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Exploring challenges and opportunities of using generative AI among Latvian teachers

MA thesis

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**Abstract**

This research explores the challenges and opportunities encountered by Latvian teachers when integrating generative AI tools in their teaching practices. This study identifies several key challenges such as insufficient amount of data about Latvian language and context, and the linguistic differences between Latvian and English languages that impact the performance of generative AI. Strategies such as using translation tools and developing high-quality prompts help to overcome these challenges. Additionally, the need for professional development support is highlighted that addresses the diverse needs and teacher's preparation levels of utilizing generative AI.

**Keywords**

Generative AI, prompts, large language models, low-resource languages.

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## **Introduction**

In recent years the integration of Generative AI in educational setting holds a promising potential to transform teachers teaching practices and enrich student learning experiences. By using generative AI powered tools such as Generative Pre-trained Transformers (GPT) teachers all around the world have gained the opportunity to use this tool to change their instructional methods, facilitate their teaching, and improve their students' learning outcomes (Cheng & Wang, 2023).

However, in the context of the Latvian educational system, the adoption of generative AI technologies presents various challenges, especially concerning the effective utilization of generative AI in a low-resource language environment. Latvian language can be classified as a low-resource language because it's spoken by approximately 1,5 million people world-wide. This leads to the generated information being of low grammatical quality or misleading, due to the insufficient amount of data available in Latvian language (Jordan et al., 2024). These challenges hinder teachers from integrating generative AI into their teaching practice and benefit from the opportunities this technology provide.

For teachers to benefit from the opportunities offered by generative AI tools, they need to have knowledge about different types of generative AI tools and skills to use this technology appropriately. Additionally, teachers need to be familiar with the capabilities and potential risks of utilizing these tools. (Wang et al.,2023).

While professional development training has the potential to equip teachers with the necessary competencies to effectively integrate generative AI into their teaching practice, it's important that these training programs are tailored to the individual needs of educators (Whalen & Mouza, 2023). Such professional development can better equip improve teachers' overall readiness and confidence to utilize generative AI tools in education to overcome challenges related to Latvian language that are present along the way.

## **1.Theoretical background**

### **1.1. What is Generative AI?**

Generative AI is a computer system that has some of the qualities that a human brain has, such as the ability to interpret language, recognize images, and learn from data supplied to it. It is a particular artificial intelligence that can generate new content such as texts, images, etc (Cambridge University Press, 2024). Generative AI generates new texts by combining the

content and style of billions of existing texts generated by other humans (Steele, 2023). Today the functionality of artificial intelligence (AI) tools has progressed significantly and now this technology has the potential to revolutionize educational systems and facilitate the daily work of educators (Wogu et al., 2018).

A prominent example of generative AI is Chat Generative Pre-Trained Transformer (Chat GPT). It is a predictive language model which replicates human language patterns but lacks the human understanding. Chat GPT can process and analyse large numbers of data using various machine learning algorithms to generate responses according to the user preferences. The first Chat GPT model was introduced by Open AI in June 2018. Subsequently, these technologies continued to improve and on November 2022 the version of Chat GPT 3-5 was introduced to the public. This model was trained on diverse datasets, comprising books, articles and webpages and it was free to use by users all over the world (Parker et al., 2024). On March 2023 Open AI launched the latest version of Chat GPT 4.0. The new model has improved its' capabilities in image recognition and the quality of generated responses, as well in eliminating shortcomings related to text input. The GPT-4 model can better solve complex problems and handle more detailed instructions, as well it can generate more diverse and creative texts (Parker et al., 2024).

## **1.2. Opportunities for teachers**

Lee & Kwon, (2024) reported that generative AI has been integrated in K-12 education in such countries in Asia as China, Korea, Taiwan, Israel and Thailand. Additionally, generative AI was present education in K-12 education in the United States and Australia and in such European countries as Spain, Belgium, Denmark and Finland. They noted that most of these studies were focused on secondary education. The duration of teaching students about AI differed from 90-minute lessons to a whole semester and covered different branches of AI – machine learning, neural networks, deep learning, and robotics (Lee & Kwon, 2024).

While digital literacy such as programming and data analysis is important for understanding AI, teachers need to support their students, so they better understand, interact and solve problems collaboratively with AI. Teachers should develop their students understanding about the core concepts of AI and establish sensibility of its limitations to recognize what it can and can't do (Kim et al., 2022).

Students can utilize Chat GPT in educational settings, for example, to ask chatbot a question in the same manner they would ask their teachers. Furthermore, by providing suggestions, this tool can be used to support and improve students reading and writing skills. This is possible because Chat GPT is able to understand and respond to natural language queries (Rahman & Watanobe, 2023). Teachers can benefit from this capability to enhance their student's text comprehension skills. For example, students can utilize AI tools for summarizing articles they have already read. Afterwards, students can evaluate the AI generated summaries and discuss what the AI got right and wrong, and why did it misunderstand certain details. Moreover, in literature classes the AI can be used to analyse, for example, character's motivation in a well-known story. Afterwards, the teacher can ask their students to compare their interpretations with AI's analysis (Steele, 2023).

Research by Kaspersen et al., (2022) noted that high school students can explore the impact of machine learning in democratic elections. Additionally, findings from Vartianen et al., (2021) stated that elementary school students learned about the fundamental ideas of machine learning and worked in groups to provide solutions for everyday problems using machine learning. Moreover, AI tools can be used to effectively enhance technology use in education improving students' skills and performance in areas related to AI, such as programming and learning machine learning algorithms. AI education enhances students' problem solving and critical thinking skills, helping them to effectively interpret AI generated results and apply AI concepts to real world problems. This approach can encourage students to create their own unique solutions, improve their AI literacy, and empowers them to be creators of AI applications (Lee & Kwon, 2024).

To provide an effective learning process for students, teachers' ability to teach needs to be strengthened. Generative AI can be utilized to support teachers in different tasks, for example, uploading, assigning and distributing learning materials, and speaking out text-based problems using text to speech technologies (Chiu et al., 2023). Findings from research by Hashem et al., (2024) indicate that AI recommendations can help teachers to develop personalized lesson plans and lesson content, potentially preventing teacher burnout. Teachers can utilize AI to perform routine tasks so they have more time to focus their attention on activities that can't be done by machines (Cheng & Wang, 2023).

Moreover, generative AI tools can be utilized to facilitate the administrative work, enhance the quality of learning materials, and to develop intelligent tutoring systems (Tahiru, 2021). AI powered learning analytic enables teachers to make data drive decisions about their teaching and learning practice. By utilizing generative AI powered analytics programs

educators can predict student performance, provide them differentiated instructions and effective feedback (Cheng & Wang, 2023).

Assessments generated by AI have demonstrated a significant impact on student performance. In different subjects, for example, biology, history and math AI powered assessments gives students often surpassed traditional methods. The tasks generated with the support from AI allowed students to achieve higher grades and improve their learning outcomes. This underscores the potential of AI in creating effective tools for education (Parker et al., 2024). However, it's important for teachers to review and refine AI generated content to confirm that it's accurate and relevant. To get the best result teachers need to write relevant, coherent and consistent prompts which need to fit the intended purpose of the output (Murugesan & Cherukuri, 2023).

### **1.3. The challenges related to the integration and contextualisation of Generative AI in education**

Recent advances in AI have made it possible to enhance teaching and learning processes using AI powered tools and services. However, it's necessary to evaluate the ethical concerns these advancements address. There are many different AI ethics guidelines and policy documents that have been announced by different governmental, academic, and industrial institutions. Researchers have identified eleven key principles that guide the development of AI policy such as transparency, justice, privacy and trust (Jobin et al., 2019).

Even with these guidelines in place, it's still unclear how to effectively apply these ethical principles in the context of K-12 education. Additionally, it's essential to understand whether additional principles are needed. In recent studies about AI ethics policies specific to K-12 education researchers have identified both similarities and differences comparing to broader AI ethics guidelines. This highlights the need to develop new ethical principles that fit the unique context of AI in K-12 education, such as pedagogical appropriateness, children's rights, AI literacy and teacher's well-being (Miao et al., 2021). There is a need for creating such learning environments where AI supports children learning and development orientated towards the needs and rights of each individual. Children under the age of 18 are entitled to special care and assistance so their well-being and overall development can be ensured. Some of these rights are the right to a nurturing education, privacy protection and freedom against discrimination (Adams et al., 2023).

Ethical utilization of AI in education requires understanding the potential benefits such as providing personalized learning experiences, and risks such as impact of AI on students' moral and social development. It's important to critically assess the effects of AI on various aspects of student's learning experiences. These considerations need to be balanced with ethical aspects like autonomy, children's rights and freedom (Adams et al., 2023). Moreover, focus on AI education should be addressed not only to the ethical use of AI but as well to the impact of AI on the society. Students who learn about AI need to know the risks, benefits, and personal biases that are associated with AI. Additionally, teachers should encourage their students to engage in discussions about the how AI might impact or replace different professions (Lee & Kwon, 2024).

Artificial intelligence can improve the way how teachers teach and how students learn. However, there aren't clear guidelines from educational institutions about how to integrate these technologies into curriculum. As well school leaders aren't aware that integration of AI into the curriculum is important, and many teachers lack the skills to understand and to use this technology (Chiu et al., 2023).

Some of the main goals for most schools is to measure their students' academic progress, prepare them for state exams and equip them with the necessary skills for everyday life. The public release of Chat GPT can be compared to allowing students to use calculators in math tests. Calculators make calculations easier, however they hinder the teacher's ability to assess their student's basic arithmetic skills. Similarly, if students to utilize Chat GPT in the classroom, it might be difficult for the teachers to measure student's reading and writing skills and problem-solving abilities (Steele, 2023).

Findings from research by Zhou et al., (2023) highlights various limitations of Chat GPT such as issues with logical reasoning, reliability, knowledge learning and robustness. Furthermore, the output generated by Chat GPT might consist of incorrect information and lack truthfulness. The tool might generate incorrect answers, for example, to math or logic questions and it lacks the power of citations. During the 21<sup>st</sup> century teachers worldwide have been cautious to utilize Wikipedia because of its crowd-sourced nature which makes it vulnerable to misinformation. Nevertheless, a significant advantage of Wikipedia over Chat GPT is that all articles in it need to have citations in the form of hyperlinks. Moreover, if an article lacks proper citations, then readers are alerted about the potential misleading information (Steele, 2023).

Another limitation of Chat GPT is that it can't search for real-time knowledge from websites. This might result in the information it provides being out-of-date. Even though Chat

GPT can generate safe and harmless responses, it's still possible to manipulate with it using misleading instructions. While Chat GPT performance in English is good, there is a need for versions with datasets in other languages and cultures (Zhou et al., 2023).

Teacher's time and energy resources are factors that impact the integration of AI into their classrooms. Artificial intelligence is relatively new topic, and many educators aren't familiar with it, and they require professional development to understand and use generative AI technologies effectively. If teachers find this technology useful and easy to use, they will be more likely to adopt them into their teaching practice (Cheng & Wang, 2023).

Teaching in the 21<sup>st</sup> century is constantly evolving, and it exposes teachers to many significant stressors such as overwork, workplace insecurity, and burnout. All these risks affect the overall well-being of teachers that correlates with students' success. However, effective integration of AI into the school curriculum will likely increase the workload of teachers because they will need to participate in professional development courses. Overloading teachers could lead to an imbalance between the resources available to them and challenges they face in school (Adams et al., 2023). It's crucial to address this because of the potential risks associate with teacher burnout. This might result with teachers facing decline in their self-efficiency and self-regulation, feelings of lack of social support and even abandoning their positions (Ghanizadeh & Jahedizadeh, 2015).

At the end of this chapter, it becomes evident that even though generative AI tools have a promising potential to transform teachers teaching practices, various challenges are present for Latvian teachers that hinder the effective utilization of these technologies. The goal of this research is to explore the challenges and opportunities of utilizing generative AI, specifically Chat GPT among Latvian teachers. To address the opportunities of utilizing generative AI in education, it's necessary to develop tailored professional development courses that provide teachers with skills and strategies that support them in overcoming these challenges. By addressing these challenges and opportunities, teachers can better integrate generative AI tools into their teaching practice, enhance their instructional methods and improve their students' learning outcomes. For further investigation of the topic and providing a framework for the research, the following research questions are formulated:

1. What challenges do Latvian teachers encounter when utilizing generative AI tools in their teaching practices within the low-resource language environment of Latvian?

2. How does the linguistic difference between Latvian and English languages impact teachers' ability to effectively communicate and integrate generative AI tools in the classroom?
3. What professional development support is necessary for Latvian teachers to enhance the effective integration of generative AI tools into their teaching practice?

## **2. Method**

The goal of this study is to investigate the limitations and barriers that teachers in Latvia face when implementing chatbots and large language models (LLM) into their teaching practice. For this master's thesis a qualitative research approach was used, and semi-structured written interviews were conducted. Qualitative methods provide an in-depth understanding of the research issues that embrace from the perspectives of the participants and from the context in which they live (Hennink et al., 2020).

Qualitative work is expressed in natural language, and it employs small number of participants and draws on cases chosen in an opportunistic or purposive manner. The small sample size allowed to collect, code and to analyse the textual data gathered from the interviews. Qualitative analysis is useful when not much is known on the topic and when the goal of the researcher is to a develop a new concept, uncover a new hypothesis, or shed light on unknown mechanisms (Gerring, J. 2017).

The research sample and the written format of the interviews were chosen purposely. There weren't many teachers in Latvia who utilize generative AI tools into their teaching practice. The second reason was that when the research took place most of the participants weren't available to participate in face-to-face interviews.

### **2.1. Sample**

This research aims to explore what are the limitations and barriers of Latvian teachers regarding integrating AI tools into their teaching practice. Based on the aim of the research, several criteria for sampling were determined.

1. The participants are currently working in schools as teachers.
2. The participants are non-native English-speaking educators.
3. Teachers should have an experience in utilizing chatbots or large language models.

The participants of this study were teachers from two State gymnasiums in Valmiera, Latvia. The total number of participants was fourteen - four teachers were from State

Gymnasium Valmiera and ten from State Gymnasium Valmiera Pargauja. All participants are Latvian citizens, they teach different subjects, have different experiences and attitudes towards AI tools. As well the teachers vary in their English language proficiency levels.

Participants have different levels of teaching experience, ranging from 2 to 35 years. The most experienced teachers have 28, 32, and 35 years of experience, while the least experienced have 2, 8, and 9 years. The average duration of the participants experience in teaching was 16 years. The age of participants is in range from 23 to 57 years old, the youngest participant is 23 years old and the oldest is 57 years old. The average age of the participants is 38 years. The gender balance wasn't maintained because five participants were males and nine females.

The participants teach in different subject fields, such as natural sciences (5), mathematics (4), languages (3), social sciences (3) and computer science (1). Six participants teach only one subject, seven teach two subjects and one teacher three subjects. Overall teachers teach 13 different subjects (Figure 1).

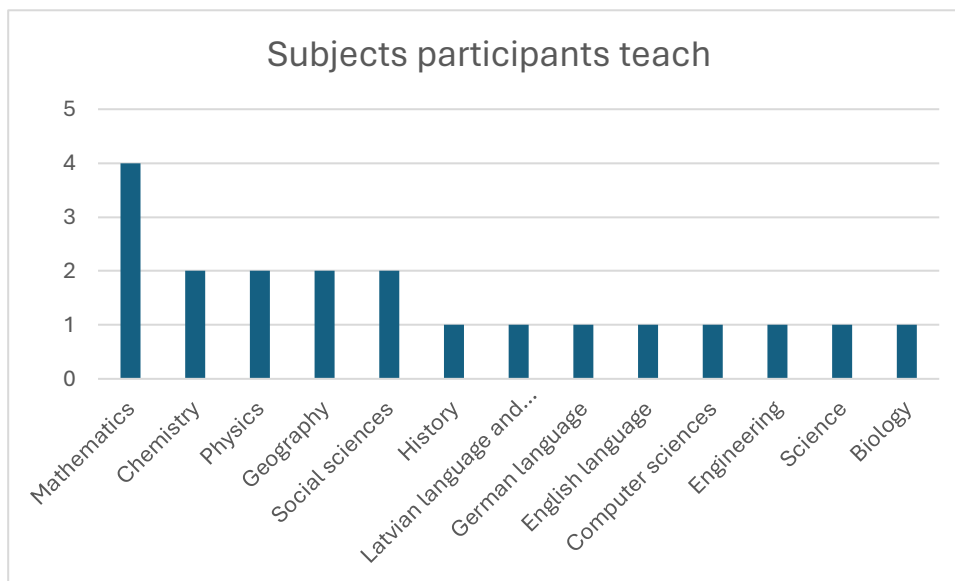


Figure 1: Which subjects do participants teach?

## 2.2. Data collection

The data was collected by conducting semi-structured interviews with non-native English-speaking educators. The designed interview protocol consists of four main parts:

1. Teacher background

2. Participant experience with utilizing chatbots and large language models and integrating them into their teaching practice.
3. The impact of language proficiency levels on the effective use of these tools
4. Linguistic barriers and limitations participants face when communicating with generative AI in Latvian language.

The interviews were conducted from April 8<sup>th</sup>, 2023, to April 20<sup>th</sup>, 2023. Data was collected using the online platform <https://www.visidati.lv> which ensure efficient data collection and anonymity for the participants. The interviews were conducted in a written open-ended format which allowed participants to provide detailed responses in their own free time. Due to the format of the interviews, the interviewer couldn't ask follow-up questions regarding participant's responses.

### **2.3. Data analysis**

The collected data was analysed using thematic analysis. The goal of this method was to explore the adoption patterns of AI tools, limitations and barriers utilizing AI in Latvian language, evaluate the quality of the generated answers and understand the professional development needs for Latvian teachers. By using this method, the author was able to capture nuanced insights from the data and to focus on patterns and trends across participant answers.

Data was coded using an Excel spreadsheet. Each respondent answer was read carefully, and statements related to the use of generative AI tools were coded. Initial codes were generated directly from the textual data, so they were backed up in actual data. Similar codes were categorized according to the potential themes. The author developed six themes and started to code the text according to the themes.

The themes were reviewed and refined continuously so they accurately represented patterns in the coded data. The review process first took place at the individual level and then across the entire data set. Each theme was clearly described and named so they captured the essence of the collected data. The developed themes were aligned in the context of research questions, focussing on challenges and opportunities towards effective use of generative AI tools for teachers in Latvia.

### **3. Results**

The aim of this study was to investigate the limitations and barriers that teachers in Latvia face when implementing chatbots and large language models (LLM) into their teaching

practice. The results section describes the main findings of this study. In the previous chapter author described that a thematic analysis was used to analyse the data. Using this method, six main themes were created. In this chapter each theme will be discussed using direct responses of the participants to ensure an enhanced and nuanced understanding of the results.

Furthermore, a discussion about the findings and limitations of this research will be presented.

### **3.1. Teachers' anticipations towards integrating AI tools in their practice**

The expectations for integrating AI tools into participants' teaching practice vary. The majority of the participants stated that using AI tools to create and improve their assignment would support their teaching. One participant said: *"In mathematics it would be useful to test a theory, for example in geometry. As well it would help to create various examples of a task or to create a test on a topic"*. Another participant expressed: *"I expect that these tools could be used to create typical problem tasks in different variants that students are asked to solve"*.

As well the participants expressed their desires regarding using AI as a tool for improving their lesson planning process. Teachers need to create new lesson plans from year to year and the process is quite time consuming, especially if the teacher works with students from different age groups. Participants highlighted that AI tools could be used as a supportive resource for structuring and organizing their lessons more effectively. One participant stated: *"If a question was asked about the structure of the lesson, the chatbot could provide specific examples of what could be done in each part of the lesson"*.

Furthermore, another perspective from the participants answers revealed the potential for AI tools to enhance the student-centred learning by providing them feedback. They highlighted their vision for utilizing AI tools to offer immediate feedback in the classroom setting which is tailored to the individual learning needs of each student. A learning environment in which the students receive instant and personalized feedback from the AI tools might lead them to enhanced self-directed learning outcomes. One participant said: *"I imagine that in the future AI tools could be used in the classroom to provide instant feedback to students, which would be suitable for their individual and self-directed learning needs"*.

Moreover, the findings of this research revealed an additional perspective expressed by the participants regarding the potential to utilize AI tools in the classroom. Even though most of the participants point out the role of AI to enhance teachers' instructional practices, some of them highlight the opportunity to use these tools to improve students' proficiency in utilizing AI. Participants described that teachers could collaborate with the students to

demonstrate them how they can independently use AI tools to validate their work. One participant expressed: *“AI tools could be used to demonstrate the students that they too can use them themselves, for example, to check whether they have done the chemical calculations for a specific task correctly. Another participant said: “These tools utilize Latvian language quite incorrectly. Students could use AI tools specifically in the error analysis aspect”.*

### 3.2. How do teachers utilize AI tools?

There are several AI tools and LLM which the participants have utilized in their teaching practice (figure 2). As well the frequency of the use differs between the participants (figure 3).

| Number of participants | AI tools utilized   |
|------------------------|---|
| 10                     | ChatGPT 3-5 and ChatGPT 4,0, Consensus, Magic School, and Dall-E (all operated by Open AI). |
| 4                      | Google Translate  |
| 2                      | Talkai.info and skolotajiem.datorium.lv (both with Latvian language integration).           |

Figure 2: What AI tools do participants utilize in their teaching practice?

| Number of participants | Frequency of use   |
|------------------------|--|
| 4                      | Rarely. Teachers have tested chatbots and LLM but don't utilize them on daily basis.                               |
| 6                      | Infrequently. Teachers use these tools about once a monts.   |
| 4                      | Frequently. They describe themselves as frequent users and utilize them in teaching practice once or twice a week. |

Figure 3: How frequent do the participants utilize AI tools?

One teacher mentioned that she uses ChatGPT to generate tasks on specific topics of the curriculum. The teacher stated: *“I use AI tools once or twice a week to convert codes from one programming language to another. As well I use them to generate various types of problems and to get codes for functions”.*

There was one participant who also utilized ChatGPT not only to develop new tasks, but as well to improve the existing ones: *“I use chatbots to convert calculation formulas and*

*to find out whether it's possible to do the necessary calculations from the given information in the task, according to the knowledge of the age group. This is how the error in the given task was detected".*

There were participants who mentioned that they use LLM in their teaching practice. One of them integrated LLM in their lessons to facilitate students' text translation: *"If the students need to translate a text from a foreign language to Latvian, I allow them to use translation tools"*. Another teacher utilized Google Translate to explore alternatives for the curriculum: *"I've used Google Translate to look for a good curriculum alternative in the Finnish education system"*.

As well there were two participants who said that they utilize chatbots to check whether they solved a task or a problem correctly: *"I use chatbots occasionally but mostly to check whether I solved the problem correctly"*. The second teacher mentioned that he used chatbots not only to check his answers but as well to try to facilitate his planning duties: *"I have utilized chatbots to check if I solved a task from the State exam correctly. As well I have tried to use them to develop lesson and teaching plans"*.

### **3.3. Exploring the limitations in the utilization of AI tools in relation to the Latvian language**

All the participants expressed that communication with chatbots in English improves the quality of the generated information compared to Latvian language. One of the participants stated: *"Yes, the language in which I communicate with the chatbot affects the answer quality. A question or instruction in English is answered more precisely"*. Another participant said that: *"Answers are more versatile and precise in English. This is likely due to the number of data/resources available in English"*.

One participant mentioned that when she communicates with the chatbot in Latvian it's necessary to manually insert specific data in the prompt so the chatbot generates the desired answers. Nevertheless, when interacting in English the prompting process is facilitated and the data in the answer such as symbols and units are generated automatically. She described her experience stating: *"When seeking information in Latvian all values, symbols and necessary units need to be written in the prompt. However, when communicating in English this process is automatized and I can get the desired answer."*

Two participants noted that utilizing the AI tools in Latvian makes it difficult to understand the meaning of the text. One of the respondents stated: *"Sometimes it's difficult to*

*understand the information in Latvian due to inflections of words that are put in the wrong conjugation or gender. Also, sometimes the answers consist of a lot of anglicisms which don't translate to Latvian or are under some other term".* The second teacher stated: *"In Latvian translations of various movies which are translated using AI, the number words are said incorrectly, and the soft consonants aren't pronounced"*.

Another participant expressed that when the communication happens in English, he can utilize the chatbot to facilitate the task differentiation process. He stated: *"Output generated in English has higher quality. When I want to develop questions for a test the input in Latvian generates task examples which can be classified as a first or second level of SOLO taxonomy. However, communication in English provides me with task examples which fit the third and fourth level of the taxonomy scale"*.

Participants expressed various limitations they had experienced when utilizing chatbots in Latvian for their teaching practice. Three teachers noted that the information generated by chatbots consist of incorrect use of terminology. One participant described their experience: *"The chemical reaction equations in Latvian don't follow standard notation and are written incorrectly. Likewise, chemical terminology is used incorrectly, for example, the names of chemical compounds and components of an atom. For example, not hydrochloric acid, but hydrogen chloride gas, not the oxidation number/state but the degree of oxidation"*. Another participant said that: *"I have experienced that mathematical terms get mixed up, for example, area and volume"*.

One participant said that the answers provided by a chatbot fails to meet the terms of the prompt. This applies to subjects and areas of curriculum which consist of the cultural and factual information about Latvia. The participant stated: *"When I asked the chatbot to generate information about our famous Latvian writer Janis Plieksans and his work, it generated in detail information about a fictional character called Janis Purvitis"*.

Three of the participants have experienced that chatbots generate mis-leading or non-existent answers. Similarly to the failure to meet the terms of the prompt, this as well happened when the information provided in the prompt was about facts and data which are specific to the Latvian context and state curriculum. Such responses discourage the teachers from utilizing these tools. They waste their time working with them without getting the desired outcome. One of the participants described his experience: *"When I created tasks for assessment work, Open AI generated all options in multiple choice answers as impossible, especially in topics related to legal advice. This happens only when the questions are asked in Latvian"*. Other teachers described that the chatbot generated a false information about the

history of Latvian literature. One of them stated that: *“The ChatGPT married two Latvian literature authors J. Rainis and A. Brigadere when generating information about their biographies”* and another one said: *“I had an experienced when chatbot generated a description about a writer’s story and it’s release date even though the story doesn’t actually exist”*.

Two participants described that the chatbots generate false information when they utilized them to solve tasks in their subjects. One participant described the failure of the chatbot to correctly answer a question about the climatic conditions of Latvia stating: *“Chatbot wrote that autumn has the lowest amount of precipitation in Latvia compared to other seasons of the year”*. The other participant stated: *“I have experienced cases in higher complexity math calculations in which the chatbot generated a false outcome”*.

### **3.4. Enhancing chatbot accuracy and effectiveness**

The interviewer asked respondents to answer questions regarding the strategies they implement to improve the quality of the chatbots generated answers. The main strategy for the participants was to change the language in which they communicate with the chatbot from Latvian to English using different LLM. One participant mentioned that from her observations the best translation quality comes from translation tools which are developed in Latvia. She said: *“I’ve used several LLM to translate the chatbots generated results. Along the way I’ve observed that the best translation quality is from Latvian translation tools such as hugo.lv and Tilde, and only then Google Translate”*.

Participants expressed that they can’t get the expected results from the chatbot in Latvian but it’s possible to go around this limitation using translation tools. The same prompt asked in Latvian and in English generate different results. The Latvian output consists of incorrect use of terminology and notation, but the exact same prompt written in English provides the user with higher quality of information. One participant stated that when he used Google Translate to translate the English results in Latvian the incorrect terminology and notation was fixed: *“If I ask the chatbot in Latvian to create 5 chemical reaction equations that describe the reactions of metals with acids the results are written incorrectly. At the same time, if I enter the information in English and then translate the results into Latvian using Google Translate, the results are in accordance with the specifics of the subject such as correct use of terminology and notation”*.

Even though participants acknowledge the support that they can get using translation tools, one participant mentioned that the quality of generated answers evolves over time: *“My experience is that the key for success is practice. To get the best possible result I need to formulate my needs in prompt so that I can't be misunderstood”*.

Several participants highlighted the importance of skills and knowledge which the users must have to get the answer they expect. These aren't only foreign language skills but as well knowledge about the curriculum and strategies regarding formulating a qualitative prompt. One of the participants stated: *“The teacher needs to be familiar with the curriculum of their subject. To get the best results it's needed to write short, concrete sentences and the user must avoid using terminology with various meanings”*. Another participant said: *“The teacher must know his subject. As well the teacher needs to be able to use terms both in the native and in foreign languages. Also, a wide amount of information should be presented in the prompt so that the chatbot catches the writer's point and provides relevant information”*.

### **3.5. Anticipated challenges hindering the integration of chatbots into teaching practice**

In their answers, the participants mentioned various reasons why teachers are against the integration of chatbots in their teaching practice. The majority of the participants mentioned teacher's insufficient knowledge of foreign languages as the main barrier. Since the basis of effective communication is, for the most part, the user's ability to communicate with the chatbot in English, many teachers might avoid using these tools. One participant stated: *“The language barrier has a significant impact; it is one of the most important reasons why teachers don't use these tools. If someone demonstrates to them that there are tools which are completely in Latvian, colleagues will be more likely to try them out”*. Another participant stated: *“The better knowledge teachers have in foreign languages, for example, in English, the easier it is to use AI tools. Not always when I ask a question in Latvian, I get the answer I expect. Even trying to paraphrase the question, it isn't always possible to get the desired end result, so my next step is to consistently switch to communication in English”*.

The responses of six participants demonstrate that a significant barrier to integrating chatbots into the teaching practice is a lack of confidence. They mentioned that teachers need to be familiar with the possible uses of these tools, as well they must have the necessary skills to effectively utilize the chatbots. One participant said: *“If the teachers have poor language skills, then before implementing the chatbots into their teaching practice, teachers need to be able to pre-test the new tools and they need to understand each of their functions”*. Another

participant pointed out that the teachers need to be confident that the content generated by the chatbots is in high quality and truthful: *““The information provided must be of high quality for the teacher to consider the idea of using these AI tools in their practice. If the information is of poor quality, then teachers won’t use these tools at all”*.”

Also, in their answers the participants mentioned that teachers attitude towards integrating chatbots in their teaching practice would improve through participation in professional development courses about the use of AI tools. Participation in such courses would improve teacher’s confidence in utilizing these tools. One participant stated: *“Professional development training that practically demonstrates the use of chatbots and how they contribute to the learning process would improve teachers’ confidence in utilizing these tools. Given the surrounding technology, many teachers are afraid to approach chatbots, because it’s a challenge for them”*.” Another participant said that teachers would benefit from such training but due to the high workload of teachers finding free time to attend these courses is challenging: *“The courses would help me to better understand how to utilize chatbots to enhance my teaching. There’s just no time for that”*.”

### **3.6. Teachers needs for professional development**

Eight participants expressed that professional development courses would be necessary for them. The required support in the course content varies among teachers. Several participants indicated the need to demonstrate specific examples regarding possible utilization of AI tools. One participant stated: *“For me it would be beneficial to attend courses which consist of experience stories, examples of how to apply AI in the learning process. For example, how to evaluate student’s work with help of AI, how to utilize AI in computer graphics or video processing”*.” Another participant mentioned their need for concrete examples of how to create an effective prompt: *“It would be useful to demonstrate specific examples of how the chatbots generated information changes when asking a more specific question. Perhaps examples of how to ask precise and focused questions in the prompts”*.”

In their answers participants mentioned their desire to understand the principles of how AI tools operate and on what data do the chatbots generate their answers. One participant stated: *“To improve my skills with utilizing AI tools, I would personally benefit from various professional development courses that would help me understand how AI can analyse and understand text and speech, how AI generates answers, and on what basis”*.”

Another participant emphasized the importance not only to focus on the current uses of the AI tools, but also to demonstrate to teachers the potential of utilizing these tools. One participant emphasised: *“It would be important to go deeper, concentrating no longer on the possibilities of using AI, but more specifically, for example, the creation of backwards planned lesson work or the step-by-step use of qualitative research skills development methodology”*.

However, six participants in their answers expressed that they don't need any professional development training. They stated that they can acquire the necessary knowledge and skills in the use of these tools by independently practicing the utilization of AI: *“The courses hinder more than help. I can get the necessary support through self-learning and testing different ways of communicating with the AI, learning about its possibilities, and understanding the effectiveness of its use”*. Another participant stated: *“I think I just need more free time and trying to use the tools in as many different ways as possible”*.

#### **4. Discussion**

At the beginning of this chapter the author addresses the previously posed research questions.

1. What challenges do Latvian teachers encounter when utilizing generative AI tools in their teaching practices within the low-resource language environment of Latvian?

The challenges that Latvian teachers encounter when they utilize AI tools in their teaching practices are the lack of AI resources and insufficient training data in Latvian language. Most of the generative AI tools are designed for high-resource languages such as English. This leads to deficiency in the generative AI performance, such as providing incorrect information or low grammar quality of the answer when utilized in Latvian language and context.

2. How does the linguistic difference between Latvian and English languages impact teachers' ability to effectively communicate and integrate generative AI tools in the classroom?

The linguistic differences between Latvian and English languages have a significant impact on teachers' ability to effectively communicate and integrate generative AI tools into their teaching practices. Generative AI tools have difficulties with the grammatical structures and vocabulary of Latvian language. The linguistic differences cause additional workload for teachers because they often need to translate or adapt the materials generated by AI to ensure their accuracy and relevance.

3. What professional development support is necessary for Latvian teachers to enhance the effective integration of generative AI tools into their teaching practice?

To enhance the integration of generative AI tools, teachers need professional development support that focuses on various aspects of effective adoption of generative AI tools. This research identified teachers' needs for training programs that cover both the technical aspects and practical guidance on how to utilize these tools. Additionally, teachers expect support with examples on how to integrate generative AI tools in the specific subjects they teach.

The findings of this research highlighted the diverse linguistic barriers experienced by the non-native English-speaking educators when utilizing AI tools in their teaching practices in Latvia. The results demonstrated that the teachers encountered linguistic barriers such as incorrect punctuation and spelling of words, misuse of terminology and the generation of inaccurate or misleading information. According to Jordan et al. (2024) research highlights that AI tools perform well in high resource languages such as English and Spanish, the generated output is sensible, accurate and understandable to the native speakers. However, when interacting with the chatbots in low resource languages, the outputs often lack coherence and fail to meet the standards. Because Latvian is spoken by approximately 1.5 million people, it can be categorized as a low-resource language. Moreover, the Latvian script consists of numerous long marks, softening marks and commas so this might lead to less accurate Latvian training data for the language models. Furthermore, the findings by Robinson et al. (2023) evaluated the performance of traditional machine translation tools and LLM across 203 languages. It was observed that in many high-resource languages, LLM such as ChatGPT perform competitively with the traditional machine translation models. However, for many low-resource languages, the traditional machine translation proves to be more effective than the LLMs despite its increased parameter size. The findings also highlighted that the effectiveness of LLMs such as ChatGPT can be predicted by analysing the number of Wikipedia pages available in each language. Notably, the data from Wikipedia in May 2024 demonstrate that there were 127,000 articles in the Latvian language compared to 6,821,862 articles in English. This data set aligns with the authors' research findings and supports the conclusions of Robinson et al. (2023). Based on the number of Wikipedia articles between these two languages, it's possible to predict that ChatGPT's performance will be less effective in Latvian compared to English.

The research findings indicate that a barrier to the effective use of AI tools in the participants' teaching practice is the insufficient amount of available data in the Latvian language. However, participants tinker to compensate for the limitations of the tools in their language. One strategy mentioned by the participants was switching from Latvian to English when communicating with a chatbot. However, in using this strategy it's necessary to keep in

mind that the average age of teachers in Latvia is 47 years. 44% of Latvian teachers are older than 50 years (OECD, 2014). It can be considered as a limitation because a large number of these teachers have low English language proficiency levels, or they don't speak English at all. This can be explained by the fact that the level of learning foreign languages in Latvian schools improved only after the restoration of independence in 1990. Nevertheless, the research by Wirantaka & Fijanah (2021) indicate that Google Translate can be utilized to increase the users' vocabulary and its use in the language being studied. By using translation tools learners' knowledge and independent learning skills related to foreign language learning can be improved (Bernardini 2016, Wirantaka & Fijanah 2021). The second strategy mentioned by participants was building a qualitative prompt to enhance the quality of the chatbots generated answers. They noted several examples of what it means for them to create a quality prompt. Teachers mentioned knowing the end result they expect knowledge of the curriculum and skills to ask short and specific questions. The findings of this research are in line with findings from other authors. According to Mungoli (2023), carefully crafted prompting together with fine-tuning of ChaGPT's parameters generates more precise, relevant, and contextually appropriate responses. Improving the input for the prompts can enhance the chatbots performance in content generation and education. The findings from research by Robertson et.al, (2024) illustrate that effective prompting process requires the user to carefully consider if their provided input is correct, free of bias and that it doesn't consist of inaccurate or misleading information. His findings state that effective AI prompting consists of three dimensions – context, structure, and evaluation. The context dimension involves accounting the user's prior knowledge, the specific topic, the intended audience and the appropriate communication tone. Well-designed prompts should consist of a clear structure which supports the collaboration between users and AI models. As well it's crucial for the users to critically reflect on the chatbots generated answers, avoiding the spread of misinformation and bias.

The results of this study indicate that there are various factors affecting not using AI tools in teaching practice. Participants mentioned barriers such as lack of knowledge of foreign languages, lack of confidence and the need for professional development courses. Even though there aren't any relevant research regarding the influence of foreign language knowledge on the integration of chatbots in teachers teaching practice, findings from research by Wang et.al, (2023) examine different factors regarding teacher's AI readiness. They state that teachers need to be equipped with knowledge, skills, and vision to make decisions about what type of AI to use and how to use it appropriately. As well their findings highlight that

teachers need to know what the AI can and can't do for them to effectively address AI's capabilities and evaluate the potential risks in utilizing it. Furthermore, the findings from Hrastinski et al., (2019) and Wang et al., (2023) indicate that it's essential for teachers to focus on understanding what the AI can offer them to improve their work and their teaching efficiency. The research results from De la Vall & Araya (2023) state that one reason against integrating AI into teachers teaching practice is its difficulty to replicate cultural and contextual nuances of languages. This can lead to errors in communication with the chatbot, especially when communicating in more complex or technical language. Furthermore, their findings indicate the lack of resources or biases in learning materials for underrepresented languages and it can lead to chatbots limited abilities to recognize errors. By understanding the opportunities, the chatbots provide to teachers they could become more confident AI users. Also, by analysing the possible errors generated by the chatbot, it would be possible for teachers to evaluate in what context to use these tools and when not to use them.

The findings of this research show that teachers expect that AI tools could be used to facilitate their daily work. In their responses, participants mention their expectations to use AI tools to enhance the processes of creating tasks, planning lessons, and providing feedback. The results from Hashem et al., (2024) revealed that ChatGPT has the potential to support teachers teaching and relieve them from major time-consuming tasks. Their findings suggest that chatbots have the potential to be used to provide personalized recommendations for lesson planning and preparation of learning materials. However, it's necessary to mention that the quality of lesson plans and learning materials can't be achieved on the first attempt. It can be done by providing ChatGPT with many specific prompts. In detail instructions added to the AI model can enhance the relevancy and usefulness of the lesson plans and learning materials. The findings from Chan&Lee (2023) indicate that teachers have intentions to use AI technologies to create personalized and immediate support and feedback both for teaching and learning. The findings from Whalen & Mouza, (2023) noted that teachers could potentially utilize ChatGPT to support their teaching, writing course syllabi, planning lessons, designing directions for learning activities. Moreover, these findings note that teachers can utilize AI to write students' progress reports, develop quiz and test questions, and rubrics for grading.

These findings highlight the importance to distinguish between professional development courses and other support mechanisms. While the support from colleagues can be valuable, it isn't a part of professional development course or strategy. In the research findings the teachers indicate the need for courses that address specific examples of how AI

tools can be used. Participants also mentioned that they would benefit from understanding how AI tools operate and what data these tools use to generate answers. The research by Whalen & Mouza, (2023) noted that professional development training needs to provide the teachers with the necessary pedagogical information and skills to incorporate AI in their lessons. But it needs to be considered that traditionally teacher training programs address different aspects of technology in education into a single course. By empowering every teacher in every grade level they can benefit from such AI technologies as ChatGPT. However, some participants in the study expressed a contrasting perspective regarding their needs for professional development. They indicated that they can independently acquire the necessary knowledge and skills in using these tools. These contrasting perspectives highlight the importance to offer flexible and diverse professional training programs both for educators who need autonomy and self-directed learning and for educators who are in need for structured training programs.

### **5. Limitations of the study**

This research had several limitations that need to be addressed to evaluate the findings of this study effectively. Firstly, the sample size was limited to only fourteen participants, making it challenging to generalize the results to the broader population of Latvian teachers. However, the smaller sample allowed to focus on more detailed answers from the participants. Another limitation that needs to be mentioned is the reliability of the results. The researcher selected the research participants using his personal contacts. This approach needed to be implemented due to the limited number of Latvian teachers who utilize AI tools in their teaching practice. Moreover, the average age of the research participants is lower than the average age of teachers in Latvia. This may have influenced the results, as younger teachers tend to have better English and technological skills.

Furthermore, the written interview format hindered the researcher's ability to ask follow-up questions. This might lead to missing opportunities for deeper exploration of participant answers. The interview format also may face challenges to interpret the intended meaning of respondent's responses and might affect the overall quality of the collected data. The lack of human interaction in the written interview format might impact participant engagement and the interviewer's ability to assess non-verbal cues during interviews. This could potentially compromise the depth of the collected data. Moreover, the quality of the results may have been affected by conducting interviews in Latvian. Nuances from

respondent's answers could have been lost during the translation process when converting participants answers from Latvian to English.

From the identified limitations, several suggestions for future studies can be emerged. Firstly, future researchers should consider using a more diverse sampling strategy to represent a broader spectrum of educators. Collaboration with different educational institutions, could provide researchers access to a more various participant sample. By doing so, the obtained results could be generalized to a larger population. As well, given the observed age bias, future studies could purposely differentiate the sample group according to the age of the participants. This way approach would allow to explore the possible differences in the perceptions and experiences regarding AI tool utilization among teachers from different age groups. Moreover, future researchers could benefit from adopting different data collection methods. By switching from written interviews to face-to-face interviews, researchers could engage in more dynamic discussion with the participants, ask follow-up-questions, and potentially capture the nuances of the participant responses more effectively.

## **6. Conclusion**

From the findings of this research on the challenges and opportunities of using generative AI among Latvian teachers the author discovered that a major challenge for them is the insufficient data in Latvian language. This is explained by the fact that the Latvian language can be classified as a low-resource language. The insufficient amount of data leads to chatbots generating grammatically poor answers, provide superficial or misleading answers. These limitations are especially present in areas related to facts and data related to the Latvian context.

Teachers English language profficiency impacts their ability to effectively communicate with generative AI tools and utilize them in their teaching practice. Information generated in English tends to be of higher quality and more reliable, making it easier to integrate into their teaching practices. Participants identified insufficient English language skills as a major barrier to effecitvely utilize AI tools. A lack of English proficiency can create a lack of confidence and discourage teachers from using these tools. However, the participants mentioned two strategies that help them reduce the influence of language skills on the quality of responses generated by chatbots. Firstly, teachers with lower levels of English can use online translation tools to facilitate their communication. Secondly, to improve the quality of the generated answers, participants mentioned the necessity to create high quality prompts.

To support Latvian teachers in the use of AI tools, it is necessary to provide meaningful professional development support. Some of the teachers mentioned the need for demonstrating specific examples of how to use these tools. Other teachers pointed out the need to understand how the AI tools operate. However, some teachers indicated that professional development support isn't necessary for them. In any case, when planning the content of professional development training, it's necessary to consider the different needs of teachers and the different levels of their preparation when working with the AI tools.

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### **Author's declaration**

I hereby declare that I have written this thesis independently and that all contributions of other authors and supporters have been referenced. The thesis has been written in accordance with the requirements for graduation thesis of the Institute of Education of the University of Tartu and is in compliance with good academic practices.

Karlis Krastins

/Digitally signed/

31.05.2024.

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## Appendices

### Appendix 1.

#### Visidati.lv Questionnaires

(originally written in Latvian and distributed to Latvian-speaking educators)

*Dear participants,*

*During the development of my master's thesis, I conducted research to find out how different chatbots are integrated into the daily work of teachers. Using the data obtained from the survey, I will explore solutions to the challenges faced by Latvian teachers who use these technologies.*

*Your participation in this survey is voluntary and completely anonymous. Your responses will be used for research purposes only and will be treated confidentially.*

**Question nr. 1** Please indicate your gender.

Female

Male

**Question nr. 2.** Please indicate your age

**Question nr. 3.** How many years have you been working as a teacher?

**Question nr. 4.** What subject do you teach?

**Question nr. 5.** Have you used chatbots or large language models? Can you make an example?

**Question nr. 6.** How familiar are you with them? Can you make an example?

**Question nr. 7.** How chatbots and large language models could be implemented into your teaching practice to support your teaching? Can you make an example?

**Question nr. 8.** Have you ever experienced that chatbots and large language models generate a misleading response? Can you make an example?

**Question nr. 9.** Does the language in which you communicate with chatbots and large language models impact the quality of generated responses? Can you make an example?

**Question nr. 10.** What knowledge and skills are necessary to generate a quality prompt? Can you make an example?

**Question nr. 11.** What kind of strategies or approaches have you used or considered using to overcome linguistic barriers when interacting with chatbots and large language models? Can you make an example?

**Question nr. 12.** How do you think the linguistic diversity among teachers might impact the effectiveness of generative AI tools in supporting their teaching practices?

**Question nr. 13.** What kind of professional development training would be useful for you to improve your skills when working with generative AI?

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