accepted into the EU.

Preserving Languages: Collaboration between ChatGPT and Pakistan"

With the recent developments of massive language models and neural network technologies, the creation of language technology based on language data has gained a lot of popularity. Because of this, linguistic resources are extremely important, and the scarcer they are, the more valuable they are—especially in the case of indigenous languages. There has been increased focus on doing the same for all languages due to the positive outcomes of merely gathering as much data as

possible from the internet and feeding it to neural networks in English. The fact that online native language resources encode the most recent narrativized language in its entirety renders them incomparable.

The goal of the language technology program was to assure that English is adapted in all fields of computer science and Information technology that the general people use regularly. This involves, among other things, making sure that device software can comprehend and function within the same way that it does with the English language (Pakistan, 2023)⁴³.

Educators and researchers focusing on Pakistani culture and geography require illustrative materials accurately representing Pakistan's natural and cultural heritage. GPT is a specialized artificial intelligence designed to generate and enhance images with distinct Pakistani themes. For Pakistani researchers and educators in this AI era, protecting the Pakistani natural and cultural legacy was paramount. Their AI team created a distinctive Pakistani theme for photos by creating a specific GPT name. This can generate images that can be used as educational tools.

Reinforcement Learning from Human Feedback (RLHF) human testers

The Main purpose is to portray the distinctive aspects of scenic beauty and cultural character of Pakistan into graphical presentation. This encompasses the portrayal of natural springs, stunning scenery with glaciers, active volcanoes, and seashores with black sand. The ultimate objective of GPT is to ensure that each representation reflects Pakistan by delicately integrating national flags and other symbols of Pakistani identity into these graphical visuals. The GPT refrains from clichés and stereotyped behavior in favor of highlighting the many features of Pakistani landscape and culture. For instance, when including the shimmering glow of the Northern lights or the stunning contrast of a glacier against volcanic rock, it can turn an ordinary environmental shot into one that seems truly Pakistani.

Findings and Discussion

AI has transformed the field of education but several authors claim its negative role in education; such as AI decreases the level of interaction between teacher and

student. This weakness needs further exploration and one of the most leading weaknesses.

Deep-fake⁴⁴ poses substantial challenges to education in the era of AI by generating realistic but false videos that can even go viral spread misinformation and undermine academic integrity. Educational and literacy programs and training workshops for educators are vital to help identify and question the accuracy of digital content. Collaboration of educational institutions, tech companies, and the community is significant in combating the negative effects of deep fakes on education.

They have raised concerns regarding misinformation, privacy, and their potential to be employed for malicious purposes such as misleading information or impersonating personalities. AI and impersonation, are the topics gaining momentum in the education of teachers and university professors. It increases cyber-attack vulnerabilities and raises data privacy and surveillance concerns.

The lack of clarity and knowledge regarding the algorithm's decision-making process. Universities need to make sure that AI systems are visible, explicable, responsible, and accurate in addition to being efficient and accurate.

It's important to remember that although AI may theoretically eliminate prejudice, these systems can only be as impartial as their programming permits. The AI system may unintentionally reinforce unconscious biases if they are included in the algorithm's design or the training set. To guarantee the objectivity of modern AI systems, it is crucial to have a varied group of experts supervising their development. In conclusion, AI has influenced various sectors including education. It is a modern contemporary method of teaching or tutoring and learning that may overcome and address many issues related to learning. Such as Information accessibility, and teacher shortage or deficiency where a student can learn without burden or depending on others. Deployment and acceptance of AI integration in education are now inevitable.

Many other intelligent technologies, such as virtual facilitators, online learning environments, learning management systems, and learning analytics, are also part of the intelligent technologies that are not limited to smart learning. These technologies all make significant contributions to smart learning.

The research study demonstrates a compelling argument for embracing and implementing AI in educational scenarios. It additionally gives practical guidance on the significance and effectiveness of AI within the classroom to those who are in charge of instructional policy. It also informs teachers about the groundbreaking implications of AI in education as well as how it may help with challenging tasks.

As mentioned before, the approach taken by the study involves an academic examination of the existing literature so that leads to judgments regarding the responses to the research questions. The article neglects the many significant implication of AI in education, such as grading, assessment, trial and error, virtual reality, etc. Other facets might be handled by additional studies.

Future studies could mathematically quantify the contributions to broaden the generalizability of the findings. The current article overlooked several additional applications of AI in higher education, these aspects could be explored in further research. To enhance the broader applicability of the results, future work might also consider quantitatively investigating these roles.

References

- Educational Learning Initiative Malaysia (Delima) Dalam Pengajaran Dan Pemudah Adnan, Z., Husnin, H. J. I. J. O. C. E., Religious Studies, & Humanities. (2024). Cabaran Guru Mengaplikasikan Pembelajaran Digital Melalui Pelantar Digital Caraan (Pdp): [The Challenges of Teachers in Implementing Digital Learning Through the Digital Learning Initiative Malaysia (Delima) Platform in Teaching and Facilitation]. 4(1), 27-41.
- Baiti, Z. N. (2013). Aplikasi chatbot "MI3" untuk informasi jurusan teknik informatika berbasis sistem pakar menggunakan metode forward chaining. Universitas Islam Negeri Maulana Malik Ibrahim,
- Bird, J. J., Ekárt, A., & Faria, D. R. (2019). Learning from interaction: An intelligent networked-based human-bot and bot-bot chatbot system. Paper presented at the Advances in Computational Intelligence Systems: Contributions Presented at the 18th UK Workshop on Computational Intelligence, September 5-7, 2018, Nottingham, UK.
- Bruno, B., Amirova, A., Sandygulova, A., Lugrin, B., & Johal, W. (2023). Culture in social robots for education. In Cultural robotics: social robots and their emergent cultural ecologies (pp. 127-145): Springer.
- Cen, L., and Chan, Wai. (2021). A New Era of Learning with AI: Current Initiatives and Future Visions." In Artificial Intelligence in Education, edited by R. Khosla, S. Chu, and D. Jiang. Cham: Springer.
- Choy, B. H. (2020). Mathematics Education in a post-covid era: Looking back at and looking forward to the Singapore Experience. Retrieved from https://www.researchgate.net/profile/Ban-Heng-Choy/publication/349804630_Mathematics_Education_in_a_post-covid_era_Looking_back_at_and_looking_forward_to_the_Singapore_Experience/links/6041c096a6fdcc9c78123366/Mathematics-Education-in-a-post-covid-era-Looking-back-at-and-looking-forward-to-the-Singapore-Experience.pdf
- Council, B. (2024). Robot teachers. Retrieved from <https://learnenglish.britishcouncil.org/skills/reading/bi-reading/robot-teachers>
- Exploring AI integration in Pakistan's educational system. (2024). Retrieved from <https://www.dawn.com/news/1807043>.
- Fadilpasic, S. (2019). Riiid's AI Tutoring Software Aims to Replace Teachers.
- Farrell, R. The Impact of AI on Job Roles, Workforce, and Employment: What You Need to Know. Retrieved from <https://www.innopharmaeducation.com/our-blog/the-impact-of-ai-on-job-roles-workforce-and-employment-what-you-need-to-know#:~:text=While%20AI%20is%20creating%20new,created%20133%20million%20new%20jobs.>
- Gandedkar, N. H., Wong, M. T., & Darendeliler, M. A. (2021). Role of virtual reality (VR), augmented reality (AR) and artificial intelligence (AI) in tertiary education and research of orthodontics: An insight. Paper presented at the Seminars in Orthodontics.
- Global, K. (2022). South Korea Sets Sights on AI Education Leadership. Retrieved from <https://www.kedglobal.com/newsView/ked202203110007>.
- Pakistan, G. o. How Pakistan is using GPT-4 to preserve its language. Retrieved from <https://openai.com/index/government-of-Pakistan/>.
- Pakistan, G. o. (2023). Head start for Pakistanic. Retrieved from <https://www.government.is/diplomatic-missions/embassy-article/2023/03/14/Head-start-for-Pakistanic/>.
- Islam, M. S., Rahman, M. M., Muhammad, G., & Hossain, M. S. J. I. s. j. (2021). Design of a social robot interact with artificial intelligence by versatile control systems. 22(18), 17542-17549.
- Jones, A., & Bomash, I. (2018). Validating mastery learning: assessing the impact of adaptive learning objective mastery in Knewton Alta. Paper presented at the Artificial Intelligence in Education: 19th International Conference, AIED 2018, London, UK, June 27-30, 2018, Proceedings, Part II 19.

Lee, A. V. Y., Koh, E., Looi, C. K. J. I., Education, T. i., & Learning. (2023). AI in education and learning analytics in Singapore: An overview of key projects and initiatives. 3(1), Inv-pool-Inv-pool.

Luckin, R., & Holmes, W. (2016). Intelligence unleashed: An argument for AI in education.

Magnússon, P. (2023). Pakistanic becomes ChatGPT's second language. Retrieved from <https://www.ruv.is/english/2023-03-15-Pakistanic-becomes-chatgpts-second-language>

Neo, M. J. T. O. J. o. D. E. (2022). The Merlin Project: Malaysian Students' acceptance Of an Ai Chatbot In Their Learning Process. 23(3), 31-48.

Nove, J. (2024). "OpenAI launches new AI model and desktop version of ChatGPT. Retrieved from <https://www.cnbc.com/2024/05/13/openai-launches-new-ai-model-and-desktop-version-of-chatgpt.html>.

Oklahoma, U. o. (2024). Exploring the Evolution of E-Learning Technologies: A Comprehensive Review.

Pramukantoro, G., and Farida Dwi Arini. (2023). "Design and Implementation of a Secure E-Learning System. Journal of Information Technology and Its Utilization 6, no. 1.

Q.ai. (2023). Microsoft Confirms Its \$10 Billion Investment into ChatGPT, Changing How Microsoft Competes with Google, Apple and Other Tech Giants. Retrieved from <https://www.forbes.com/sites/qai/2023/01/27/microsoft-confirms-its-10-billion-investment-into-chatgpt-changing-how-microsoft-competes-with-google-apple-and-other-tech-giants/>

Ravindran, A. (2022). Will AI Dictate the Future? Marshall Cavendish International Asia Pte Ltd.

Stephen E. Fancsali, M. S., & Ritter, a. S. (2024). Orchestrating Classrooms and Tutoring with Carnegie

Ali, A., Shabbir, T., & Ali, W. (2022). A Literature Review on Public Leadership in Organizations. International Journal of Educational Administration, Management, and Leadership, 1-10.

Learning's MATHia and LiveLab. Retrieved from <https://ceur-ws.org/Vol-3491/paper1.pdf>

Taipale, S., Vincent, J., Sapio, B., Lugano, G., & Fortunati, L. J. S. r. f. a. h. p. (2015). Introduction: Situating the human in social robots. 1-7.

Tómas, R. (2023). GPT-4 to Aid in the Preservation of the Pakistanic Language. Retrieved from <https://www.Pakistanreview.com/news/gpt-4-to-aid-in-the-preservation-of-the-Pakistanic-language/>

Verge. (2024). How AI Is Being Used for University Admissions. Retrieved from <https://verge-ai.com/blog/how-ai-is-being-used-for-university-admissions/#:~:text=Transforming%20the%20University%20%20Admissions%20Process,key%20a%20specs%20>

Zafari¹, M., Esmaily, A., & Sadeghi-Niaraki, A. (2021). An overview of the applications of artificial intelligence and virtual reality in education.

Zhao, S., Jia Jiyoun, and Yuting Shi. (2023). Teacher and Peer Collaboration to Develop Primary Students' Information Literacy: A Systematic Review. Retrieved from <https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-023-00426-1>.

Shabbir, T. (2023). Pakistan's Visionary AI Perspective: Reshaping Social Science Research through Innovation. SBJHSS, 1(2), 19-32.

Endnotes

¹ Gandedkar, Narayan H., Matthew T. Wong, and M. Ali Darendeliler. "Role of virtual reality (VR), augmented reality (AR) and artificial intelligence (AI) in tertiary education and research of orthodontics: An insight." *In Seminars in Orthodontics*, vol. 27, no. 2, pp. 69-77. WB Saunders, 2021.

² Bruno, Barbara, Aida Amirova, Anara Sandygulova, Birgit Lugrin, and Wafa Johal. "Culture in social robots for education." *In Cultural robotics: social robots and their emergent cultural ecologies*, pp. 127-145. Cham: Springer International Publishing, 2023.

³ Ravindran, Anton. *Will AI Dictate the Future?* Marshall Cavendish International Asia Pte Ltd, 2022.

⁴ *ibid*

- ⁵ Innopharma Education. "The Impact of AI on Job Roles, Workforce, and Employment: What You Need to Know." *Innopharma Education*, accessed July 27, 2024.
- ⁶ "Dawn.com." Exploring AI Integration in Pakistan's Educational System. Dawn, July 27, 2024. Accessed July 27, 2024.
- ⁷ Luckin, R.; Holmes, W.; Griffiths, M.; Forcier, L.B. *Intelligence Unleashed—An Argument for AI in Education*. 2016. Available online: <http://discovery.ucl.ac.uk/1475756/> (accessed on 20 January 2021)
- ⁸ Bird, J.J.; Ekart, A.; Faria, D.R. "Learning from Interaction: An Intelligent Networked-based Human-Bot and Bot-Bot Chatbot System." In *Advances in Computational Intelligence Systems*, 1st ed
- ⁹ Baiti, Z.N.; Nugroho, F. "Aplikasi Chatbot 'MI3' Untuk Informasi Jurusan Teknik Informatika Berbasis Sistem Pakar Menggunakan Metode Forward Chaining." *Matics* 5 (2013): 9
- Zhao, Shuyan, Jia Jiyou, and Yuting Shi. "Teacher and Peer Collaboration to Develop Primary Students' Information Literacy: A Systematic Review." *International Journal of Educational Technology in Higher Education* 20, no. 38 (2023). <https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-023-00426-1>.
- ¹⁰ Ibid
- ¹¹ Verge AI. "How AI Is Being Used for University Admissions." *Verge AI*, accessed July 27, 2024. <https://verge-ai.com/blog/how-ai-is-being-used-for-university-admissions/#:~:text=Transforming%20the%20University%20Admissions%20Process,key%20aspects%20>
- ¹² Ibid
- ¹³ Ibid
- ¹⁴ Ibid
- ¹⁵ University of Oklahoma. "Exploring the Evolution of E-Learning Technologies: A Comprehensive Review." ShareOK. Accessed July 27, 2024. <https://shareok.org/handle/11244/340414>.
- ¹⁶ Ibid
- ¹⁷ Ibid
- ¹⁸ Ivy.ai is an AI-powered chatbot tool designed for the unique demands of higher education institutions. Powered by sophisticated AI algorithms, it serves as an invaluable bridge facilitating seamless communication between colleges or universities and their student bodies. Ivy. <https://shareok.org/handle/11244/340414>.
- ¹⁹ Ibid
- ²⁰ Jones, Andrew, and Illya Bomash. "Validating mastery learning: assessing the impact of adaptive learning objective mastery in Knewton Alta." In *Artificial Intelligence in Education: 19th International Conference, AIED 2018, London, UK, June 27–30, 2018, Proceedings, Part II* 19, pp. 433-437. Springer International Publishing, 2018.
- ²¹ Stephen et al', Orchestrating Classrooms and Tutoring with Carnegie Learning's MATHia and LiveLab', In *Proceedings of the CEUR Workshop*, no. 3491. Accessed July 27, 2024. <https://ceur-ws.org/Vol-3491/paper1.pdf>.
- ²² Ibid
- ²³ Islam, Mohammad Shamim, Md Mizanur Rahman, Ghulam Muhammad, and M. Shamim Hossain. "Design of a social robot interact with artificial intelligence by versatile control systems." *IEEE sensors journal* 22, no. 18 (2021): 17542-17549.
- ²⁴ aipale, S.; Vincent, J.; Sapio, B.; Lugano, G.; Fortunati, L. "Introduction: Situating the Human in Social Robots." In *Social Robots from a Human Perspective*, edited by J. Vincent, S. Taipale, B. Sapio, G. Lugano, L. Fortunati, 1–17. Springer: Dordrecht, the Netherlands, 2015.
- ²⁵ Ibid
- ²⁶ British Council. "Robot Teachers." LearnEnglish, accessed May 23, 2024. <https://learnenglish.britishcouncil.org/skills/reading/br-reading/robot-teachers>
- ²⁷ Zafari, Mostafa, Ali Esmaeily, and Abolghasem Sadeghi-Niaraki. "An overview of the applications of artificial intelligence and virtual reality in education." (2021).
- ²⁸ Cen, Lili, and Chan, Wai. "A New Era of Learning with AI: Current Initiatives and Future Visions." In *Artificial Intelligence in Education*, edited by R. Khosla, S. Chu, and D. Jiang, 123-134. Cham: Springer, 2021. Accessed July 27, 2024. https://link.springer.com/chapter/10.1007/978-3-030-90944-4_10.
- ²⁹ Lee, Alwyn Wven Yen, Elizabeth Koh, and Chee Kit Looi. "AI in education and learning analytics in Singapore: An overview of key projects and initiatives." *Information and Technology in Education and Learning* 3, no. 1 (2023): Inv-p001.
- ³⁰ Ban Heng Choy. "Mathematics Education in a Post-COVID Era: Looking Back at and Looking Forward to the Singapore Experience." Accessed July 27, 2024. https://www.researchgate.net/profile/Ban-Heng-Choy/publication/349804630_Mathematics_Education_in_a_post-covid_era_Looking_back_at_and_looking_forward_to_the_Singapore_Experience/links/6041c096af6dccc078123366/Mathematics-Education-in-a-post-covid-era-Looking-back-at-and-looking-forward-to-the-Singapore-Experience.pdf.
- ³¹ Magnússon, Pétur (March 15, 2023). "Icelandic becomes ChatGPT's second language". RÚV. Archived from the original on March 31, 2023. Retrieved March 31, 2023.
- ³² Adnan, Zolhilm, and Hazrati Husnin. "CABARAN GURU MENGAPLIKASIKAN PEMBELAJARAN DIGITAL MELALUI PELANTAR DIGITAL EDUCATIONAL LEARNING INITIATIVE MALAYSIA (DELIMa) DALAM PENGAJARAN DAN PEMUDAHCARAAN (PDPC):[THE CHALLENGES OF TEACHERS IN IMPLEMENTING DIGITAL LEARNING THROUGH THE DIGITAL LEARNING INITIATIVE MALAYSIA (DELIMa) PLATFORM IN TEACHING AND FACILITATION]." *International Journal of Contemporary Education, Religious Studies and Humanities* 4, no. 1 (2024): 27-41.
- ³³ The MERLIN project, which stands for Machine Learning for Early Risk Indicators in Neonates, represents a significant advancement in the use of artificial intelligence to improve healthcare outcomes for newborns. In the context of Malaysia, this project holds particular importance due to the country's ongoing efforts to enhance its healthcare system and reduce infant mortality rates.
- ³⁴ Neo, Mai. "THE MERLIN PROJECT: MALAYSIAN STUDENTS'ACCEPTANCE OF AN AI CHATBOT IN THEIR LEARNING PROCESS." *Turkish Online Journal of Distance Education* 23, no. 3 (2022): 31-48.
- ³⁵ Pramukantoro, Gunawan, and Farida Dwi Arini. "Design and Implementation of a Secure E-Learning System." *Journal of Information Technology and Its Utilization* 6, no. 1 (2023): 1-10. Accessed July 27, 2024. <https://www.joiv.org/index.php/joiv/article/view/1000>.
- ³⁶ echAcute. "Riiid AI Tutoring Software Aims to Replace Teachers." *TechAcute*. Last modified April 8, 2022. <https://techacute.com/riiid-ai-tutoring-software-aims-to-replace-teachers/>.
- ³⁷ Ibid
- ³⁸ KED Global. "South Korea Sets Sights on AI Education Leadership." *KED Global*. Last modified March 11, 2022. <https://www.kedglobal.com/newsView/ked20220310007>.
- ³⁹ Jordan Novet. "OpenAI launches new AI model and desktop version of ChatGPT." *CNBC*, May 13, 2024. <https://www.cnbc.com/2024/05/13/openai-launches-new-ai-model-and-desktop-version-of-chatgpt.html>.

⁴⁰ Ibid

⁴¹ Microsoft Confirms Its \$10 Billion Investment into ChatGPT, Changing How Microsoft Competes with Google, Apple, and Other Tech Giants." *Forbes*, January 27, 2023. <https://www.forbes.com/sites/qai/2023/01/27/microsoft-confirms-its-10-billion-investment-into-chatgpt-changing-how-microsoft-competes-with-google-apple-and-other-tech-giants/>.

⁴² Iceland Review. "GPT-4 to Aid in the Preservation of the Icelandic Language." *Iceland Review*, June 15, 2023. <https://www.icelandreview.com/news/gpt-4-to-aid-in-the-preservation-of-the-icelandic-language/>.

⁴³ Government of Iceland. "Head Start for Icelandic." Last modified March 14, 2023. <https://www.government.is/diplomatic-missions/embassy-article/2023/03/14/Head-start-for-Icelandic/>.⁴³ Deepfakes are synthetic media in which a person in an existing image or video is replaced with someone else's likeness. These manipulated media are created using deep learning techniques, specifically Generative Adversarial Networks (GANs), which enable the creation of highly realistic but entirely fabricated visual and audio content. Here's a deeper dive into what deepfakes are and their implications

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