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The impact and potential of artificial intelligence in language education

Abstract

Over the past decade, the education community, together with students, could not avoid taking advantage of the digital revolution and integrating different applications into the teaching and learning process. The research explored the potential of using AI-based applications in the teaching of humanities subjects. The focus was on teachers of Hungarian and foreign languages, whose attitudes and knowledge on the topic were measured through a random, anonymous questionnaire survey. The survey confirmed a low level of awareness among the teaching community, partly due to a higher proportion of digital immigrants. However, teachers are open to learning about AI and see positive benefits in using it. In line with previous assumptions, foreign language teachers have higher levels of awareness and are the main users of AI-based applications, while Hungarian language teachers are much less likely to use them. The survey also covered the use of chatbots, and the results showed that a high percentage of teachers recognize the tasks solved using ChatGPT.

Keywords: foreign language teachers, Hungarian language teachers, artificial intelligence, AI-based application, chatbot, education

Literature review

Artificial intelligence-based technologies have revolutionized language learning in recent decades (Hong 2023: 5). AI-based chatbots, for example, allow learners to learn anytime, anywhere. These chatbots can engage in interactive conversations with learners (Kuhail et al. 2023: 975), provide opportunities for vocabulary development, use language learning software, and practice the target language.

The use of AI-based technologies in language learning also opens new opportunities to overcome language learning challenges. (Porkoláb and Fekete 2023: 68) present several areas where AI can be effectively applied:

– Individualized instruction, which means that learners are provided with vocabulary that matches their current abilities and helps them to progress.
– Real-time feedback, which allows learners to receive immediate error correction and explanation, leading to more effective learning.

- Flexible learning environment, allowing learners to progress at their own pace, which enhances their academic performance. AI-based adaptive learning systems not only improve the language learning experience but also increase learners' motivation and confidence by adapting learning content and strategies to their abilities and development.
- Interactive learning opportunities, where students can actively participate in the learning process, helping them to better understand and remember information.
- Continuous improvement and change, ensuring that students are always working with the latest and best learning materials, as research results are constantly monitored and processed by artificial intelligence.

Duolingo, Rosetta Stone, and Babbel (Loewen et al. 2020: 209) are language learning platforms and applications that use artificial intelligence technology for language teaching. Duolingo offers free training for around 80 different language combinations. Its internal beta version was released in 2011, launched to the public in 2012, and had 10 million users by September 2013. The English course for Hungarian speakers became available in 2014. The Hungarian course for English speakers became available in 2016. Duolingo (Shortt et al. 2023: 4) offers a wide range of writing tasks and provides listening, comprehension and speaking practice. Acquired skills are presented in a playful way in the form of a tree that can be traversed, with a vocabulary feature to practice recently learned words.

Users are awarded "skill points" for language learning, for example for completing a lesson. A skill is considered mastered when the user has completed all the lessons associated with it.

The program relies heavily on data during the teaching process (Tiara et al. 2021: 4). It keeps track of which questions cause users more difficulty and what kind of mistakes they make. It then summarizes this data and learns from the observed patterns.

Experts at the Technical University of Zurich have developed an AI-based application called Quazel (Michot 2023: 13) to facilitate language learning. The AI recognizes the learner's level in each language and adapts the conversations, word usage, and sentence structures accordingly. Previous language learning apps were overwhelmingly based on written communication and exercises, but those that could communicate in live speech also worked with pre-set sentences. However, recent leaps and bounds in chatbot development have allowed language-teaching apps to undergo

a similar evolution. ChatGPT and AIs like it work with language models that an app can use to have a natural-sounding conversation with the learner.

The importance of using AI-based systems in education has been explored in several Hungarian and international research studies. (Tolner–Pogátsnik–Módné 2023) Research and Market, in an analysis of the US education sector, estimates that the use of artificial intelligence will increase by almost 50% between 2022–26 (Szabóné 2023: 52).

The researchers point out the fears and barriers to the spread of AI applications, not only in society in general but also from the perspective of educators, who are concerned about various changes in the workplace, the possible spread of false information, and the sovereignty of privacy (Rajki 2023: 13 or Arató and Balázs 2023). Also in this research, referring to the study by Jurafsky and Martin (2023), he describes the advantages and several applications for the humanities. In the humanities, it is the software supporting text comprehension and language processing that facilitates a simpler and more practical analysis of texts, by using algorithms to analyze the style, characteristics, structure, and various aspects of works. An example is HuSpaCy, a free analysis system in Hungarian, which can analyze existing documents both grammatically and semantically, thus helping users. Not only for teachers but also for researchers, the DeepL application can be used to translate texts written in ancient languages as well as in foreign languages. At the same time, spelling and stylistic accuracy are also important for English-language studies and teaching materials, and Grammarly is recommended to detect these errors. In addition to the above, Rajki's research (2023) also describes several chatbots and content-creation tools.

Looking to the future, considering the expectations of the labor market, Mező (2019) suggest a three-pronged approach to the application of artificial intelligence, the goal, the tool, and the impact. The goal is to learn about AI and to educate about it.

The tool, in each discipline, leads to forward-looking support by being effective for both educators and learners. Its impact on future generations is wide-ranging, with implications for linguistics, education, politics, economics, health, and other disciplines. From an educational perspective, its positive impact is that it can also optimize the work of teachers. AI can support students in non-formal and informal learning, it can be personalized, and it can help students with special needs to catch up.

Digital literacy, as it is called, is increasingly gaining ground, to preserve cultural and, in this context, linguistic heritage. The processing of digital documents and data, which has increased enormously, the exploration of

connections and the formulation of conclusions is beyond the capacity of the human brain to absorb and therefore requires the use of machine intelligence (Palkó 2022: 235). The appropriate archiving or creation of teaching materials requires the coordinated work of representatives of several disciplines, such as the humanities and computer science. The use of artificial intelligence and language processing applications opens the possibility of collecting and processing documents that are important for the transmission of cultural heritage and support education.

Code Poetry is almost the most recent and perhaps the most interesting of the AI applications. It is a work of art in which program codes are used for artistic purposes, i.e. poetry created using a computer programming language, and its popularization could therefore be a success for younger generations. (Mező 2023: 10) Writing a code poem requires both an interest in literature, humanities literacy, and a suitable IT background and proficiency in the relevant programming language. It has the advantage of providing an interactive experience but may be hampered by the fact that, due to the diversity of code languages, fewer people may be familiar with interpreting the poetry written in the code.

Methodology and sample

A random, non-limited questionnaire survey was conducted among teachers of Hungarian language and literature and teachers of foreign languages. A total of 67 questionnaire responses were received during the one-week data collection period in April 2024.

16% of the respondents were Baby Boomers and 57% were from Generation X. Generation Y accounted for a further 21%, while the remaining 4% came from Generation Z. The average age of the sample is 49.7 years. The modus of age is 54 years, while the median value is 50 years. The generational distribution of the respondents reflects the distribution of the Hungarian teacher population, the fact that the teaching population is ageing.

The gender distribution of respondents also reflects the well-known trend that education is a feminizing field. 91% of respondents are female and only 9% are male.

We asked teachers of Hungarian language and literature and teachers of foreign languages to fill in the questionnaire. 40% of the respondents teach English, 30% Hungarian language and literature and 22% German. The remaining 8% teach other languages.

The survey also considered the educational institution type in which the respondents teach (Table 1). Some respondents teach in more than one type

of school. Most respondents teach in technical education, but more than 22% of respondents teach in more than one type of educational institution.

Table 1. Distribution of sample by type of school

Type of school indicated	**Value**	**Distribution**
Primary School	13	19.40%
Primary School, High School	3	4.48%
Primary School, High School, Higher Education	1	1.49%
Primary School, High School, Technical School, Higher Education, Language School	1	1.49%
Primary School, High School, Technical School, Higher Education, Language School, Other	1	1.49%
Other	3	4.48%
Higher Education	6	8.96%
High school	7	10.45%
High School, Language School	1	1.49%
High School, Technical School	3	4.48%
Language School, Other	1	1.49%
Technical School	23	34.33%
Technical School, Other	2	2.99%
Technical School, Higher Education, Other	1	1.49%
Technical School, Language School	1	1.49%
Total	**67**	**100%**

As a last basic data to introduce the respondents to the survey, we measured the type of municipality where their educational institutions are located. The largest proportion (64%) work in a city with county status. A further 30% teach in smaller cities. 3% carry out their educational activity in a village. The remaining 3% indicated more than one type of municipality.

Results

In the first part of the questionnaire survey, we wanted to find out how well-informed teachers of foreign languages and Hungarian language are about AI-based applications, how open they are to using them in their teaching activities and to participating in training on them.

Overall, a quarter of the sample surveyed are not familiar with any AI applications at all, but just over half of the teachers do use them, with

0.03% using them in all lessons, but the majority using them with moderate regularity.

If we look at the results by generation in terms of the awareness and knowledge of applications among humanities teachers, the most striking finding from the sample is that there is no difference at all in the habits of Generation Z compared to Generations X and Y.

20% of Baby Boomers are familiar with more than one app, and almost half of the educators are also familiar with ChatGPT. The 16.4% of Baby Boomers who are the least likely to use it are the 16.4% who are the most averse to it, 27.3% who are users to some extent, but a larger proportion 64% would like to use it in their work, with the remaining proportion open to it. Only 10% of the Baby Boomers generation refuse to take part in training to help them use AI-based applications effectively, while the rest would like to join.

More than half of those completing the survey is Generation X. The smallest proportion, 16%, are not familiar with apps, but the largest, 47%, have listed more than one. In their case, 10% refuse to use it, 42% are undecided, but less than 1% are open to training, only 1 would not like it, 8% are undecided, but more than 90% would like to attend training on how to use AI effectively. 29% of Gen Y are not familiar with AI applications, while 21% are more. No one refused to use them, but 57% answered unequivocally yes and less than half were undecided. Of those open to education, under 10% were not definitely in favor. Generation Z represents the smallest sample in the survey, 25% do not use it, but the remaining 75% are familiar with or use several types of apps. However, 50%-50% are equally open or undecided about using AI-based software and participating in training to support it.

Looking at the same questions, there is a significant difference in the subjects taught, with most teachers in the sample who teach only foreign languages, i.e. 83%, being users, while only 38% of teachers who teach only Hungarian language and literature are open to training, but all of them.

Extending the study to school types, a third of primary school teachers do not use any AI application and are clearly open to training, while nearly 40% are undecided. Secondary school teachers show a more negative statistic, with 50% who are aware but none using an AI-based application and only 25 who are clearly positive about attending training, and the remaining 75% undecided. More familiar among technician trainers, 82% of respondents, however, do not typically use them, with only approximately 56%. These trainers are much more open to training, with 56% unequivocal, 41% undecided and 4% who reject it.

Most respondents to the survey, 54%, are familiar with the ChatGPT application, more specifically, in response to our questionnaire asking

respondents to list which AI-based application they are familiar with, one or more options were described by respondents, but this does not mean that they use it. In response to the free-word question, however, a quarter of respondents described not knowing or using this type of application at all or could not think of any.

Most of the AI-based applications mentioned, grouped by function, were software for language learning and translation software. These applications were mentioned by a low proportion, about one fifth of respondents. If we look at this question only for language teachers, the result increases by only 4-4%. Similarly, the proportion of teachers who are more broadly informed and who identified three or more AI-based applications is around 20%.

When looking at the responses of teachers of Hungarian, the results show a much lower level of awareness in this area. However, the applications listed by the more informed educators, a fifth of those surveyed, are diverse, with mentioning a total of 32 types of AI-based applications. In addition to player applications that can be used in class and help with learning, Quillbot and Grammarly were mentioned, which can be used for word processing and drafting. Tengr.ai, a graphics creator for editing images, and Pictory were also listed. Among the applications mentioned are several very effective tools that are useful in the humanities and in the education of students. Turboscribe turns video into text, SpeechTexter turns speech into written text.

Using Writetone, it is possible to write texts in different styles. Using the Masterdebate Communication app, it is possible to practice debating and argumentation.

In the questionnaire, the teachers were asked about the impact they think AI has had on the subjects they teach and on the use of language. The answers to both questions were very similar. The Likert 5-point scale was employed to evaluate the opinions. The extremes were very rarely used by respondents, i.e. in the question on how you feel the overall impact of AI on the subject you teach is, 1.49% of respondents gave a bad score and 4.48% gave a completely good score. The other question, how do you feel the overall impact of AI on students' language use, was answered with the same number of extremes. It is interesting to note that only Baby Boomers mentioned a negative impact, while Generation X and Y respondents gave a positive response. Interestingly, Generation Z respondents did not give either extreme answer. The number of respondents ticking 3 (medium value) was well above 50%. For the question on the impact of AI about own subject, 59.7% of respondents gave a score of 3. For the other question on the impact on the use of language, 61.19% of respondents gave a score of 3. For both

questions, more than half of the respondents chose a neutral 3. This shows that teachers perceive both positive and negative benefits of AI.

The surveyed teachers were asked about the positive and negative impact of AI on the subjects they teach. By giving a free-word response, they were given the opportunity to express their opinions accurately. In terms of positives (Fig. 1), a quarter of instructors had no experience, they do not know or do not see any positive impact. The majority, however, gave a wide range of responses on the benefits and aspects that they found useful. The responses show that most teachers see the support provided by AI as positive in many respects, with many more believing that it helps them to complete tasks, is effective and gives them new ideas, a sense of achievement and, in addition, it is enjoyable. AI also has a positive impact on students, it motivates them, makes the task interesting for them and improves their creativity.

Figure 1. Positive impact of AI.

The educators see as the negative effects (Fig. 2) is that students will be less motivated to think because of the rise of AI, and that they will not develop many skills such as creativity, critical thinking, and concentration. It will have a negative impact on their ability to understand texts and formulate texts, their perseverance will be reduced, and they will become self-disconnected. Homework and essays will not be their independent product and will therefore lose their relevance. Several commentators have also pointed out that assignments produced by AI-based applications should be treated with appropriate caution, as in many cases they may be wrong, inaccurate, or

misleading. Only one teacher commented that he did not see any negative impact. It is interesting that creativity was mentioned in both senses, with several respondents saying that it develops creativity and several respondents stating it as negative because the student is not thinking.

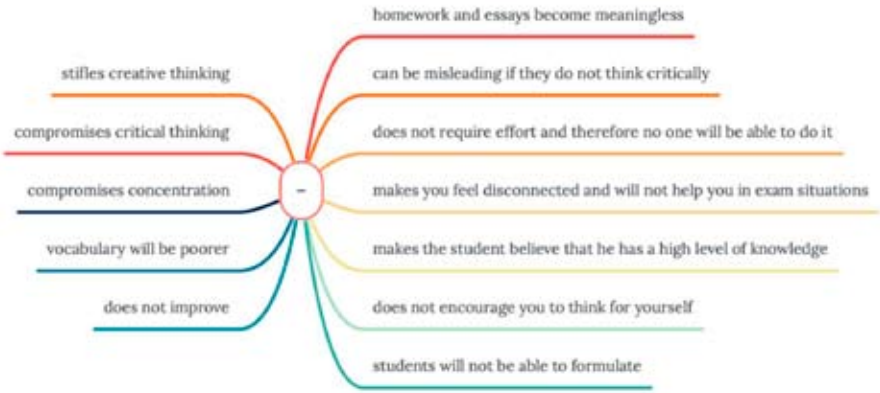

Figure 2. Negative effects of AI.

Respondents were also asked whether they recognize when their students use artificial intelligence to solve problems. If we look at the total population, 58.21% of respondents indicated that they do recognize when students use AI to solve problems. 13.43% indicated that they do not recognize it. While the remaining 28.36% indicated that they had not thought about it so far.

When looking at the responses by generation, it can be observed that no matter which generation the teacher or instructor belongs to, at least half of the respondents recognize the use of AI. The highest value was seen for Generation Y teachers, with a total of 64.29%. When we look at the responses of not recognizing it, we find that none of the Generation Z teachers chose this option. The Baby Boomers generation (18.18%) was the most likely to say they would not recognize it, while for generations X and Y this figure is below 15%. Those respondents who chose the option that they had not yet recognized the use of AI, Generation Z teachers stood out with the highest value of 50%. The responses of the other 3 generations surveyed ranged from 20% to 30%.

The next open question was to briefly summarize what they noticed when students used AI in their tasks if they answered yes. A total of 41 respondents provided an analyzable answer to this question. The responses received indicated that teachers were confident that they recognized the use of AI. More than 60% of the responses received noted the use of vocabulary and

grammatical structures that differed from the learners' level of knowledge. In over 55% of responses, the idea is that teachers know their own students' abilities, and if their answers are significantly different, they assume they are using some kind of artificial intelligence application. As one respondent put it literally, "knowing my students, I can see that they are not expressing their own thoughts".

Very common in the answers given is a dislike that it is too good to be true. More than 20% of the responses list things that help to recognize the use of AI. These typically related to the use of clichéd text elements and verbosity. Overall, from the responses received, it can be concluded that teachers, knowing their own students and the content of the course material, are very likely to recognize the use of AI. However, there is some uncertainty and concern in the responses received. Quoted verbatim from the response received: "I am not sure I always recognize it, but there have been examples of misuse of words and concepts. For me, the most memorable was when an adjective was expressed in the first-person plural of AI (e.g. 'We must be used consciously..., we are dangerous'). This was frightening."

At the end of the questionnaire, we asked the teachers who responded about two of the great dilemmas of our time. We asked them what they think will have a greater impact on them personally and on society in the coming years: artificial intelligence or climate change (Fig. 3). When asked which of the two would make a bigger difference to their lives in the next 5-10 years, 66% of respondents said artificial intelligence.

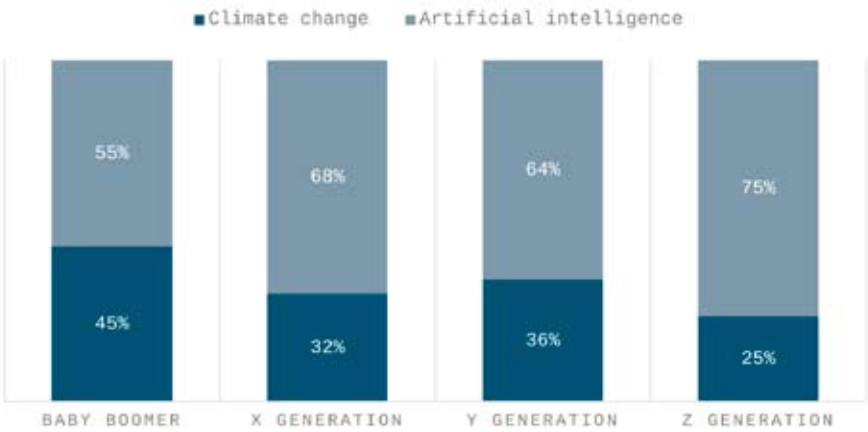

Figure 3. Opinion on which of the two big challenges of the future will make the biggest difference to the respondent's life in the next 5-10 years.

The question was also analyzed in terms of respondents' generational affiliation. It is clear from the responses that the youngest generation (Gen Z) surveyed believe that AI is the most important factor influencing their lives. In contrast, the oldest generation surveyed (Baby Boomers) consider climate change to be the most important factor influencing their lives.

As in the previous question, artificial intelligence was identified as the phenomenon with the greatest socio-economic impact (Fig. 4). In response to this question, 64% of respondents believed that AI would have a greater impact on society than climate change in the future. The difference in opinions between the generations was examined. 75% of Generation Z respondents think the impact of AI is the most significant. Interestingly, in this aspect, Generation X rated the importance of climate change the highest.

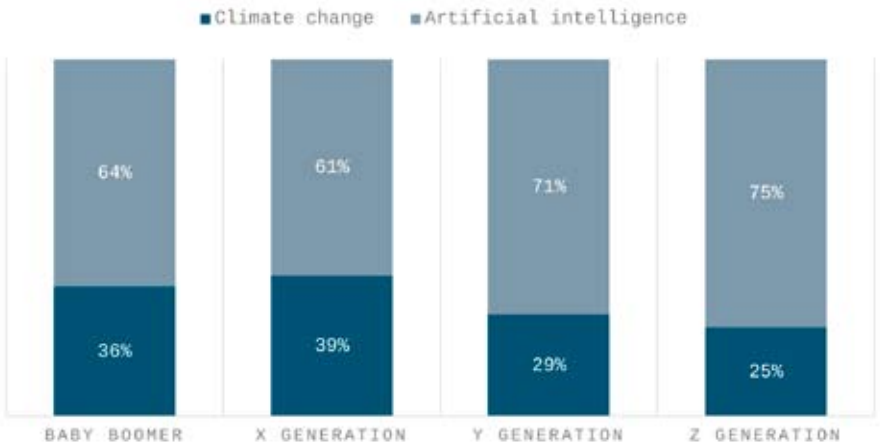

Figure 4. An opinion on which of the two major challenges of the near future will have a greater impact on socio-economic integration in the next 5-10 years.

Discussion and conclusion

In this study we focused on the opinions of Hungarian and foreign language teachers in Hungary and examined the impact and perception of the increasingly popular artificial intelligence. The questionnaire survey revealed that a quarter of the sample surveyed did not know of any AI-related applications (or at least could not list any, did not know that they were based on AI), while half of the respondents use AI. This usage rate is slightly lower than the results measured by Forbes Advisor (Hamilton 2023) among 500

teacher respondents in the US, but this measurement was not limited to language teacher responses as our survey was. 60% of teachers surveyed in the US use artificial intelligence. It is perhaps interesting to note that 55% of respondents in that survey felt that AI had a positive impact on the teaching process, whereas in our survey this was more in the neutral range.

The study supported the hypothesis that foreign language teachers use such applications more than Hungarian language and literature teachers. More than 80% of the respondents would be open to training on the use of AI in teaching, which we believe strongly indicates the openness and willingness of teachers to develop. Also striking in this area is the fact that the willingness to participate in training is above 50% in all generations surveyed.

Both positive and negative effects of AI were indicated by respondents. It is interesting to note that, despite the negative aspect being mostly identified as a lack of thinking, several positive aspects were presented by teachers.

Intergenerational differences were also examined for each question, but the generations showed only minor differences in the questions examined.

The research concluded by examining the relationship between climate change and artificial intelligence as two major issues of our time. Respondents were clearly of the opinion, regardless of generation, that AI will have a greater impact on their lives and on socio-economic society than climate change in the coming period.

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