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Artificial intelligence as a virtual language teacher

Abstract

This study explores the role of artificial intelligence (AI) as a virtual language teacher, highlighting its capabilities and applications in education. AI is defined as the ability of machines to acquire and apply knowledge to perform cognitive tasks, such as processing language, learning, and decision-making. The paper examines various AI technologies, including chatbots and natural language processing, that enhance language learning through personalised and interactive methods. Emphasising the effectiveness of AI in providing real-time feedback, adapting to individual learning paces, and offering customised learning experiences, the study concludes that AI-based tools significantly improve language learning efficiency and accessibility. Additionally, the integration of AI in language education can reduce language barriers, offering learners access to diverse linguistic resources and real-time pronunciation correction, ultimately fostering a more inclusive and effective learning environment.

Keywords: artificial intelligence (AI), language learning, Natural Language Processing (NLP), chatbots, personalised learning, interactive education

I. What is artificial intelligence? (Introduction)

Without claiming completeness, some of the definitions of artificial intelligence that I consider to be the most pragmatic are:

OECD1 (2016) and UNCTAD2 (2017) define artificial intelligence (World Investment Report 2016 – Investor nationality: policy challenges UNCTAD (2017). World Investment Report)[1] as the ability of machines and systems to acquire and apply knowledge to carry out intelligent behavior. This means performing a broad variety of cognitive tasks, e.g. sensing, processing oral language, reasoning, learning, making decisions, and demonstrating an ability to move and manipulate objects accordingly. Intelligent systems use

[1] World Investment Report 2016: Investor Nationality: Policy Challenges, UNCTAD 2017 (2017, June 2). *Transnational Corporations*, 23(3), 67–101. https://doi.org/10.18356/44d1623d-en see in Going Digital: Making the Transformation Work for Growth and Well-being, Meeting of the OECD Council at Ministerial Level Paris, 7-8 June 2017. https://www.oecd.org/mcm/documents/C-MIN-2017-4%20EN.pdf

a combination of big data analytics, cloud computing, machine-to-machine communication, and the Internet of Things (IoT)[2] to operate and learn.

In the Turing test definition, artificial intelligence is the ability of a machine to communicate (via electronic output devices) with a human without the fact that the interaction is not with a real human being detected, and the substantive decision-making aspect is binary based. Marvin Minsky, a pioneering figure in artificial intelligence, defined the technology as enabling machines to perform activities that require human intelligence. At the core of artificial intelligence are the research theories, methodologies, and applications by which human intelligence can be simulated, extended, and extended (Jiang 2022: 13).[3]

AI system) means software that is developed with one or more of the techniques and approaches listed in Annex I and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions.[4]

In summary, modern artificial intelligence (AI) is a system that can sense its environment, take action to maximize the chances of achieving its goals, and interpret and analyze data in a way that it can learn from and adapt to, i.e., improve itself.

One area of investigation of the impact of AI-based applications on human life is the role of AI in education, e.g., using OpenAI ChatGPT-4, human-AI collaboration, and personalized methods of AI teaching. In the following, I would like to share my personal experience with Reader T on how AI can be used in language teaching and learning. I tested software that promised unique results in English learning. The author of this paper has no educational background but has 24 years of higher education experience as a lawyer, so the primary aim of the paper is not a linguistic analysis but to explore the teaching methods provided by AI.

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[2] The Internet of Things is a concept, a general idea, that describes how distinctive electronic devices in our environment can sense signals in the environment, collect data, and then share these sensations with other devices, connecting them to a network.

[3] Jiang, R. (2022, November 16). How does artificial intelligence empower EFL teaching and learning nowadays? A review of artificial intelligence in the EFL context. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.1049401

[4] Proposal for a regulation of the European Parliament and of the Council laying down harmonized rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain EU legislative acts Brussels, 21.4.2021 COM (2021) 206 final, 2021/0106 (COD), Article 3, definitions, point 1.

II. Types, tools, and applications of AI

There are purely software-based AI systems that operate exclusively in the virtual world (e.g. voice assistants, image analysis software, search engines, speech, and face recognition systems) or AI can be embedded in hardware (robots, self-driving vehicles, drones), internet applications, algorithms, and chatbots.

In the case of artificial intelligence, we talk about weak or strong systems. Weak or Narrow AI is AI created to solve a problem and focus on a single task, such as AlphaGo, Alexa, or Siri. AlphaGo is great in the one game it was designed for, but not good in others. Strong AI is not known to exist now. This would describe a self-aware AI with its own emotions. Ray Kurzweil predicts a date of 2045 for the emergence of a robot as intelligent as a human. This point is called the singularity. (Keserű 2000: 43).[5] At present, AI development is mostly focused on a few specific areas and techniques, which may include large-scale Machine Learning, Deep Learning, Natural Language Processing (NLP)[l];[6] computer vision (image analysis), algorithmic game theory, economic and social computing dimensions of AI, and systems for automated robotic processes.[7]

Currently, AI is being applied with extraordinary efficiency in the following areas:

1. Data analysis and data mining: AI enables companies and researchers to extract valuable information (patterns) from large data sets. It is widely used in marketing, customer relations, and market research.
2. Automation: the use of AI enables the automation of monotonous, repetitive tasks, increasing efficiency and reducing the chance of human error. Both industrial robots and administrative utilities use this technology.
3. Speech recognition and language processing. This technology is essential for the operation of virtual assistants and chatbots.

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[5] Keserű (2000). A 21. századi technológiai változások hatása a jogalkotásra. Dialóg Campus.

[6] The meeting of artificial intelligence and linguistics is the understanding of language by computer methods, which can then be used in a variety of ways, such as as a basis for content analysis, text tagging, sentiment analysis, or automatic machine translation.

[7] Some specific areas in which AI already shows a unique technological development are, e.g., https://leonardo.ai/, https://magicai.hu/, https://chat.openai.com/, https://www.suno.ai/, https://www.heygen.com/, and https://www.brandcrowd.com/ai-logo-generator.

4. Image processing and vision technology: using AI, machines can interpret images and videos, revolutionizing facial recognition, medical diagnostics, and security systems.
5. Personalized recommendations: The AI, with the help of online stores and streaming services, can better understand the tastes and preferences of users, so they can provide more accurate recommendations.
6. Autonomous vehicles: AI is key to the development of self-driving cars, drones, and other autonomous vehicles that can navigate and make decisions on their own.
7. Robotics: AI helps robots become more intelligent and adaptive, enabling them to perform more complex tasks in industry and everyday life.
8. Health diagnostics and treatment: AI revolutionizes medical diagnostics and treatment, helping to detect diseases early and develop more effective therapies.
9. Financial analysis and risk management: AI's application in the financial sector helps in analyzing market trends, reducing risks, and developing automated trading strategies.
10. Smart homes and cities: AI helps increase energy efficiency and better manage city infrastructure through smart home devices and city services.
11. Games and simulation: AI is playing an increasingly important role in the development of video games and virtual reality applications, providing more realistic and interactive experiences.
12. Security and surveillance: AI can help security systems be more efficient and intelligent through facial recognition and automatic detection of suspicious activities.
13. Scientific research: AI contributes to scientific research by helping to analyze data, make discoveries, and speed up the research process.
14. Education: With AI, teaching materials and learning methods can be customized, increasing the efficiency and availability of education.
15. Art and Creativity: AI opens new dimensions in art and creativity, enabling machine-generated music, graphics, and other artistic creations.

III. A brief history of AI

The history of AI began in the 1940s when the "thinking" of machines first started to be addressed. In the 1950s, Alan Turing, a British mathematician and

codebreaker (he developed a computer to decipher codes used by the Germans during the Second World War), formulated the so-called Turing test, a method to determine whether a machine could imitate human intelligence. The next big step was the Dartmouth Conference (1956), which is considered the birth of AI as a formal scientific field, as it was here that the term "artificial intelligence" was first used. The 1980s marked another milestone for AI research, a period of AI revival when expert systems gained considerable popularity in corporate decision-making processes. The development of microprocessors (Furber, n.d.)[8] accelerated, increasing the speed of computation, which in turn enabled the modeling of neural networks. In the 1990s, the US government made the Internet available to the private sector, which contributed significantly to boosting innovation and globalization. In 1997, IBM's Deep Blue computer defeated Garry Kasparov, the world chess champion, marking a major milestone in the development of AI. In the early 2000s, AI research focused mainly on machine learning, speech recognition, and image processing. In 2006, Geoffrey Hinton, one of the pioneers of deep learning, introduced the use of deep neural networks, which revolutionized machine learning and opened new possibilities for AI. In the 2010s, deep learning and working with big data gained further momentum. In 2011, IBM's Watson AI system won the quiz game Jeopardy! marking another milestone in the development of AI, particularly in the areas of natural language processing and machine learning. In 2012, the Google Brain project, which focused on deep learning, showed significant progress in image recognition, demonstrating that neural networks can process and interpret visual information in a similar way to the human brain. AI has become indispensable in a growing number of industries, significantly impacting the economy, education, healthcare, and everyday life (Keserű 2000:40-2).[9]

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[8] "The microprocessor – the central processing unit of a computer integrated on a single microchip – dominates computing at every scale, from the smallest consumer devices to the largest supercomputers. A computer needs memory to store programs and data, a processor to execute those programs using the data, and I/O (input/output) capabilities to interface with the outside world. The intensive action occurs inside the processor, and the microprocessor integrates all processing functions on a single microchip. The introduction of the microprocessor represented a breakthrough in the size and cost of computer systems and was one of the advances that led to the personal computer (PC) revolution and then to the revolution in mobile devices. The next revolution in computing, in which the microprocessor will play a central role, is the IoT – the Internet of Things." In Furber. (n.d.). Microprocessors are engines of the digital age. https://Www.Ncbi.Nlm.Nih.Gov/Pmc/Articles/PMC5378251.

[9] Keserű (2000). *A 21. századi technológiai változások hatása a jogalkotásra*. Dialóg Campus.

There are many ways of developing AI and all of them are being used simultaneously. One is good programming and data, and the other is collecting behaviors, so the machine must be used. The way I'm developing a self-driving car is to program it and run it on a test track, and the third way is to send it out on the road; it will do 200,000 kilometers, and that's how it will be smart. The development of AI will reach a stage where it can be made available to the public in an open test drive in November 2022.

ChatGPT, developed using OpenAI in language learning, is the best-known and most widely used AI technology today. Behind it is a large neural network that behaves like the human brain. In the early 2000s, the field of chatbots and natural language processing (NLP) was still in its infancy. The first chatbots were simple, rule-based systems that responded to user input with limited responses. Between 2006 and 2010, machine learning, in particular deep learning, started to become increasingly important in language processing. NLP research is increasingly focused on understanding context and creating a natural conversation flow. In the coming years, we can expect to see even more advancements in NLP technology as researchers continue to push the boundaries of what is possible with machine learning. One area of interest is improving the ability of chatbots to understand and respond to human emotions, allowing for more personalized and engaging interactions. Another important aspect of NLP research is developing algorithms that can accurately detect and correct grammar and spelling mistakes in real time. Additionally, there is ongoing work on creating chatbots that can hold conversations across multiple languages, breaking down language barriers for users around the world. Finally, researchers are exploring how NLP technology can be applied in various industries, such as healthcare, customer service, and education, to improve efficiency and the user experience.

1. One area of NLP research focuses on sentiment analysis, which involves analyzing text to determine the emotions expressed by users. This can help businesses better understand customer feedback and tailor their responses accordingly.
2. Another interesting aspect of NLP is the development of virtual assistants like Siri or Alexa, which use natural language understanding to respond to user commands and queries more conversationally.
3. NLP algorithms that detect and correct grammar and spelling mistakes in real time are crucial for improving communication efficiency across various platforms, from social media to professional writing tools.
4. Multilingual chatbots are an exciting application of NLP technology, enabling seamless conversations between speakers of different languages and facilitating global communication.

5. The potential applications of NLP in industries such as healthcare, customer service, and education are vast, from improving patient-doctor interactions through voice recognition software to enhancing personalized learning experiences with intelligent tutoring systems.

In the mid-2010s, significant advances were made in machine learning and deep learning, which enabled chatbots to engage in more natural and lifelike conversations. In 2018, OpenAI introduced GPT-2, a much more advanced version of the earlier GPT model. GPT-2 could generate surprisingly coherent and relevant texts, marking a significant step forward in the evolution of language models. In 2020, OpenAI introduced GPT-3, which brought even further improvements in language modeling. GPT-3 has exceptional language capabilities, including the ability to generate conversations, essays, and technical texts. This model has greatly facilitated the development of chatbots, allowing them to engage in more natural, human-like dialogue. GPT and other similar technologies are evolving, gradually becoming embedded in everyday technologies and services, changing the way we interact with machines. (*Megjelent a ChatGPT-4*, 2023)[10] Chatbots powered by GPTs are also becoming more widespread and more effective at managing user needs. However, with GPTs, it is not possible to see what data they have been trained on, so it is difficult to know where the system can be used safely and to make improvements (*Nyíltról zárttá változik az OpenAI*, 2023).[11]

[10] The Microsoft-backed OpenAI research organization has released its latest large language model, GPT-4, which is the engine for Bing and many third-party applications. The new model can now respond to images, offer recipe suggestions from photos of ingredients, and write captions and descriptions. It can process up to 25,000 words instead of the previous 3,000, and OpenAI claims that GPT-4 is smarter and more intelligent than previous versions and other major language models. For now, GPT-4 is only available to those who pay $20 a month for ChatGPT Plus, OpenAI's subscription service launched in February. However, there is a cap of 100 messages per four hours. The premium package includes access to the chatbot under heavy load, as well as faster response speeds and priority access to new features. But there's a way to get access to the tool for free: at the same time as unveiling the new bot, Microsoft revealed that Bing AI has been running on GPT-4 all along. To use the company's chatbot, you need to subscribe to a queue. The "traditional" ChatGPT remains free to use on the OpenAI site. Several companies have already announced that they will use GPT-4 for their products, including language app Duolingo, payment provider Stripe, and education portal Khan Academy. Additional tools based on GPT-4 may be developed as it makes its toolkit available to developers in the form of an OpenAI API." In *Megjelent a ChatGPT-4* (2023, March 16). https://hirlevel.egov.hu/2023/03/20/megjelent-a-chatgpt-4/.

[11] *Nyíltról zárttá változik az OpenAI*. (2023, March 20). https://hirlevel.egov.hu/2023/03/20/nyiltrol-zartta-valtozik-az-openai/.

IV. Artificial intelligence technology tools for language learning

AI-based technologies are very powerful tools that can help overcome language learning difficulties and maintain appropriate motivation, both on the part of teachers and students. Machine learning (ML) allows programs to model language contexts to help learners understand context-specific language use. Natural language processing (NLP) allows programs to interpret and process natural language input. Chatbots model real-time conversations that help learners get personalized language practice. Interactive applications play a teaching role in language development. These adaptive learning systems offer learners customized learning strategies, considering individual abilities and strengths. AI can therefore improve language learning in several ways:

1) It provides grammar analysis, which allows learners to practice grammatical structures, e.g. Grammarly quickly identifies and corrects spelling, grammatical, stylistic, and syntactic errors and suggests improvements in sentence structure and style; improving word usage, style, and paraphrasing are also strengths of Chat GPT, Gemini, Quill Bot, and Trinka.
2) Thanks to speech recognition technology, learners can practice pronunciation and improve their speech understanding, e.g., Google Speech Text can detect and correct pronunciation errors; Microsoft Azure Speech Service, Amazon Alexa, Apple Siri, and Google Speech Recognition & Synthesis not only need to identify pronunciation errors but also check intonation and intonation, in addition to providing real-time feedback to learners. Adaptive learning systems provide a personalized learning experience, considering the individual needs and abilities of learners, e.g., Duolingo is one such application that uses AI to teach using personalized content and tracks learners' progress, allowing them to progress at their own pace. Quazel, an application being developed at the Technical University of Zurich, teaches students in 21 languages. Rosetta Stone: Rosetta Stone is another language-learning app that uses artificial intelligence to support language learning.
3) Gamification is a way of using gamified learning methods to motivate learners in language learning, e.g., Babbel, which allows learners to learn new vocabulary and grammatical structures in an interactive environment, but also Quizizz, Conker, Quizlet, Twee, Chat GPT, Gemini, and Course Factory, which are apps developed to produce interactive quizzes and learning materials.

AI as a personalized language mentor

The 7-week online courses are traditionally divided into 4 levels: beginner, basic, intermediate, and advanced. The skill-building tools, adapted to the different levels, are the vocabulary wizard, grammar wizard, pronunciation builder, writing exercises, speech builder, and situational sentence builder. There is a separate training package for travelers (beginner traveler, basic traveler, intermediate traveler) and workers (e.g., waiter, hairdresser, etc.), and a separate training package for speaking comprehension and grammar rules. The online English teaching method I have tested uses traditional tools (e.g., a book, a workbook, a teacher's video, an English-Hungarian dictionary, etc.) with traditional methods (e.g., the actual grammar video lesson with the teacher's explanation in about 10 minutes; the grammar lesson in a situational exercise in English and Hungarian; dialogues in the form of an audiobook in English; practice of words and phrases with British female or male voice selection; quizzes, e.g., what is the Hungarian equivalent of an English sentence?, inserting words in sentences, choosing grammatical structures in sentences, etc.) but also revolutionizes language learning by introducing new methods (e.g., the app allows you to practice texts, record pronunciation, and listen back later; you can also set the difficulty level of texts to 100 or 200 words). These newer methods are important because research now shows that we can remember about 20% of the material we hear for the first time, so it is essential that it can be replayed or listened to several times. On the other hand, the possibility of meeting more native English-speaking teachers is significant because accents will not be a particular difficulty in practice. Thirdly, stress-free learning is ensured by the fact that you can converse with the AI about the AI when you want to and at a level that suits you, eliminating the inhibition that speaking in front of others would create any complexity. Fourthly, by being able to listen back to or view the English spoken by the learner, he or she will have an objective view of his or her performance.

Research has also shown that the emotional world is of great importance in human education, and it is therefore more effective to learn the correct use of vocabulary and grammar through personal examples and individual situations. Therefore, it is very important to take emotional involvement into account in the learning process, i.e., memorize a text that makes the user really interested and emotionally involved in the thinking (personal example = emotional involvement = brain imprinting).

A personalized learning experience therefore means that the AI-English application adapts to the individual learning style, pace, and level, thus

ensuring a flexible, personalized learning experience while at the same time allowing for more effective and faster language learning. It achieves this through interactive and fun learning methods that help maintain motivation and make it easier to remember words and phrases you have already learned. Learning at home, available at any time, is based on personal examples and individual interests, ensuring motivation is always maintained. The AI explains the material and answers questions and quizzes. Tasks tailored to individual interests include, for example, writing about a specific topic. If I write the topic title twice in a row, it is worded slightly differently each time, which makes the task exciting and thus motivates me sufficiently.

By being able to generate personalized example sentences and phrases, the app helps you learn basic grammar rules and vocabulary and provides a well-practiced, solid foundation for future language use. AI can also help you develop your speaking skills by allowing you to listen to the correct pronunciation of sentences and words in the AI English app at any time and even download them for practice.

The AI application using ChatGPT 4.0 takes you from words to complex texts. To illustrate with an example: 1) Topic: Fruit 2) 10 different fruit names are shown in written and spoken English and Hungarian, showing pronunciation and spelling. 3) Writing sentences with the different fruit words (one-word easier and harder example sentences, choice of words) 4) Writing a one-word situation, if you specify the who, 100-word easier or 200-word harder version, which the listener can read out, record this for feedback and change the speed of the reading.

In the dialogue generator section, you just need to enter a word, and you're ready to chat in no time. The generated texts and dialogues can be saved and can also be made into an audio file with a single click, which can even be downloaded in MP3 format. In addition to practicing words, sentence formation, and pronunciation, it is also possible to practice writing emails and motivation letters, which is a great help in learning the formal form of written communication techniques.

It is also possible to join a Facebook group, which allows you to discuss difficulties, problems, and challenges with other students. The possibility of communicating with people at the same level of awareness (fellow learners) is a strong motivation. The Facebook group offers the possibility to ask questions, correct assignments, and consult teachers. In the case of technical problems, there is, of course, a dedicated help desk for students. I consider it a very innovative solution that on Mondays, Wednesdays, and Fridays, the student receives an email reminder about the last completed lesson and the next due lesson, encouraging him/her to attend regularly.

The MI effectively acts as a mentor, achieving rapid and spectacular success through personalized methods and the emotional impact on the individual. These applications allow learners to learn at their own pace (with sufficient time to complete the task), and with the help of AI, they receive immediate feedback on their progress and support in the language learning process. At the end of the task, the % pass rate is displayed, and if less than 80% pass rate is achieved, the task is restarted in the same task type. At the end of each block, a final test consisting of five different grammar exercises previously practiced is given. These are also varied tasks (e.g., putting a grammatical structure in place at the right time, clicking on words in the right grammatical order, choosing the right words for a sentence from a set of words, etc.). by allowing the user to choose to practice at an easier or more difficult level for most functions and to do so at his or her own pace, according to his or her individual schedule, easily integrating it into the daily language learning routine.

For me, the following tools were a significant innovation with AI technology compared to previous language learning methods:

Correcting mistakes: by correcting sentences immediately, the effectiveness of the learning process is increased, along with the learners' confidence, as they are immediately confronted with their progress.

CREATING CONVERSATIONS: With AI, you can even write complete conversations to improve your conversational skills (you have to specify who you're talking to and what the topic is and model it in 100 words easy or 200 words difficult).

TRANSLATE TO ENGLISH: AI-English translates perfectly from Hungarian to English and from English to Hungarian, simplifying the process of overcoming language barriers quickly and easily.

PRESENTATION OF SENTENCES: The app can present example sentences in any tense, both in question and declarative sentences, to help you practice more complex grammatical structures.

The app can GENERATE TEXTS on any topic, allowing you to acquire a wide range of vocabulary and knowledge in English while also helping you write a CV or a formal email.

EXAMPLES WITH CONTEXT WORDS: New words are easiest to learn through memorable examples. AI-English can be relied on to come up with some example sentences using the words you provide.

So, it doesn't matter whether the learner is a beginner, a newcomer, intermediate, or advanced, and it doesn't matter what book or methodology they use. AI-English is useful for anyone who wants to speed up and enjoy

their learning or keep their English up to date. AI-Angel is available for iOS and Android devices and can also be used in a computer or laptop browser within the app. So, you can use it virtually anywhere; all you need is internet access.

VI. Summary

AI is transforming our lives, promising to bring productivity gains, efficiency, and lower costs, contribute to better lives, and help people make better predictions and more informed decisions. Given the speed of development and the wide range of applications, research requires an interdisciplinary approach involving a wide range of societal actors (users, developers).

Artificial intelligence is a highly creative new technology capable of summarizing a wealth of databases, which could be defined as the "problem solver of the future": it can extract patterns and rules from data and interpret them autonomously. Artificial intelligence is a combination of different algorithm-driven methods and techniques, ultimately leading to systems that can change (learn through data analysis, make decisions), thereby solving more complex problems (hence the term intelligent) and communicating in a way that is deceptively like human communication. It can optimize the learning experience by accessing data and mentoring students. The use of AI-based technologies in language learning opens new possibilities to overcome language learning challenges. Language learning difficulties include difficulties in maintaining motivation, slow acquisition of basic grammar rules, challenges in correct pronunciation and fluency, often a lack of time and energy to learn, and difficulty in finding learning materials and tasks that fit different needs.

Artificial intelligence can be used effectively in language learning because:

1. "It allows for personalized instruction (e.g., learners are given vocabulary that matches their current abilities and helps them to develop).
2. It provides real-time feedback, allowing learners to receive immediate corrections and explanations of errors, leading to more effective learning.
3. A flexible learning environment. This means that learners can progress at their own pace, which enhances learning performance.
4. Interactive learning: AI technology enables interactive learning, where students actively participate in the learning process. This helps students better understand and remember information.

5. The types of language learning difficulties and the effective methods used to solve them can be transferred to practically any field of education" (Porkoláb & Fekete, 2023:67-80),[12] only the content of the curriculum changes, but the problems, solutions, and AI techniques can be applied in any field of education (Megjelent *a ChatGPT-4;* 2023)[13] as well, in my view.[14]

From the educational point of view, the advantages of AI are: that it can help to balance future- and skill mismatches; the educational software can map the learner's strengths and weaknesses, thus focusing on tasks that aim at improving the learner's weaknesses; AI and other technologies (e.g., neurotechnology) can improve physical and cognitive abilities, enabling people to work longer or live healthier lives; it allows educational aids to be tailored to the specific needs of users; Data analysis can be enhanced; a shorter time is needed to summarize larger amounts of data; Error-free processing can be expected in a given round. Automation increases: the more routine and "repetitive" a task, the more it can be performed by AI (e.g., translations); it can "work" 24/7; without rest time, the amount of human leisure time can increase; it can propose and implement innovations on its own.

This technology provides unlimited possibilities: own pace, own time, and own examples through endless practice. The pairing of traditional teaching methods and art

[12] Porkoláb, D., & Fekete, T. (2023, August 16). A mesterséges intelligencia alkalmazása a nyelvtanulásban. *Iskolakultúra*, 33(8), 67–80. https://doi.org/10.14232/iskkult.2023.8.67

[13] According to OpenAI, the system's progress is reflected in its performance in a total of 34 academic and professional exams. These include the Uniform Bar Exam, the LSAT, the SAT Math, and the SAT Evidence-Based Reading and Writing exams. On more than half of these tests, he scored significantly higher than in the past. The new system was trained on more data than its predecessor, but the organization did not say how much information was used. These training data components are called parameters and essentially indicate how good the model is at solving a problem, for example, generating text. In *Megjelent a ChatGPT-4* (2023, March 16). https://hirlevel.egov.hu/2023/03/20/megjelent-a-chatgpt-4/.

[14] Some specific areas in which AI has already shown unique technological maturity are: 1) design, outline, and structure writing: ChatGPT, Gemini, Gamma, Whimsical AI; 2) literature summarization with citations: Scite AI, Perplexity, Keymate AI, ResearchRabbit; 3) presentation creation: Gamma Slidesgo AI, Canva Magic Write; 4) image-based text generation, task generation: Gemini, ChatGPT; word usage, style correction, paraphrasing: ChatGPT, Gemini, Quillbot, Trinka; Summarizing, extracting, and compressing text: ChatPDF, Elicit, Semantic, Scholar, Gemini, ChatPDF, Generate text, data, image, and illustration: Adobe Firefly, Midjourney, Tengr. AI, DALL E; production of interactive quizzes, learning materials, and entire courses: Quizizz, Conker, Quizlet, Twee, ChatGPT, Gemini, CourseFactory. Károli Gáspár Református University, ICT Research Centre.ikt. kutatóközpont@kre.hu

1. Users can benefit from AI technology by having their specific needs met more effectively and efficiently, leading to a more personalized experience.
2. The enhanced data analysis capabilities of automation can help organizations make better-informed decisions based on large amounts of data.
3. With the ability to summarize larger amounts of data in a shorter time frame, businesses can quickly identify trends and patterns that may have otherwise gone unnoticed.
4. Automation can significantly reduce the occurrence of errors in processing tasks, leading to more accurate results and improved overall efficiency.
5. By delegating routine and repetitive tasks to AI, human workers are freed up to focus on more complex and creative projects, ultimately increasing productivity and fostering innovation within an organization.

Artificial intelligence is therefore capable of revolutionary breakthroughs, and not only in language learning. The personalized learning methodology of AI technology guarantees fast, interactive, motivating, and fun learning with unlimited practice opportunities in any subject. AI systems can monitor student progress and optimize learning content.

The other side of the coin should not be overlooked either, as the use of simple, fast, and, in most cases, now free applications reduce our thinking effort, e.g., increasingly sophisticated translation tools are available (e.g., DeepL). This technology puts other skills at the forefront, to which education must also respond (e.g., prompting). (Kömlődi 2022);[15] 'thinking' beyond human capacity, whose problems are not currently understood, can be out of human control. It can innovate on its own and lack emotional intelligence; it can make decisions emotionlessly and faster; it can cause and amplify discriminatory inferences depending on the data it teaches; the availability of the technology can create economic (competitive) and social divides;

[15] Prompts are the textual instructions or inputs given to the AI, based on which the AI generates text or images. In a few words or sentences, we describe what we want to see or read, and the system comes up with a solution. It is not easy to come up with the right instructions, so prompts are becoming an increasingly important element of human-machine interaction and may become the dominant user interface of the near future. In Kömlődi. (2022, October 24). A promptmérnök lesz a közeljövő egyik legfontosabb IT-állása? *Jelenből a Jövőbe*. Retrieved April 8, 2024, from https://hirlevel.egov.hu/2022/11/01/a-promptmernok-lesz-a-kozeljovo-egyik-legfontosabb-it-allasa-mi/.

privacy boundaries can become blurred; and from a privacy perspective, AI systems must be able to handle data effectively. Protecting students' data is of paramount importance, especially when the system collects and analyzes information on course preferences and student performance. (Zawacki-Richter et al. 2019: 39).[16]

The question arises as to whether these tools will be able to replace traditional teaching methods and teaching roles in the future or whether they can be "only" used as mentors. In my view, learning strategies should continue to be developed by teachers, highlighting the most relevant information and contexts within the given cultural and scientific context, but in many respects, teaching needs to change toward skill development.

In the broader spectrum of fields (e.g., law, economics, medicine, etc.) outside the rule systems that affect language learning, the so-called "white box" problem, i.e., the opacity of decisions made by AI, is one of the most problematic areas. This often makes it difficult for users to understand how AI systems arrive at a decision. Another challenge is that AI systems need to be scalable. Although AI-based programs can standardize learning materials, further development is needed to adapt to the individual needs and prior knowledge of learners (Hayashi 2019).[17]

I agree with Árpád Rab, senior researcher at the NKE Research Institute for Information Society, who says that "many students in higher education are already writing their theses with ChatGPT. Students are very fond of technological innovations; they think they're new to their teachers, so they will get away with them. I can try to guess what question the student has asked. I type it into the computer, and if it comes out the same, I can tell the student that, well, that was cheating. But in the end, we'll find ourselves fighting each other over digital devices instead of being able to have a lesson with the student. It is not to have a machine recognize text written by other machines, but maybe not to have to ask for forty-page theses. It might be enough to have five pages or even just an oral presentation that shows what the student's thoughts are. (*"A jövő munkája a jól kérdezés lesz"; https://*

[16] Zawacki-Richter, O. – Marín, V. I. – Bond, M. – Gouverneur, F. (2019, October 28). Systematic review of research on artificial intelligence applications in higher education: where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1). https://doi.org/10.1186/s41239-019-0171-0, http://iulresearch.iuline.it/index.php

[17] Hayashi, Y. (2019, April 16). The Right Direction Needed to Develop a white box Deep Learning in Radiology, Pathology, and Ophthalmology: A Short Review. *Frontiers in Robotics and AI*, *6*. https://doi.org/10.3389/frobt.2019.00024

hirlevel.egov.hu/2023/02/19/mesterseges-intelligencia-mi-a-jovo-munkaja-a-jol-kerdezes-lesz/, 2023).[18]

So, the solution:

1. Exploring the role of AI in personalized learning and how it can cater to individual student needs.
2. Discuss the potential challenges faced by educators when implementing AI tools in the classroom and ways to address them.
3. Analyzing how AI can assist in grading, feedback, and assessment processes to streamline workflow for teachers.
4. Examining how ChatGPT and similar technologies can promote creativity and critical thinking skills among students.
5. Investigating the cost-effectiveness of integrating AI technology into educational settings and its impact on resource allocation within schools.

The current artificial intelligence and innovations in its various applications (chatbots, text generators, and image generator applications), such as OpenAI ChatGPT-4, cloud computing, and self-driving cars, are all about the ontological foundations of our existence. The future Artificial General Intelligence (AGI) is an artificial intelligence system – not yet an existing technology, but already an outlined end goal – capable of performing the kind of intellectual tasks that animals or humans can perform. The cultural revolution brought about by artificial intelligence will continue to shape the way we live and work in the future. As we move towards AGI, the possibilities are endless in terms of the tasks and challenges it will be able to tackle. From healthcare to transportation, AGI has the potential to revolutionize every aspect of our society. It is both exciting and daunting to think about the impact that this technology will have on our daily lives. AI requires a new response, as the technological realization of AI with human-like capabilities is within reach. The question arises as to what strategies individuals and societies will and can use to deal with the complexity brought about by ICTs and adapt more successfully in the future. ("Kicsit félek tőle – Vallja a mesterséges intelligenciáról az OpenAI vezetője is;" 2023) ("ChatGPT: Inside the Latest Version with OpenAI CEO Sam Altman;" 2023).[19]

[18] *"A jövő munkája a jól kérdezés lesz"; https://hirlevel.egov.hu/2023/02/19/mesterseges-intelligencia-mi-a-jovo-munkaja-a-jol-kerdezes-lesz/.* (2023, February 2). https://hirlevel.egov.hu/2023/02/19/mesterseges-intelligencia-mi-a-jovo-munkaja-a-jol-kerdezes-lesz/.

[19] ChatGPT isn't perfect, but he still scored in the 90th percentile on the US bar exam, wrote a near-perfect SAT, the US equivalent of the math exam, and can now code in most programming languages. The latest program, GPT-4, is the first step on a long journey.

Further suggestions:

1. The potential benefits and risks of achieving AGI, such as increased efficiency in various industries or concerns about job displacement and ethical implications.
2. The role of government regulations and policies in overseeing the development and deployment of AGI to ensure safety, security, and ethical considerations is addressed.
3. The impact of AGI on different sectors, including healthcare, transportation, education, and entertainment, and how society can prepare for these changes.
4. The importance of fostering collaboration between AI researchers, policymakers, ethicists, and other stakeholders to address the challenges posed by AGI advancement.
5. The need for continued research into artificial general intelligence to better understand its capabilities and develop strategies to harness its potential while minimizing negative consequences.

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Artificial general intelligence is the company's long-term goal, which, once it crosses a threshold, will make it smarter than humans. It thinks differently than we do. It uses deductive reasoning instead of memory, which is partly the problem. "The models we create have to be thought of as an inferential system, not a factual database. They can function as a fact base, but that's not what's special about them – we want what they do to be closer to the ability to reason than to memorize," Altman said. Kicsit félek tőle – vallja a mesterséges intelligenciáról az OpenAI vezetője is (2023). *Info starts*. https://hirlevel.egov.hu/2023/03/20/kicsit-felek-tole-vallja-a-mesterseges-intelligenciarol-az-openai-vezetoje-is/; ChatGPT: Inside the latest version with OpenAI CEO Sam Altman (2023, March 17). *ABC News; YouTube*. https://hirlevel.egov.hu/2023/03/20/kicsit-felek-tole-vallja-a-mesterseges-intelligenciarol-az-openai-vezetoje-is/