Preparing teachers for the application of AI-powered technologies in foreign language education

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Abstract
As any other area of human lives, current state of foreign language education has been greatly influenced by the latest developments in the modern information communication technologies. The paper focuses specifically on the incorporation of artificial intelligence (AI), which includes a wide range of technologies and methods, such as machine learning, adaptive learning, natural language processing, data mining, crowdsourcing, neural networks or an algorithm, into foreign language learning and teaching.

First, the paper is concerned with changes brought to foreign language education specifically through the application of AI-powered tools and discusses ICALL (intelligent computer assisted language learning) as a subset of CALL. Second, it summarizes eight types of AI-powered tools for foreign language education and related results of the existing research, however scarce it is. Third, it discusses the frame for effective preparation of foreign language teachers in order to integrate AI-powered tools into their teaching to make it easier, less time-consuming and more effective. The author argues for reconsideration of the existing frames of requirements for CALL teachers.

Keywords: foreign language education, artificial intelligence, machine learning, adaptive learning, personalised language learning

1 Artificial intelligence in linguistics and education

Through smart technologies, financial technologies, eCommerce, marketing, manufacturing, and automotive industries, artificial intelligence (AI) has become part of our daily lives.

The term itself was used for the first time in 1956 by John McCarthy who organised the workshop at Dartmouth College and in the proposal defined the workshop´s aims as follows: "The study (of artificial intelligence) is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans,

and improve themselves" (Russel & Norvig, 2010, p. 17). McCarthy´s first expectations related to AI (later known as strong AI) that computers will be able to replicate human cognitive functions and AI tools will be able to think like humans (along with the treat to take over control from humans eventually) have not been proved correct. The question remains whether machines will be able to actually think or develop independent consciousness in the future. Many authors agree that it is unlikely that such strong AI will be developed in the near future.

As research has progressed, scientists modified their expectations and concentrate their activities on building "models based on human reasoning, without the end goal of replicating complex human thinking" (Marr, 2018).

Contemporary definitions of AI differ in various aspects and the problems to formulate a united definition of AI are caused by both constant shifts in what AI includes (Luckin et al., 2016) as well as by the interdisciplinarity of its research (AI has been studied not only by computer science, but also by philosophy, anthropology, biology, pedagogy, psychology, linguistics, cognitive science, neuroscience, statistics, and many others).

One group of definitions see *AI as machines, computers or computer systems* that imitate cognitive functions that are normally associated with the human mind, such as learning and problem solving (*Russell & Norvig, 2010).*

Another group of definitions consider *AI as a specific set of skills* of computers, e. g. Baker and Smith (2019, p. 10) define AI as "computers which perform cognitive tasks, usually associated with human minds, particularly learning and problem-solving". The *Encyclopaedia Britannica* states that AI is „the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings," where intelligent beings are those that can adapt to changing circumstances.

 Other group of definitions see AI in a much broader context, *as a science,* e. g. Stone at al. (2016) says that "artificial intelligence (AI) is a science and a set of computational technologies that are inspired by—but typically operate quite differently from—the ways people use their nervous systems and bodies to sense, learn, reason, and take action." (Stone et al., 2016). The *English Oxford Living Dictionary* gives this definition: "The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages."

Merriam-Webster Dictionary connects both above-mentioned aspects of artificial intelligence and defines it as a) a branch of computer science dealing with the simulation of intelligent behaviour in computers, and b) the capability of a machine to imitate intelligent human behaviour.

In this paper, we adopt the definition of AI given by Luckin et al. (2016, p. 14) who define AI „as computer systems that have been designed to interact with the world through capabilities (for example, visual perception and speech

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recognition) and intelligent behaviours (for example, assessing the available information and then taking the most sensible action to achieve a stated goal) that we would think of as essentially human". These computer systems include a wide range of technologies and methods, such as machine learning, adaptive learning, natural language processing, data mining, crowdsourcing, neural networks or an algorithm.

2 AI-powered tools in education (AIEd)

For linguists and language teachers, AI is interesting from more than one aspect. Using AI and NLP (*natural language processing*) help create more detailed descriptions of natural languages, leads to better-processed corpora, as well as to a better understanding of mental processes occurring in human brains while verbally communicating, etc. AI-powered tools are applied also in computer linguistics, in the creation of computer languages, machine translations and improvement of human-machine communication via *speech recognition, speech synthesis,* etc*.*

Similarly, **AI-powered tools** belong to the currently emerging fields in educational technology and many authors see enormous benefits they could possibly bring both to students and teachers. AI-powered education (AIEd) "offers the possibility of learning that is more personalised, flexible, inclusive, and engaging. It can provide teachers and learners with the tools that allow us to respond not only to what is being learnt, but also to how it is being learnt, and how the student feels. It can help learners develop the knowledge and skills that employers are seeking, and it can help teachers create more sophisticated learning environments than would otherwise be possible. For example, AIEd that can enable collaborative learning, a difficult task for one teacher to do alone, by making sure that the right group is formed for the task-at-hand, or by providing targeted support at just the right time" (Luckin et al., 2016, p. 11).

Baker and Smith (2019) divide AI tools used in education into three groups: a) learner-facing, b) teacher-facing, and c) system-facing ones.

a. **Learner-facing AI tools** are software that students use to learn a subject matter.
b. **Teacher-facing systems** are used by teachers with the purpose to reduce their workload and make their output more effective in specific automating tasks, such as administration, assessment, feedback and plagiarism detection.
c. **System-facing AI tools** provide information for administrators and managers on the institutional level, for example, they help monitor attrition patterns across faculties or colleges.
The current study focuses only on the first two categories.

Both foreign language learners and teachers can choose from a wide scale of AI-powered tools that should make their efforts easier. Applying AI in foreign

language education provides learners with immediate and highly individualized support, which is a fundamental building stone for personalized learning as one of the ideal standards of contemporary pedagogy. In this aspect, AI-powered tools are ahead of human teachers who simply do not have capacity to continually analyse each and every learner´s outputs, diagnose their individual learning needs, adapt the learning content accordingly and give learners well-grounded feedback in the span of several seconds – and that all in the class of twelve or more students. AI-powered tools are, on the other hand, able to collect massive amounts of data on learner´s learning progress, on their basis to model their personal learning curves and to adapt learning content accordingly. Moreover, they enhance learners´ progress through the functionality of small consequential steps and immediate feedback. Therefore, these programmes and applications can be used by teachers as very effective supporting tools because they are able to free teachers from tiring, energy- and time-consuming activities such as grammar or pronunciation drills.

As Brusilovsky and Miller (2001) have it, AI tools stand in opposition to the traditional "just-put-it-on-the-web" approach in the development of online and web-based educational courses. They are results of decades-long efforts of system designers, data scientists, product designers, statisticians, linguists, cognitive scientists, psychologists, education experts and many others to develop education systems that help teachers and support learners to develop their knowledge and flexible skills for a constantly changing world. Current AI educational systems incorporate either adaptive or intelligent operations or both.

Adaptive educational systems (AES) are designed to adapt some of the key functional characteristics (e.g. content, sequence of activities or navigation support) to the learner needs. This may happen thanks to "building a model of the goals, preferences and knowledge of each individual student and using this model throughout the interaction with the student in order to adapt to the needs of that student" (Brusilovsky & Peylo, 2003, p. 156). An adaptive system thus "operates differently for different learners, taking into account information accumulated in the individual or group learner models" (Magnisalis, Demetriadis, & Karakostas, 2011).

Intelligent educational systems (IES) incorporate and perform "some activities traditionally executed by a human teacher - such as coaching students or diagnosing their misconceptions" (Brusilovsky & Peylo, 2003, p. 156). They aim to provide learner-tailored support through implementing "extensive modelling of the problem-solving process in the specific domain of application" (Magnisalis, Demetriadis, & Karakostas, 2011). Brusilovsky & Peylo, 2003, p. 158) list as major Intelligent Tutoring technologies the following: *curriculum sequencing* (providing the student with the most suitable individually planned sequence of topics and

learning tasks to help find an "optimal path" through the learning material), *intelligent solution analysis*, and *problem solving support*.

3 AI in foreign language education

The meaning of AI-powered education has been rapidly growing in all areas of educational content; however, this paper focuses solely on the application of AI into foreign language education. Along with MALL, CMC, e-learning, web learning, application of AI-powered tools into foreign language learning is a subset of *computer-assisted language learning* (CALL). With latest developments in natural language processing, progress in deep and networked learning, and the growth in technological ability to handle massive data, today's AI has significant applications for language studies in general, and for foreign language education in particular. The shift from CALL to ICALL (Intelligent CALL) has been inevitable and brought a substantial change in the quality of student-computer interaction (Kannan & Munday, 2018).

Expected benefits of ICALL stem from the fact that AI has a potential to make digital language learning truly personalised to each learner. It may lead to the reduction of time, cost and learners´ frustration occurring when completing tasks without immediate feedback. All this is possible due to big data processing and machine learning algorithms which adapt in real-time to learner behaviour, calculating each learner's strengths and weaknesses and generating an entirely personalised set of study materials in each session (which brings in new ethical implications). Moreover, and equally importantly, the algorithm learns from both individual and collective learner behaviour, making its predictive power even stronger (Campbell-Howes, 2019).

Other expected benefits of ICALL include: learner´s own pace of progress; instant feedback as a strong motivational factor; individualized repetition of topics and emphasizing activities where a learner has had weaker output; quick and objective assessment of learner´s progress; better understanding of learner´s learning preferences and strategies; predicting learner´s future performance with a high probability; quick and objective assessment of teaching tools (texts, lectures, assignments, tests, etc.).

As Schulze (2008) has it, the most relevant areas of AI research for CALL include natural language processing (NLP), user modelling, expert systems, and intelligent tutoring systems (ITS).

Natural language processing (NLP) deals with both natural language understanding (when computers are designed to be able to receive and decode ["understand"] natural language input, spoken or written) and natural language generation (when scientists aim at designing computers able to produce natural language output, again both spoken or written). Both functions (represented, for example, by automatic speech recognition systems and chatting robots) involve

the processing of graphological, phonological, morphological, syntactical, semantic, and pragmatic features of natural languages.

The main goal of user modelling is to adapt computational systems to their users. This incorporates "observing user's behaviour" (via collecting, storing, and analysing data from their answers and responses to previous tasks) and predicting their future behaviour (e.g. via counting their personal memory curves).

Together with user modelling, the expert modelling is an essential component of intelligent tutor systems (see below). Both user and expert modelling are related to *the big data* field of computational statistics and predictive analysis.

Forms of applying IA into foreign language education

a) Generating personalized learning materials

Based upon responses the student makes while learning, adaptive educational systems shape their learning path through appointed learning materials. Some AI-powered tools can customize learning materials for a specific learner, course or school and create, for example, personalized textbooks. Personalised learning materials are an alternative to traditional textbooks and materials which represent the so-called "one-size-fits-all" approach to schooling in which teachers provide all students in each class or course with only one type of learning materials.

b) Using machine translation tools

Machine translation (MT) is the process when computer software is employed to translate a text (written or spoken) from one natural language to another. For a long time, using MT tools for language learning purposes has been limited due to a questionable quality of their outputs. Artificial intelligence technologies like neural machine translation have improved the quality of machine translation considerably and free-access web-based MT services resulted in millions of users using services such as Google Translator, Translator Online, Foreign Word, Web Trance for their work or study every day. MT can be a useful aid to language learning (Cook, 2010; Garcia, & Pena, 2011; Lee, 2019; Myers, 2000; Niño, 2009; Rogers, 1996; Steding, 2009; White & Heidrich, 2013); however, foreign language teachers tend to regard the use of MT as a learner's failure, disruption or even breakage of academic honesty (Case, 2015; Niño, 2008; Steding, 2009). Several studies have concentrated on preventing the use of MT services in the classroom (Steding, 2009). However, prohibiting the use of MT services in the classroom has been found to be largely useless and ineffective (Cook, 2010; Steding, 2009; White & Henrich, 2013). White and Heinrich (2013) argue that language teachers should focus on ways how to help learners to use MT tools effectively, instead. Therefore, to benefit student learning, foreign language teachers should be aware of MT possibilities and limitations and provide adequate guidance to their students (Williams, 2006).

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Despite the growing popularity of machine translation tools among language students, research into their application in foreign language classes has been scarce. Briggs (2018) studied students' attitudes and beliefs regarding the use of web-based MT tools for English language learning. His results showed that most students use MT tools to support their language studies despite a limited trust they had in the accuracy of their outputs. Lee (2019) explored the role of machine translation in English as a foreign language EFL writing. Her outcomes revealed that machine translation improved students´ revision skills and facilitated a decrease in occurrence of lexical and grammatical errors. Garcia and Pena (2011) observed the effects using the MT can have on beginner language learners. Niño (2009) who observed behaviour of learners of Spanish, found that weaker students were more likely to use MT tools than stronger students.

c) Utilising AI writing assistants

AI writing assistants (based on NLP and machine learning) help users through various steps of the writing process (augmented writing). Using AI systems, they correct grammatical errors within a written text (via conducting a continual error-analysis), provide recommendations for later improvements and provide additional resources for further study. In foreign language classrooms, these systems help learners to go through the writing process individually, correct themselves and think about the process itself. Using AI in this way facilitates learner´s self-regulation and autonomy. The examples of AI writing assistants are *Grammarly, ProWriting Aid, Textio, AI Writer, Textly AI* and *Essaybot*.

d) Conversing with chatbots

Chatting robots (chatbots) are groups of computer programs that are meant to simulate intelligent human language interaction. A human user and a computer (robot) are engaged in informal chat (in a written or spoken form) using a natural language. Chatbots are most frequently utilized in marketing communication; however, they may be used effectively in foreign language classrooms as well (Dargan, 2019; Jia, 2004a, 2004b; Jia, 2008; Kerly, Hall, & and Bull, 2007). Learners can learn through the process of direct communication with a robot. In addition, chatbots can provide customized answers in response to learners´ messages, grade their performance, and provide tips on what learners need to improve. The research conducted by Fryer and Carpenter (2006) showed that most students enjoyed using the chatbots and they generally felt more comfortable conversing with the bots than a student partner or teacher, which might seem a surprising finding. Jia & Chen (2009) in their study investigated how a chatbot could be used to motivate learners to practice English. Results revealed that students felt comfortable and believed that the approach could help them with language learning. The results also showed that regular conversations with chatbots positively affected student´s language confidence, improved their listening ability,

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and boosted their interest in language learning. However, it is important to note that using chatbots might be not effective for beginner speakers. The problem is that most chatbots respond merely to simple keywords and cannot assess whether the language input is grammatically or pragmatically correct. Chatbots still work in clearly defined scenarios with predictable dialogues and corresponding error sources. So far, chatbots cannot interpret even less serious pronunciation mistakes, as well as grammar and spelling mistakes. They are ideal as learning aids to foster conversational skills of very proficient or native speakers (Fryer & Carpenter, 2006). However, as Lotze (2018) argues, AI dialogic systems still need to meet some key criteria (especially spontaneity, creativity and shared knowledge) before they can serve as substitutes for a real-life language teacher. To name some examples of AI chatbots: *Rosetta Stone* (25 languages), *Andy, Mondly, Memrize*, etc.

e) **Applying AI-powered language learning software (platforms and apps)**

When it comes to language learning, online platforms are increasingly becoming the norm. Cloud-based online platforms incorporating NLP, crowdsourcing, gamification elements, automatic speech recognition, automatic speech generation and AI writing assistant applications belong to the most popular learning aids used by young users. Examples: *Duolingo, Busuu, Speexx, Babbel, Memrise, Magiclingua* and many others.

Lotze (2018) distinguishes two basic technical concepts for language learning software: **the conventional graphical user interface with speech recognition and language interface with dialogue function.**

In the *conventional graphical user interface***,** just like in traditional textbooks, language learners go through series of digital exercises (filling gaps, substitution exercise, matching exercises, etc.). The problem here lies in the fact that learners work with strictly pre-defined language (close tasks) and many apps are based on outdated concepts (the grammar-translation method, audio-lingual and pattern drills) because they are easy to model. There is a lack of any space for learner´s creativity or spontaneity. The apps supplemented by language recognition software should be able to recognize spoken contributions, however, they are not able to cooperate if mispronunciations or pronunciation with accent occurs.

Language interface with dialogue function **were designed to s**imulate natural verbal interaction with a virtual tutor. These dialogue systems follow the principle of a simple chatbot. Learners are free to make either written or oral contributions that the technology analyses for the presence of predefined keywords. If the right keyword is used, an appropriate predefined response from the artificial tutor is selected and output. The problems occur when a learner produces an utterance the programme designers did not foresee. In such a case the programme cannot respond appropriately.

f) Relying on intelligent tutoring systems (ITS)

ITS are computer-based learning systems designed to simulate one-to-one personal tutoring. They consist of four basic components: the domain model, the student model, the tutoring model, and the interface model. "Based on learner models, algorithms and neural networks, they can make decisions about the learning path of an individual student and the content to select, provide cognitive scaffolding and help, to engage the student in dialogue. ITS have enormous potential, especially in large-scale distance teaching institutions, which run modules with thousands of students, where human one-to-one tutoring is impossible" (Zawacki-Richter et al., 2018, p. 5). By integrating NLP-based tutoring systems (both downloadable software or online systems) which can give corrective feedback and tailor instructional materials, reactive one-sided ITS systems have been changed into interactive machine learning tutors. Examples: *Word Bricks, CASTLE, I-ETER, Web Passive Voice Tutor, WUFUN* (for Chinese university students learning English), *Your Verbal Zone* (for Turkish students learning English vocabulary), *E-Tutor* (for learning German as a second language), *TAGARELA* (for learning Portuguese at the university level), *Robo-Sensei* (for Japanese), *Spanish for Business Professionals* (SBP), etc.

Adaptive and intelligent systems for collaborative learning support (AICLS systems) is another type of IA-powered educational tool. Collaborative learning which combines social and construction elements of the learning process occurs when learners develop a shared understanding of a problem through a mutual interaction (e.g. a dialogue in a classroom or a chat in an online group). Introducing AI-powered tools into the process aims at supporting both social skills and knowledge building processes. The meta-analysis of 105 research studies and articles on AICLS conducted by Magnisalis, Demetriadis, and Karakostas (2011, p. 16) showed that learning benefits of students „do not emerge unconditionally when using AICLS systems to support collaborative learning. Learning impact is subject to learning design and capability of AICLS to adapt and intervene in an unobtrusive way".

g) Intelligent virtual reality (IVR) is a complex system integrating conversational AI tools, spatial context awareness technologies, and gesture and facial landmark recognition systems, NLP, speech recognition and natural language understanding technologies. Learners can practice speaking with AI-based avatars that simulate realistic conversations with native speakers, which enable learners to gain fluency and build confidence through highly personalized practice. IVR is used to create an authentic virtual reality and game-based learning environments. Virtual agents (avatars) can act as teachers, facilitators or students' peers. If used in foreign language education, IVR systems face the same problems as chatbots and online platforms/apps. As Lotze (2018) argues, "the interaction with the agent will only work smoothly if learners input the questions and answers that the system developers were able to foresee. (...) Outside the scripted

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application areas, dialogues with chatbots and agent systems are erratic, incoherent and prone to error. They cannot serve as a role model for foreign language learners".

4 ICALL and a changing role of foreign language teachers

Even though human teachers and social interactions beyond the digital environment are still essential for mastering a second language, the application of CALL into foreign language learning, including the elements of AI, leads to redefined roles for teachers and learner (Lam & Lawrence, 2002).

AI based systems provide language learners with the environment where they can choose their own path and pace of learning, and where learners can take more control over their own learning. AI powered systems facilitate development of learner´s decision-making skills and lead to their learning autonomy. Students can digitally connect with native speakers around the world or to use IA-powered conversational tools (e. g. chatbots) to intensify their learning without a teacher´s personal involvement. Language learners have more opportunities to be more active participants in the learning process rather than passive recipients of knowledge.

Teaching becomes more learner-centred, since learners are expected to be able to make their own decisions and become responsible for their work more independently. The teacher, on the other hand, abandons his/her previous position of the only authority and decision-maker, to become rather a facilitator and supporter of learners (Bancheri, 2006; Rilling et al., 2005).

5 Preparing foreign language teachers for applying AI and ICALL

The area of using AI-powered tools in foreign language learning is rather new, therefore, to date, a general lack of research studies on using AI in foreign language education can be witnessed. To the author´s knowledge, there has been neither the empirical research on pedagogical effects of using AI-powered tools in foreign language classes, on learners´ responses regarding the use of AI tools, or on teachers´/teacher trainees´ attitudes toward using AI-powered tools, nor research on their preparation for the application of AI-powered tools in their classes.

However, the topic does not need to be explored in complete isolation, or from scratch. Preparing teachers for ICALL is a subset of CALL teacher training which has been addressed by multiple publications and research articles. If the general aim of CALL teacher training is "to equip current and future language teachers with the knowledge and skills, both technical and pedagogical, to incorporate technology effectively into their classes" (Hubbard, 2008, p. 180), *The aim of ICALL teacher training is, parallelly, to inform current and future language teachers about latest AI-powered educational tools, and provide them with the knowledge and skills needed for effective integration of these AI tools into their classes.*

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Many researchers have argued that teachers (their attitudes, beliefs, and preferences) play a crucial role in the success of CALL methodology (e.g., Albirini, 2006; Atkins & Vasu, 2000; Beatty, 2003; Egbert, Paulus, & Nakamichi, 2002; Goertler & Winke, 2008; Cummings Hlas, Conroy, & Hildebrandt, 2017; Hong, 2010; Hoven, 2007; Hubbard, 2004, 2008; Hubbard & Levy, 2006a, 2006b; Kessler, 2006, 2007, 2010; Lam, 2000; Levy, 1997; Liu, Theodore, & Lavelle, 2004; Lord & Lomicka, 2011; Luke & Britten, 2007; Peters, 2006; Pokrivcakova et al., 2015; Straková & Cimermanová, 2018; Williams, Abraham, & Bostelmann, 2014 and others).

If teachers have an appropriate training for using AI technologies and positive AI-related experience, they will be more likely to implement ICALL in their own classrooms. A fundamental condition of success is to help them feel well prepared and confident to act in AI technology-enhanced environments.

A number of previous researches (Abdelhalim, 2016; Kim, 2002; Lam, 2000; Liaw, Huang, & Chen, 2007; Russel & Bradley, 1997; Sabzian, & Gilakjani, 2013) have revealed that foreign language teachers generally support CALL and welcome modern technologies in their classrooms, however, some (and probably most of them) are reluctant to use ICT extensively. Along with external factors (lack of material equipment, insufficient technical support, inflexible curriculum, time stress), this reluctance to apply CALL is determined by many internal factors, such as:
- lack of information and ICT skills,
- lack of experience with ICT as a learner,
- lack of motivation,
- struggle to integrate ICT with teacher´s existing learning style and practices,
- feeling like being out of their comfortable zone,
- fear of losing a dominant position in the classroom,
- fear of a weakening control over students,
- as well as losing students´ respect.

In their research, Park & Son (2009) observed that "the expectation that teachers should be experts in the use of computers is not fully supported by the teachers, although they seem to be convinced that CALL makes language learning interesting". Abdelhalim (2016) noticed that "even when respondents integrate ICT in their teaching, integration is limited to low-range applications such as email services or getting information from the Internet". These findings have been supported by results of other related studies (Arnold, 2007; Galanouli, Murphy & Gardner, 2004; Kessler, 2006; Pelgrum, 2001; Rakes & Casey, 2002; Torres, 2006, and others).

These are the factors the ICALL teacher trainers need to take into consideration. It is probably too soon to define sets of specific skills of ICALL

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teachers or to propose models of ICALL teacher training but, undoubtedly, they will be created soon. It will be important not to lose the path in the process and approach the task realistically and pragmatically. Foreign language teachers do not need to be programmers or artificial intelligence experts if they want to apply chatbots or add Duolingo practice to their classes.

Many authors on CALL teacher training have elaborated long lists or complicated charts of "key skills" for CALL which, sometimes, put unrealistic requirements on foreign language teachers forgetting that they should be primarily language professionals and teachers.

Adequate and continuous professional training may be the best answer to overcome all the above-mentioned barriers in effective CALL. Because to use modern technologies willingly and effectively teachers need to believe that technology can help them achieve educational objectives more effectively (in shorter time and with less effort). Moreover, they must be sure that no other learning objectives or aspects of classroom management will be disturbed by the technology usage. In addition, they need sufficient ICT skills and unhindered access to technology.

Conclusion

Integrating AI into education brings new quality to both learning and teaching. The AI-powered tools help create sophisticated educational environment where learning may be more personalised, teaching more flexible, and management more inclusive. They can help learners develop the knowledge and skills that modern technology-enhanced society looks for and requires. The dystopian view expects AI to take over absolute control and become the student's tyrant tutor dictating what, when and how they should learn, based on the data that it continually collects about students without their consent. The utopian vision sees learners who are in charge of their personal AI tools which help them (and their teachers) better understand their progress and organize learning activities.

AI in language learning led to the establishment of ICALL (intelligent computer-assisted language learning). IT-powered tools can be applied in many ways and this paper identified eight of them: *personalized learning materials, machine translation tools, AI writing assistants, chatbots, AI-powered language learning software -platforms and apps, intelligent tutoring systems, adaptive and intelligent systems for collaborative learning support, intelligent virtual reality.*

To integrate these ICALL tools into regular teaching processes, teachers need to form new skills (Hampel & Stickler, 2005; Kassen, et al., 2007) to support learners but also to avoid needless workload and useless repetitive tasks, e.g. via writing assistants and correction systems (Dodigovic, 2009; Chodorow, Gamon, & Tetreault, 2010).

However, very soon research will need to answer many questions, including the following ones: What is the current state of ICALL and how well are language

teachers informed about its advancements? What are the AI tools most frequently chosen by language teachers to incorporated into their teaching? How do language teachers perceive ICALL and what is their motivation to integrate ICALL tools into their everyday teaching practice? What are the key skills language teachers need for new, AI-enhanced teaching environment? How exactly should ICALL advancements be reflected in teacher training programmes?

References

Abdelhalim, S. (2016). An Interpretive Inquiry into the Integration of the Information and Communication Technology Tools in TEFL at Egyptian Universities. *Journal of Research in Curriculum, Instruction and Educational Technology*, 2(4), 145-173 .

Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: the case of Syrian EFL teachers. *Computers & Education*, 47(4), 373–398. https://doi.org/10.1016/j.compedu.2004.10.013

Arnold, N. (2007). Technology-mediated learning 10 years later: Emphasizing pedagogical or utilitarian applications? *Foreign Language Annals*, 40(1), 161–181.

Atkins, N. E., & Vasu, E. S. (2000). Measuring knowledge of technology usage and stages of concern about computing: A study of middle school teachers. *Journal of Technology and Teacher Education, 8*(4). 279-302.

Baker, T., & Smith, L. (2019). Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges. Retrieved from Nesta Foundation website: https://media.nesta.org.uk/documents/Future_of_AI_and_education_v5_WEB.pdf

Bancheri, S. (2006). A language teacher's perspective on effective courseware. In Randall P. D., & Margaret A. H. (Eds.) *Changing Language Education through CALL* (pp. 31-47). New York: Routledge.

Beatty, K. (2003). *Teaching and researching Computer-assisted Language Learning*. London: Pearson Education

Briggs, N. (2018). Neural machine translation tools in the language learning classroom: Students' use, perceptions, and analyses. *The JALT CALL Journal, 14*(1), 3-24.

Brusilovsky, P., & Miller, P. (2001). Course Delivery Systems for the Virtual University. In T. Tschang, & T. Della Senta (Eds.) *Access to Knowledge: New Information Technologies and the Emergence of the Virtual University,* (pp. 167-

206.). Amsterdam: Elsevier Science. Available online at http://www2.sis.pitt.edu/~peterb/papers/UNU.html.

Brusilovsky, P. & Peylo, C. (2003). Adaptive and Intelligent Web-based Educational Systems. *International Journal of Artificial Intelligence in Education,* 13(2003), 156–169.

Campbell-Howes, K. (2019). Why is AI a good thing for language teachers and learners? *OxfordTEFL: Teacher Training*. Retrieve from: https://www.oxfordtefl.com/blog/why-is-ai-a-good-thing-for-language-teachers-and-learners.

Case, M. (2015). Machine Translation and the Disruption of Foreign Language Learning Activities. *eLearning Papers*, 45, 4-16.

Chodorow, M., Gamon, M., & Tetreault, J. (2010). The utility of article and preposition error correction systems for English language learners: Feedback and assessment. https://doi.org/10.1177/0265532210364391

Cook, G. (2010). *Translation in language teaching: An argument for reassessment*. Oxford: Oxford University Press.

Cummings Hlas, A., Conroy, K., & Hildebrandt, S. A. (2017). Student Teachers and CALL: Personal and pedagogical uses and beliefs. CALICO Journal, 34(3). doi: 10.1558/cj.26968

Dargan, J. (2019). Artificial Intelligence: The Angel of Death For Foreign Language Teachers. Chatbots Life (29 April 2019). Retrieved from https://chatbotslife.com/artificial-intelligence-the-angel-of-death-for-foreign-language-teachers-cbff644a4967.

Dodigovic, M. (2009) Artificial Intelligence and Second Language Learning: An Efficient Approach to Error Remediation. 99-113. https://doi.org/10.2167/la416.0

Drent, M., & Meelissen, M. (2007). Which Factors Obstruct or Stimulate Teacher Educators to Use ICT Innovatively? *Journal of Computers & Education*, 4 (3), 12-36.

Egbert, J., Paulus, T., & Nakamichi, Y. (2002). The impact of CALL instruction on classroom computer use: A foundation for rethinking technology in teacher education. *Language Learning & Technology, 6*(3), 108–126.

Fryer, L., & Carpenter, R. 2006. Emerging Technologies Bots as Language Learning Tools. *Language Learning &Technology,* 10(3), 8–14.

Galanouli, D., Murphy, C. & Gardner, J. (2004). Teachers' Perceptions of the Effectiveness of ICT-competence Training. *Computers & Education*, 43, 63-79.

Garcia, I., & Pena, M. I. (2011). Machine translation-assisted language learning: Writing for beginners. Computer Assisted Language Learning, 24(5), 471–487. doi: 10.1080/ 09588221.2011.582687

Goertler, S., & Winke, P (2008). The effectiveness of technology-enhanced foreign language teaching. In Goertler, S. & Winke, P. (Eds.), *Opening doors through*

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distance Education: Principles, perspectives, and practices (pp. 233-260). CALICO Monograph Series 7. San Marcos, TX: CALICO.

Hampel, R. & Stickler, U. (2005). New skills for new classrooms: Training tutors to teach languages online. *Computer Assisted Language Learning*, 18(4), 311–326.

Hong, K. H. (2010). CALL teacher education as an impetus for L2 teachers in integrating technology. *ReCALL, 22*(1), 53–69. https://doi.org/10.1017/S095834400999019X

Hoven, D. (2007) The affordances of technology for student teachers to shape their teacher education experience. In Kassen, M. A. et al. (Eds.), *Preparing and developing technology-proficient L2 teachers* (pp. 133–163). San Marcos, TX: CALICO.

Hubbard, P. (2004) Learner training for effective use of CALL. In Fotos, S. & Browne, C. M. (Eds.), *New perspectives on CALL for second language classrooms* (pp. 45–67). Mahwah, NJ: LEA,

Hubbard, P. (2008). CALL and the future of language teacher education. *CALICO Journal*, 25(2), 175–188.

Hubbard, P., & Levy, M. (2006a). Introduction. In Hubbard, P. & Levy, M. (Eds.), *Teacher Education and CALL* (pp. ix–xi). Philadelphia: John Benjamins. https://doi.org/10.1075/lllt.14

Hubbard, P., & Levy, M. (2006b). The scope of CALL education. In Hubbard, P. & Levy, M. (Eds.), *Teacher Education and CALL* (pp. 3–20). Philadelphia: John Benjamins. https://doi.org/10.1075/lllt.14.04hub

Jia, J. 2004a. CSIEC (Computer Simulator in Educational Communication): A Virtual Context-Adaptive Chatting Partner for Foreign Language Learners. In *Proceedings of ICALT04 (International Conference on Advanced Learning Technology)*, 690–692. Los Alamitos, CA: IEEE Computer Society.

Jia, J. 2004b. The Study of the Application of a Web-Based Chatbot System on the Teaching of Foreign Languages. In *Proceedings of Society for Information Technology & Teacher Education International Conference 2004*, ed. C. Crawford et al., 1201–1207. Cheasapeake, VA: Association for the Advancement of Computing in Education.

Jia, J. 2008. The Generation of Textual Entailment with NLML in an Intelligent Dialogue System for Language Learning CSIEC. In *Proceedings of the IEEE International Conference on Natural Language Processing and Knowledge Engineering 2008,* 194–201. Piscataway, NJ: Institute of Electrical and Electronics Engineers.

Kannan, J. & Munday, P. (2018). New trends in second language learning and teaching through the lens of ICT, networked learning, and artificial intelligence. In Fernández Juncal, C. & Hernández Muñoz, N. (Eds.), Vías de transformación en la enseñanza de lenguas con mediación tecnológica. *Círculo de Lingüística*

Aplicada a la Comunicación, 76, 13-30. Retrieved from: http://dx.doi.org/10.5209/CLAC.62495

Kerly, A.; Hall, P.; and Bull, S. 2007. Bringing Chatbots into Education: Towards Natural Language Negotiation of Open Learner Models. *Knowledge-Based Systems* 20(2): 177–185.

Kassen, M. A., Lavine, R. Z., Murphy-Judy, K. Peters, M. (Eds.) (2007). Preparing and developing technology-proficient L2 teachers: CALICO Monograph Series Volume 6. San Marcos, TX: Computer Assisted Language Institution Consortium (CALICO)

Kessler, G. (2006). Assessing CALL teacher training: What are we doing and what could we do better? In P. Hubbard & M. Levy (Eds.), *Teacher Education in CALL* (pp. 23–44). Philadelphia: John Benjamins. https://doi.org/10.1075/lllt.14.05kes

Kessler, G. (2007). Formal and informal CALL preparation and teacher attitude toward technology. *Computer Assisted Language Learning, 20*(2), 173–188. https://doi.org/10.1080/09588220701331394

Kessler, G. (2010). When they talk about CALL: Discourse in a required CALL class. *CALICO Journal, 27*(2), 376–392. https://doi.org/10.11139/cj.27.2.376-392

Kim, H. (2002). Teachers as a barrier to technology-integrated language teaching. *English Teaching*, 57(2), 35-64.

Lam, Y. (2000). Technophilia vs. technophobia: A preliminary look at why second language teachers do or do not use technology in their classroom. *The Canadian Modern Language Review, 56*, 389–420. https://doi.org/10.3138/cmlr.56.3.389

Lam, Y., & Lawrence, G. (2002). Teacher-student role redefinition during a computer-based second language project: Are computers catalysts for empowering change? *Computer Assisted Language Learning, 15*(3), 295-315.

Lee, S.-M. (2019) The impact of using machine translation on EFL students' writing. *Computer Assisted Language Learning*, DOI: 10.1080/09588221.2018.1553186

Levy, M. (1997). A rationale for teacher education and CALL: The holistic view and its implications. *Computers and the Humanities, 30*, 293–302.

Liaw, S., Huang, H., & Chen, G. (2007). Surveying instructor and learner attitudes toward E-learning. *Computers & Education*, 49(4), 1066-1080.

Liu, Y., Theodore, P., & Lavelle, E. (2004). Experimental effects of online instruction on teachers' concerns about technology integration. *International Journal of Instructional Technology and Distance Learning, 1*(1), Retrieved from: http://www.itdl.org/journal/Jan_04/article03.htm

Lord, G., & Lomicka, L. (2011). Calling on educators: Paving the way for the future of technology and CALL. In Arnold, N. & Ducate, L. (Eds.), *Present and future promises of CALL: From theory and research to new directions in language teaching* (pp. 441–469). San Marcos, TX: CALICO.

Lotze, N. (2018). Goodbye to classroom teaching? Artificial intelligence in language learning. Translation: Chris Cave. Copyright: Goethe-Institut e. V., Redaktion Magazin Sprache. Retrieved from:
https://www.goethe.de/en/spr/mag/dsk/21290629.html?forceDesktop=1.

Luckin, R., Holmes, W., Griffiths, M. & Forcier, L. B. (2016). Intelligence Unleashed. An argument for AI in Education. London: Pearson.

Luke, C. L., & Britten, J. S. (2007). The expanding role of technology in foreign language teacher education programs. *CALICO Journal, 24*(2), 253–267.

Magnisalis, I., Demetriadis, S., & Karakostas, A. (2011). Adaptive and Intelligent Systems for Collaborative Learning Support: A Review of the Field. *IEEE Transactions on Learning Technologies*, 4(1), 5 – 20.

Marr, B. (2018). The Key Definitions Of Artificial Intelligence (AI) That Explain Its Importance. *Forbes*. Retrieved from:
https://www.forbes.com/sites/bernardmarr/2018/02/14/the-key-definitions-of-artificial-intelligence-ai-that-explain-its-importance/#40ebc5304f5d

Myers, M. J. (2000). Voice recognition software and a hand-held translation machine for second-language learning. *Computer Assisted Language Learning*, 13(1), 29–41. doi: 10.1076/0958-8221(200002)13:1;1-k;ft029

Meriam-Webester Dictionary (online). https://www.merriam-webster.com/dictionary/artificial%20intelligence

Niño, A. (2008) Evaluating the use of machine translation post-editing in the foreign language class. *Computer Assisted Language Learning*, 21(1), 29-49, DOI: 10.1080/09588220701865482

Niño, A. (2009). Machine translation in foreign language learning: language learners' and tutors' perceptions of its advantages and disadvantages. *RecALL*, 21(2), 241–258. doi: 10.1017/S095834400900017

Park, C. N. & Son, J.-B. (2009). Implementing Computer-Assisted Language Learning in the EFL Classroom: Teachers' Perceptions and Perspectives. *International Journal of Pedagogies and Learning*, 5(2).

Pelgrum W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers & Education*, 37(2001), 163–178.

Peters, M. (2006) Developing computer competencies for pre-service language teachers: Is one course enough? In Hubbard, P. & Levy, M. (Eds.), *Teacher education in CALL* (pp. 153–165). Philadelphia, PA: John Benjamins Publishing Company.

Pokrivcakova, S. et al. (2015). *CALL and Foreign Language Education: e-textbook for foreign language teachers*. Nitra: Constantin the Philosopher University. Available at: http://www.klis.pf.ukf.sk/public/S.%20Pokriv%C4%8D%C3%A1kov%C3%A1%20et%20al.%20-%20CALL%20and%20Foreign%20Language%20Education.pdf

Rakes, G. C., & Casey, H. B. (2002). An analysis of teacher concerns toward instructional technology. *International Journal of Educational Technology*, 3(1).

Rilling, S., Dahlman, A., Dodson, S., Boyles, C., & Pazvant, O. (2005). Connecting CALL theory and practice in pre-service teacher education and beyond: Processes and Products. *CALICO Journal,* 22(2), 213-235. DOI: 10.1111/j.1944-9720.2006.tb02276.x

Rogers, M. (1996). Beyond the dictionary: the translator, the L2 learner and the computer. In Anderman, G. & Rogers, M. (Eds.), *Words, words, words. The translator and the language learner* (pp. 69–95). Clevedon: Multilingual Matters.

Russell, G., & Bradley, G. (1997). Teachers" computer anxiety: Implications for professional development. *Education and Information Technologies*, 2, 17-30.

Russell, S. J. & Norvig, P. (2010). Artificial Intelligence: A Modern Approach (3rd ed.). Upper Saddle River, New Jersey: Prentice Hall.

Sabzian, F., & Gilakjani, A. P. (2013). Teachers' attitudes about computer technology training, professional development, integration, experience, anxiety, and literacy in English language teaching and learning. *International Journal of Applied Science and Technology,* 3(1). Retrieved from http://ijastnet.com/journals/ Vol_3_No_1_January_2013/9.pdf

Schulze, M. (2008). AI in CALL—Artificially Inflated or Almost Imminent? *CALICO Journal,* 25(3), 510-527.

Setyarini, M. C. E. (2015). Understanding Teachers' Computer Anxiety. *Eternal: English Teaching Journal,* 6(1), 74-87.

Steding, S. (2009). Machine translation in the German classroom: Detection, reaction, prevention. *Teaching German*, 42(2), 178–189. doi: 10.1111/j.1756-1221.2009.00052.x

Stone, P., Brooks, R., Brynjolfsson, E., Calo, R., Etzioni, O., et al. (2016). *Artificial Intelligence and Life in 2030. One Hundred Year Study on Artificial Intelligence*: Report of the 2015-2016 Study Panel. Stanford University, Stanford, CA. Retrieved from: http://ai100.stanford.edu/2016-report

Straková, Z. & Cimermanová, I. (2018). Developing reflective skills of student teachers in the virtual learning environment. *Electronic Journal of e-Learning,* 16(2), 107-121.

The Encyclopaedia Brittanica. https://www.britannica.com/technology/artificial-intelligence

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Torres, N. V. (2006). How Well are ESL Teachers Being Prepared to Integrate Technology in Their Classroom? *Teaching English as Second or Foreign Language e-Journal*, 9(4), 1-28.

White, K. D., & Heidrich, E. (2013). Our policies, their text: German language students' strategies with and beliefs about web-based machine translation. *Teaching German*, 46(2), 230–250. doi: 10.1111/tger.10143

Williams, L. (2006). Web-Based Machine Translation as a Tool for Promoting Electronic Literacy and Language Awareness Article. *Foreign Language Annals,* 39(4), 565 – 578.

Williams, L., Abraham, L., & Bostelmann, E. (2014). A discourse-based approach to CALL training and professional development. *Foreign Language Annals, 47*(4), 614–629. https://doi.org/10.1111/flan.12119

Zawacki-Richter, O., Marín, V. I., Bondand Franziska Gouverneur, M. (2018). Systematic review of research on artificial intelligence applications in higher education–where are the educators? *International Journal of Educational Technology in Higher Education*, 16, 39(2019), doi:10.1186/s41239-019-0171-0

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