PRE-SERVICE TEACHERS' PERCEPTIONS OF AI AND ITS IMPLEMENTATION IN THE FOREIGN (ENGLISH) LANGUAGE CLASSROOM

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Abstract. The potential for using artificial intelligence (AI) systems in education (including foreign language teaching and learning) poses new demands on 21st century pre-service teachers who need to be prepared to integrate it successfully in their classrooms. The current paper, therefore, aimed to examine the attitude and readiness of 52 Bulgarian pre-service foreign language teachers on using AI in English language instruction. Based on the data obtained, it was established that the pre-service teachers demonstrated a general positive disposition towards using AI tools in their foreign language lessons and declared their readiness to implement AI technologies in the foreign language classroom but lacked the skills and competencies needed to do so. The results also showed that teacher training institutions and policy makers on national level have to define the AI knowledge, competencies and skills of prospective teachers so that they could actively engage with AI ethically and meaningfully in their profession.

Keywords: Pre-service English language teachers; pre-service AI teacher training; attitude towards AI; readiness to implement AI technologies; AI-supported foreign language teaching and learning

Introduction

The potential of artificial intelligence (AI) in education has been an issue of debate ever since AI generated tools permeated the lives of both students and teachers around the world. While some consider it a "game changer" (Richardson & Clesham 2021, p. 10) due to the unprecedented opportunities AI offers for active learner engagement and personalized instruction, others remain uncertain about its positive effect on students' learning, performance and assessment (Wu & Yu 2023; Chen & Lin 2024; Rahman et al. 2023; Chiu, Moorhouse, Chiu et al. 2023; Chan & Hu 2023). Regardless of the perspective undertaken, AI is a fundamental component of modern pedagogy that puts forward the need to redefine not only the traditional roles of teachers and students, but also reconsider

the competencies of educators to support learning, teaching and assessment though AI-driven technologies.

In the light of this, the number of research studies focusing on the preparation and capacity of teachers to implement AI tools in their teaching practices is increasing in the recent years. However, current research on teachers' perceptions and readiness to engage with AI professionally is mainly focused on in-service teachers. For instance, Nazaretsky et al. (2022) researched the trust of practicing K-12 science teachers to AI and their willingness to make it a constituent element of their teaching practices. They established that teachers' lack of knowledge about AI was the main prerequisite for their fear that AI could replace teachers and thus devalue their job. Still, when teachers were provided with rigorous training that included both theoretical knowledge and hands-on experience on how to utilise AI tools and instruments in their educational settings (as part of the designed by the researcher teacher training programmes), their openness towards and AI and readiness to exploit its didactic potential increased. Consistent with this are the data from a study conducted by Lee, Davis and Rye (2024) on the acceptance of AI technology by Korean in-service teachers. The results indicated that teachers had a favourable attitude towards AI-based teaching and learning and perceived AI focused teacher professional development programmes as a substantial contributor to their increased knowledge and skills to leverage AI in education. Additionally, Alvarez-Herrero (2024) investigated the opinion of Spanish teachers on AI and its utilization in education and concluded that they needed further training in order to get a better understanding of the nature, risks and limitations of AI, on the one hand, and improve their pedagogical capacity to utilise it in their teaching and learning settings, on the other hand.

Previous works have also shown the effect of various factors on university teachers' readiness to adopt AI in their teaching routines. Wang et al. (2021) used the Technology Acceptance Model (TAM) to track the intention of university academic staff to integrate AI tools in their teaching. They evaluated the interplay of teachers' anxiety, attitude towards AI, self-efficacy, perceived ease of use and perceived usefulness and came to the conclusion that the increased self-efficacy of university teachers could lower their anxiety to approach AI technologies.

The available research on the factors that affect the attitude of pre-service teachers towards AI is scarce. Nevertheless, present studies on the acceptance and readiness of teacher candidates to incorporate AI in their lessons invariably demonstrate that there is a strong correlation between pre-service teachers' beliefs and their future actions (Ajzen 2011). For instance, Zhang et al. (2019) approached 452 German pre-service teachers in order to determine the factors that govern their acceptance of AI educational tools. They established that the main factors which had an effect on the pre-service teachers' intention to use AI were the perceived ease of use and perceived usefulness. The authors also found that self-efficacy was

a strong positive determinant of future teachers' AI use only if teacher training programmes included concrete examples which showcased how AI technologies could be incorporated in the classroom.

Another important finding, which is in compliance with the results of other researchers (Haseski 2019; Pokrivcakova 2023), is the negative attitude of prospective teachers to AI. In his study Haseski (2019) determined that pre-service teachers perceived AI as a threat because it could replace teachers and thus put an end to the teaching profession. Furthermore, the negative emotions evoked by AI were triggered by the risks associated with AI among which reducing students' creativity and ability to think critically, potential violation of privacy and confidentiality, health and security risks, destruction of humanity. In a like manner Pokrivcakova (2023) stated that pre-service teachers perceive AI both as a threat to humanity and as an additional burden to the workload of language teachers. Furthermore, she highlighted the pessimistic concern of future EL teachers that AI would diminish the emotional bond between students and teachers and subsequently lower the quality of their interpersonal skills to empathise, participate in meaningful interaction and work collaboratively.

Despite the fact that existent research sheds light on the various factors that shape the opinion of pre-service teachers on AI in education and has acknowledged their readiness to make it an essential component of their pedagogical repertoire, to our knowledge the research of Pokrivcakova (2019) is the only work which focuses on pre-service foreign (English) language teachers' attitude towards AI and its integration in the teaching and learning of English as a second language (L2). This is the reason why we decided to fill in this void in research literature by providing a snapshot of the perceptions and readiness of a sample of pre-service English language (EL) teachers from Bulgaria on AI integration in the L2 classroom.

Research questions and hypotheses

The current study aims to discover the answers to the following research questions (RQ):

RQ1: What is the attitude of pre-service EL teachers on the implementation of AI in English language teaching and learning?

RQ2: Do pre-service EL teachers consider themselves ready to employ AI technology in their future professional practice?

Given the fact that research findings prompt the positive influence of pre-service teachers' basic knowledge of AI on their eagerness to incorporate AI supported tools in lesson planning and execution (Sanusi, Ayanwale & Tolorunleke 2024; Zhang et al. 2023), it is logical to suppose that future teachers' awareness of the nature, principles and specifics of AI will have a positive effect on their attitude towards AI enhanced education. Contingent upon research findings that pre-service teachers' capacity to implement AI in foreign language instruction is an antecedent

of their readiness to incorporate it in their educational circumstances (Martí-Parreño, et al. 2018; Li et. al. 2022; Sanusi, Ayanwale & Tolorunleke 2024), we could also assume that prospective teachers' readiness to creatively engage with AI is dependent upon their skills and competences to do so. Therefore, we formulated the following hypothesis: pre-service EL teachers' readiness to incorporate AI in the process of foreign language instruction is correlated to their attitude towards AI implementation in the teaching and learning of English and their pedagogical knowledge and skills to design and manage AI supported EL lessons.

Methodology
A. Study sample
The participants in the study were 52 pre-service teachers of English as foreign language from the University of Ruse. 92,30% of the study subjects were enrolled in the primary school EL teachers undergraduate programme, while 7,69% attended the post graduate programmes for primary and lower secondary school teachers of English. The gender ratio of the study sample represented the typical gender profile of teacher training programmes – 5,77 % (N = 3) male and 94,23 % (N = 49) female. The participants were in their first (19,23%, N = 10), second (23,08%, N = 12), third (26,92%, N = 14) and fourth (30,77%, N = 16) year of study and their mean age was 23,06 (SD = 4,22).
B. The instrument
The instrument utilized for the purposes of the study was a questionnaire designed by the researcher after examining existing studies specifically focused on investigating the opinion and attitude of EL pre-service and in-service teachers on the use of AI in foreign language instruction (Laborda, Diaz & Ramirez 2020; Edmet, Ichaporia, Crompton & Crichton 2023; Pokrivcakova 2023).
The questionnaire was written in Bulgarian and was created by using Google Forms. The first section collected demographic information (items 1 – 4) (e. g. gender, age, year of study, study programme) and the other three sections comprised statements structured along a 5-point Likert scale (ranging from 1 = Strongly disagree to 5 = Strongly agree). The second section (items 5 – 8) focused on determining the knowledge of the study subjects of AI technologies used in their everyday lives and the acquisition of the target language (K-AI). The third section (items 9 – 21) elicited responses on the attitude of pre-service EL teachers on the use of AI in EL teaching) (Att-AI) and the fourth section explored the readiness (items 22 – 23) (R-AI) and competencies (items 24 – 34) of the study respondents to apply AI technologies in the process of EL teaching and learning (Comp-AI).
The reliability and validity of the online questionnaire was assessed by calculating the mean score (M), standard deviation (SD), Skewness, Kurtosis and Cronbach's alpha of each of the four variables explored in our study (Table 1).

Table 1. Descriptive statistics of the study deliverables

Variable	M	SD	Skewness	Kurtosis	Cronbach's alpha
K-AI	3.52	0.55	0.59	0.961	0.807
Att-AI	3.67	0.69	0.48	0.512	0.701
R-AI	3.49	0.79	0.56	0.688	0.728
Comp-AI	3.24	0.80	0.35	0.627	0.895

The statistical results about the mean scores of the four study deliverables indicate that they range from 3.24 to 3.67, while the SD is lower than 1 which suggests that the distribution of the responses is narrow. The ranges of the Kurtosis (from 0.701 to 0.961) and the Skewness (0.35 to 0.59) show a relatively balanced distribution as the values of both the Skewness and Kurtosis are close to 0 (Cohen et al. 2003). The reliability of all variables is adequate as the Cronbach's alpha is above 0.7 (DeVillis 2003). All this proves that the data obtained through the online questionnaire are reliable and valid.

C. Data collection procedure and analysis

The link to the online questionnaire was sent by the researcher through e-mail to a total of 81 pre-service EL teachers from the University of Ruse (Bulgaria) at the beginning of March 2024 and they were given two weeks' time to fill it in. Participation in the questionnaire was voluntary and anonymous. By completing the questionnaire participants declared their agreement that their answers will be utilised in the present study. Out of the 81 students approached, 52 participants responded.

Data analysis was performed by the researcher once the study sample completed the online questionnaire. The descriptive analytical approach was used along with inferential statistics that give insights on the relationships among the four variables – K-AI, Att-AI, R-AI and Comp-AI. The statistical processing of the collected data was performed by the SPSS software (version 29) and involved the testing of the reliability of the questionnaire items (calculating the Cronbach's alpha) followed by a multiple regression analysis used to discover and assess the interplay between the different variables and an ANOVA-test to determine if there are differences between the attitude and competences to use AI among the study subjects with regard to their year of study.

Results

In this section we will present only the results relevant to the formulated research questions and the research hypothesis. Details about the study subjects' knowledge of AI technologies and competencies to implement AI applications in the teaching of English as a target language will be presented and discussed in another publication.

*Attitude of the study subjects on the integration of AI in foreign language education*

The attitude of the pre-service EL teachers towards AI technologies is assessed by their responses to items 9 – 21 in the online questionnaire (Figure 1).

A generally positive disposition to the implementation of AI in EL instruction is revealed by the responses of the study sample to items 9 to 13. The answers of the study subjects to item 9 demonstrated that most of the pre-service teachers (61,5 %) agreed that AI technologies have their place in the foreign language classroom, while only 15,6% expressed their disagreement. The percentage of pre-service teachers who were not sure whether AI would bring more benefits to L2 instruction of primary school pupils than drawbacks were 23,1% which is one third of the study sample. The range of responses to items 10 – 13, which focus on the impact of AI tools on the receptive and productive L2 skills of learners, showed that the study respondents acknowledged the beneficial effect of AI applications on the speaking, writing and reading comprehension skills of EL learners. The percentage of pre-service teachers who expressed strong agreement or agreement was 63,4 % for speaking, 55,8 % for writing and 63,4 % for reading.

The negative attitude of pre-service EL teachers towards the implementation of AI technologies in the L2 classroom is indicated by their answers to items 14, 16 and 18. There was a broad agreement among the study respondents that AI would negatively affect EL tuition (item 14) as 65,4% of the pre-service teachers strongly agreed with the statement, 13,5% expressed their agreement, whereas only 3,8% disagreed. The pre-service teachers also asserted their lack of agreement that AI would make the jobs of EL teachers easier (item 18), with 19,2% strongly disagreeing and 26,9% disagreeing and only 9,6 % strongly agreeing. Responses also outlined the unanimous disbelief of the study subjects that AI would boost their professional pedagogical skills to design and manage EL lessons (item 16). A total of 59,6% of the future teachers expressed their strong disagreement or disagreement with the statement in item 16. However, 30,8% of them chose the neutral answer and less than 10% consented with item 16.

Similar results were obtained in items 17, 19 and 21 which highlight pre-service EL teachers' perception of AI as a either a threat to the teaching profession or a factor that impedes the work of foreign language teachers. There was an almost equally balanced percentage of answers along the rating scale of item 17 – 32,7% strongly disagreed or disagreed, 40,4% strongly agreed or agreed and 26,9% remained neutral, whereas the answers to item 19 indicated a much higher concentration to the neutral level with 53,8% of the responses, 36,6 % of agreement and 9,6% of disagreement. The predominant consent of the teacher candidates with item 21 (69,5% of the study subjects agreed or strongly agreed) signaled that they perceive AI based applications for automatic translation a challenge to the profession of

language teachers and of translators as the development of such tools makes language learning unnecessary.

To what extent do you agree or disagree with the following statements
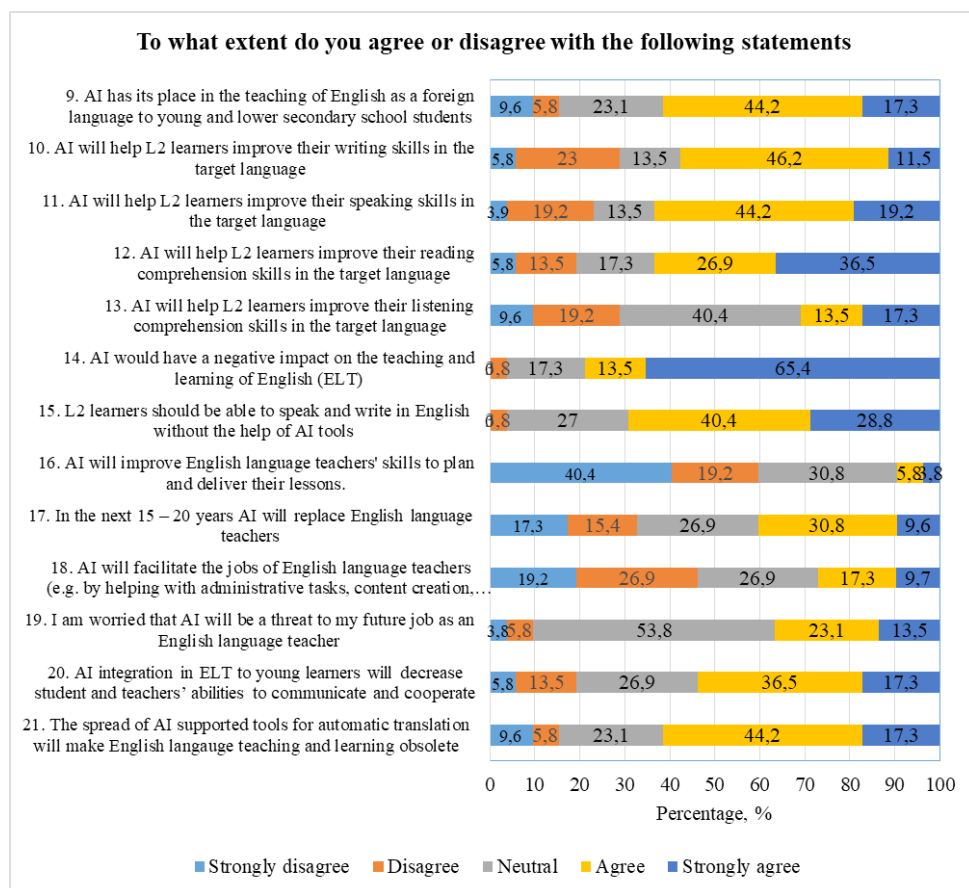
Figure 1. Attitude of the study respondents to the implementation of AI in the English language teaching and learning

The negative appraisal of the study respondents towards AI language learning tools on the productive skills of L2 language learners and on the communicative skills of both teachers and students was exemplified by their answers to items 15 and 20. More than half of the study participants – 65,4% agreed that L2 learners' productive skills should not depend on AI applications (item 15). Furthermore, 53,8% of them agreed or strongly agreed that AI technology would lower the quality of classroom interaction of both EL teachers and learners. The

results elucidated the belief of the pre-service teachers that language proficiency and language performance are strictly human faculties that are developed and improved only when communicating with other humans and that this should not be changed.

A. Readiness of the study subjects on the integration of AI in foreign language education

The readiness of the study subjects to approach AI technologies in L2 instruction was measured by their responses to items 22 and 23 (Figure 2).
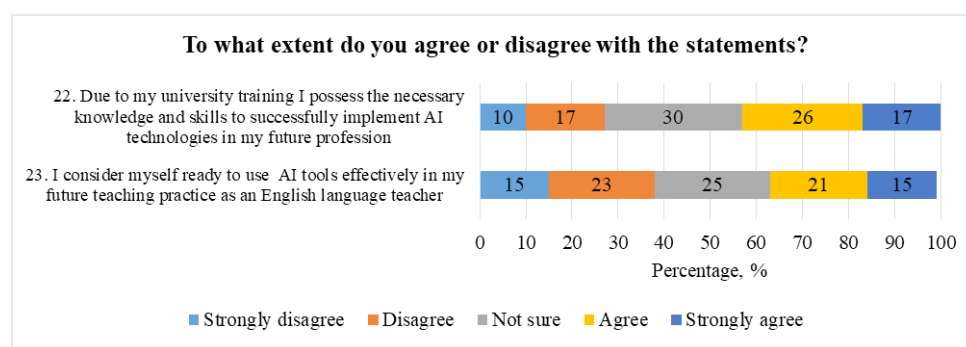
Figure 2. Readiness of the study subjects to implement AI technologies in L2 instruction

The majority of the pre-service EL teachers expressed the opinion that their university training equipped them with the required knowledge and competencies to effectively deploy AI supported foreign language lessons in their future professional career. The responses of the study participants to item 23 revealed that nearly half of them – 41% agreed or strongly agreed with the statement and nearly a third of them (10% strongly disagreed and 17% disagreed) were skeptical about it. 30% of the pre-service teachers were not sure whether they were prepared well-enough to engage successfully with AI technologies in their prospective jobs.

The answers to item 23 showed that 36% out of all study subjects perceived themselves ready to incorporate AI tools in the L2 classroom (36%) whereas an almost equal percentage of the study participants (38%) considered themselves not ready to engage in similar pedagogical practices. A considerable percent of the pre-service teachers (25%) remained neutral.

B. The interplay between the study subjects' readiness to implement AI technologies and attitude towards AI

The relationship between the readiness of the study subjects to implement AI technologies in L2 instruction (R-AI) and their attitude towards AI (Att-AI) was

assessed by a correlation analysis of the study variables (Table 2) and a subsequent multiple regression analysis.

Table 2. Correlation coefficients among the four study variables

	K-AI	Att-AI	R-AI		Comp-AI
K-AI	1				
Att-AI	0.579**	1			
R-AI	0.602**	0.577**	1		
Comp-AI	0.503**	0.639**	0.677**		1

** Correlation is significant at the 0.01 level (2-tailed correlation)

The data in Table 2 indicate a strong positive relation between the two variables in focus – Att-AI and R-AI (r = 0.579) and in fact demonstrate a strong positive relation between all four variables.

The multiple regression analysis manifested the statistically significant dependence of the third variable R-AI upon the rest of the variables – F (2.182) = 6.20, p <0.001, R^2 = 0.849. The variable that was found to be the strongest predictor of the study subjects' readiness to implement AI technologies in L2 instruction (R-AI) was their competence to implement AI tools in education (Comp-AI) (β = 0.407, p < 0.001), followed by their attitude towards AI (Att-AI) (β = 0.341,   p < 0.001) and their knowledge of AI applications (K-AI) (β = 0.208, p < 0.001).

Discussion

The results obtained from the performed data analysis with regard to the first research question (RQ1) reveal that the study respondents have a positive attitude to the integration of AI applications in the L2 classroom. The pre-service EL teachers acknowledge the positive influence of AI technologies on the development of learners' skills to engage in meaningful oral or written communication and to comprehend the meaning of texts perceived aurally or visually. However, they voiced their concerns about its power to diminish human interaction, replace teachers and put an end to the teaching and learning of languages. These results are not surprising as they comply with the concerns expressed by pre-service teachers reported in previous studies (Haseski 2019; Pokrivcakova 2023) and by in-service EL teachers (Edmet et al. 2023). In addition to that, though AI is generally perceived as a technology that could lower the workload of teachers and enrich their pedagogical repertoires as it "combine[s] different learning methodologies and instructional design" (Ibryamova & Arsov 2018, p. 420), it is considered by the study respondents as a technology that has a negative effect on the teacher, students and the education process.

It is interesting to note that around a third of the participants chose to give a neutral answer to some of the questions assessing their attitude towards AI and its projection

in the teaching and learning of English. That was also marked in the available studies focused on pre-service teachers' behavioural intentions to engage pedagogically with AI in their prospective workplace (Haseski 2019; Pokrivcakova 2023) and by the empirical works providing insights on the relationship between pre-service teachers' knowledge of AI technologies and competences to work with them in the classroom (Zhang et al. 2023). A plausible reason behind the answer "Not sure" could be the mixed feelings of the representatives of the digital generation who use AI tools every day, but who do not have enough experience to approach them didactically. Another possible explanation could be the fact that university academic staff involved in the preparation of prospective teachers do not act as role models. We cannot deny the fact "university academic staff are trying to respond adequately to the dynamic changes in education … and adapt … to the needs of the digital generation of learners" (Ivanova & Ibryamova 2023, p. 123). Still higher education institutions are lagging behind the rapid boom of AI technologies and are persistently trying to build their capacity to incorporate AI systems in their administrative, research and educational activities. Due to this university academic staff needs to enhance their AI knowledge, skills and competences by taking part in informal training or formal learning opportunities that provide the basic knowledge of AI technologies and their use in education (Bosen et al. 2023). Still, teacher training programmes need to provide the future teachers with adequate knowledge of AI-based educational tools and of the benefits of deploying AI applications in the education process – "high degree of personalized leaning opportunities, detailed and simultaneous feedback, which, in itself, [are] … a prerequisite for the effectiveness of the learning process" (Stefanova 2023, p. 177). Thus, candidate teachers would gain an awareness of the characteristics and features of AI and of the respective AI driven educational applications and would be able to also approach pedagogically AI technologies with less anxiety and fear.

The results of our study directly related to answering our second research question (RQ2) are contradictory. One the one hand, the Bulgarian pre-service EL teachers claimed that their university training has prepared them to effectively employ AI technologies in the instruction of English, nearly half of the study respondents declared that they were not ready to utilise AI in their prospective career activities and almost the same number of them remained uncertain about their readiness to incorporate AI tools in their roles as teachers. These results could be interpreted in the light of the data obtained from the correlation and multiple regression analysis of the four variables tracked in the study. The data from these two analyses revealed that the strongest predictor of the readiness of the Bulgarian study subjects to integrate AI technologies in their pedagogical settings was their competence to utilize AI-supported educational content and techniques and not the pre-service teachers' attitude towards AI followed by their attitude to do so. These

results confirm our research hypothesis and are in accordance with the findings of other researchers who examined the correlation between pre-service teachers' self-efficacy to approach AI technologies for pedagogical purposes, knowledge and skills to engage with them in the education process and their attitude towards AI applications (Zhang et al. 2023). In fact, empirical studies prove that one of the factors that is highly significant of pre-service teachers' readiness to design educational setting enriched with AI technologies, is their knowledge and competence to deploy AI educational tools and products.

We could also claim that pre-service teachers' uncertainty about their readiness to use AI technologies in their L2 classrooms is indicative of the fact that the prospective EL teachers lack sufficient understanding of the benchmark competencies that they need to possess in order to be able to self-assess whether they are competent enough to make informed decisions about which AI applications to choose and how to implement them in their target language lessons. This puts forward the following implications: education decision makers and policy stakeholders on national and EU level have to design and implement an AI competence framework for teachers which would define the AI proficiency levels of educators. This framework would offer clear guidance and clear reference points to higher education institutions involved in teacher training (including the preparation of EL teachers) on the AI knowledge, skills, competences graduate teachers need to possess at the end of their university training.

Limitations

The limitations of the current study are mainly related to the gender profile of the study sample which deprived us from exploring the gender specific perceptions towards AI technologies and their integration in foreign (English) language education. Further research is also need in order to evaluate the impact of other factors (e. g. perceived ease of use, perceived usefulness, anxiety) that could affect pre-service teachers' attitude and readiness to navigate AI-based applications in education.

Conclusions

The results of the research study demonstrate that although pre-service EL teachers appreciate positively the potential of AI technologies to facilitate the process of L2 acquisition, they have mixed feelings towards their implementation in foreign language instruction. The main concerns of pre-service teachers are triggered by their fear that AI supported tools could replace teachers in the future and that AI could cause certain limitations on genuinely human activities such as teacher-student interaction or language acquisition. The caution expressed by the candidate teachers is a clear indication of the fact that they do not follow blindly the digital hypes in education; rather, they approach them critically. However, that

also suggests that the future teachers' appraisal of AI integration in the acquisition of a foreign language is salient to their general knowledge of AI and specific skills and competences for designing AI enriched educational scenarios. The latter claim resonates with our finding that pre-service EL teachers' readiness to use AI technologies in their future careers depends strongly upon their pedagogical skills and competences to offer AI-enhanced foreign language teaching and learning opportunities.

The research undertaken clearly indicates to education stakeholders and university academic staff on national and European level that pre-service teacher training programmes need to be updated so that they not only offer authentic theoretical and practical knowledge of AI and hands-on learning experiences for the future teachers of languages on using AI driven tools for educational purposes, but are based on relevant AI competence levels. This, along with a straightforward university policy that advocates for the integration of AI tools in the academic and administrative affairs of higher educational institutions, would successfully foster the positive attitude of pre-service EL teachers towards AI technologies and will increase their perceived self-efficacy to implement AI tools in their professional contexts.

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