

# The Use of Artificial Intelligence for Personalized Learning: Teacher Perspective

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**Abstract**— This study aimed to explore teachers' current practices around the personalization of education for students with reading comprehension challenges. We also delved into their experiences and opinions on using artificial intelligence in this regard. Interviews with teachers from various schools and varying degrees of experience were the primary data. Study results showed that insufficient time and resources were the most prominent challenges for teachers, followed by the number of different levels and needs they had to adapt to. Teachers were positive about using artificial intelligence and had used it before, but very few of them had tried integrating artificial intelligence to provide personalized education. The most prominent critique was a lack of trust in the accuracy of texts generated with artificial intelligence. Misuse of artificial intelligence by educators and students (e.g., cheating) was reported as a fear, prompting a discussion on the importance of educating everyone on the proper use of technology in the ecosystem. Overall, teachers see artificial intelligence as an opportunity to mitigate their ongoing challenges regarding personalized education and augment students' engagement by tailoring learning experiences to each student's needs, preferences, and learning styles.

**Keywords**- *Artificial Intelligence; Generative AI; Personalized Learning; Adapted Education; Reading Comprehension.*

## I. INTRODUCTION

The Norwegian educational system has faced two critical issues in recent years: the decrease in the number of new applicants for all teacher education programs [1] and the high amount (44%) of active teachers considering leaving their profession [2]. This is despite most teachers (86%) reporting that they enjoy being a teacher; however, as a possible explanation, teachers experience significant time pressure, with the majority (93%) reporting that various tasks are hindering them from doing their pedagogical work [2]. These tasks diminish teachers' available time for learning-related tasks, such as text adaptation, leaving them with insufficient time to create personalized learning materials for their students.

Personalized learning is a fundamental pedagogical principle and is important in helping students reach their potential [3][4]. It enables teachers to tailor their courses based on each student's needs, preferences, and learning styles and provide equal opportunities to all students instead of creating a learning environment based on a traditional one-size-fits-all approach. In Norway, all students have the right to receive personalized education by law [5]. Teachers are responsible for planning and holding the class and ensuring all students receive their entitled individual learning. In a typical class, there are significant differences in the level of students and learning difficulties, such as Attention Deficit/Hyperactivity Disorder (ADHD), reading and writing difficulties, and language difficulties. Teachers need enough time to support each student's development, which requires more effort. This leads to the process of providing personalized education being complex and challenging.

One possible avenue worth exploring is to mitigate this problem by using Artificial Intelligence (AI). AI-assisted solutions have the potential to provide a personalized learning environment and equalize education for everyone [6]. AI can enhance education quality in multiple ways, such as data recording, pattern detection, and adaptation [7]. With its ability to analyze large datasets, AI can generate texts of good quality for end users, making it a valid option when considering text processing. It has the capabilities to be used as an intelligent tutoring system [8] as well as generating alternative text for non-text content, auto-captioning for videos, word prediction, text simplification [9], and text adaptation for individuals with cognitive and learning challenges [10]. By using AI as a learning tool, teachers could save time adapting education, and students could gain more personalized learning materials.

Previous research has shown that AI-assisted solutions have been proven to be effective in personalized learning within the educational context by enhancing educational material, students' engagement, and learning outcomes [11][12]. Further, learners and instructors have positive

attitudes toward AI integration for personalized education [6]. However, exploring the use of AI to personalize education around text adaptation for individual students' levels has been a low priority [12][13], highlighting the current study's novelty.

Taken together, this study's aims are twofold: first, it aims to understand the current practices of teachers from the primary to secondary level, the challenges they encounter, and their solutions to provide personalized education. Second, we explored teachers' opinions on using AI to personalize the learning process within the educational context and their experience with AI. We believe the study results contribute insights into the current issues regarding AI integration into personalized education and teachers' perspectives.

The remaining part of the paper proceeds as follows: Section 2 explains the study's methods and reasonings in detail. Section 3 presents the study's findings, focusing on two key themes: teachers' current practices of personalized education and their opinions on using AI for this purpose. Section 4 contains comparisons to earlier research and analysis of the results. The final section concludes the study and presents recommendations for future research.

## II. METHODS

We conducted an exploratory study to understand teachers' practices on personalized education for students with different reading comprehension levels and their perspectives on AI integration in educational settings. The interview was the primary data collection method, and it included teachers in various schools and all school levels with varying degrees of experience.

### A. Participants

A total of 20 teachers participated in the study, representing 15 different Norwegian schools. Participants were selected based on their involvement in courses with a significant emphasis on text-related content. A deliberate effort was made to ensure representation from each level of the school system by including a minimum of five teachers from elementary school, eight from middle school, and five from high school. In addition, there were two teachers from a learning center, a school for adults providing special education or primary and lower secondary school education. The teachers' experience varied from two years up to 41 years, with the average being 17.4 years. The most common course taught was Norwegian (n=15, 75%), followed by social studies (n=9, 45%) and science (n=7, 35%). On average, the teacher's self-reported digital literacy was 3.7 out of 5, with the lowest result being 3 out of 5. All teachers use a PC or a tablet besides their mobile phones. They spend, on average, six to seven hours daily on digital devices.

### B. Interview Guidelines

The interview guidelines comprised three sections. The first section focused on gathering teachers' demographic

information, including age, years of experience, courses they teach, and their responsibilities in the school. We also asked at which school level they taught to better understand the focus on personalized education and how it was performed at the different school levels.

The second section delved into the teachers' work and thoughts around personalized education within reading comprehension. We investigated how teachers implement strategies for reading comprehension - examining the frequency and scope of these personalizations, the tools they utilize, and any challenges they face implementing them. Additionally, we aimed to understand the methods they consider most effective for personalized learning and whether there are strategies they would integrate more if afforded additional time. Another important topic in this section was how this personalized education was tailored towards different learning difficulties.

The final section focused on teachers' awareness and perspectives on using AI in education. The questions aimed to uncover their familiarity with the technology, instances of its utilization in teaching practices, perceived educational applications, and any associated concerns. Through these questions, we sought insights into the nuanced dynamics of teachers' relationships with AI regarding its practical integration and broader pedagogical considerations.

### C. Procedure

The interviewees were acquired through a mix of personal networks, directly emailing random teachers at schools in the surrounding area and contacting school administrators. Given the interview's strong focus on reading comprehension, one of the prerequisites was that the teacher taught at least one text-based subject. We also aimed to limit the number of teachers to three per school, and in cases where there were multiple teachers from the same school, they had to belong to different sections. Physical interviews were used for the teachers in the local area. Otherwise, the interview was conducted via video call. Two researchers were present during the interviews to guide the process and take notes.

### D. Data Analysis

Data from the interviews was sorted by entering all the interview responses into a spreadsheet. The answers were organized by having each question as a column and the interviewee number as rows. This gave us a good overview of the data, and we could sort by different data points to examine links and differences between subgroups of interviewees. The first analysis round was done by reviewing each question individually and writing down the main themes and findings. This helped create a baseline of data that we could then analyze further to find patterns and extract the relevant information. In the next step of the analysis, we used the established themes to do a thematic analysis of our data [14]; the main themes were current practices for personalized education and how teachers approach AI in education.

### III. RESULTS

The findings from the interviews are presented in two sections. The first section explores teachers' perspectives on personalized reading comprehension education, while the second section focuses on experiences and reflections regarding AI integration.

#### A. Personalized Education

**Current Situation.** Time availability was a significant concern among interviewed teachers. When asked about their ability to adjust teaching to meet student needs, most teachers (n=16, 80%) highlighted a deficiency in time. The remaining teachers (n=4, 20%) reported having sufficient time without encroaching upon their work hours. Two of the teachers who reported having sufficient time clarified that this was due to their class being about half the size of a normal-sized (around 15 rather than 30) class, with one saying, *“Yes, I have enough time since there are few students in my class, but it can still be difficult when many students are struggling.”* The other two teachers who expressed having enough time were affiliated with high schools, indicating a notable discrepancy among K-13 level educators.

A contributing factor to most teachers' time constraints is the significant amount of time teachers use on personalized learning through text adaptations. Within any given class, there is a large variety of students' reading levels; one teacher noted that there are up to 10 different levels that must be adapted to. This makes it harder for teachers to adapt to each student as they first must find the correct level to adapt to and then do the actual adaptation, with one stating, *“Managing the capacity and resources for following up on the students is a problem, 3 out of 4 can follow the class, but the challenge is picking up the rest.”* There were 11 (55%) teachers providing a direct number of students for whom they made extra adaptations regarding reading comprehension. The result showed that 91% (n=10) of those teachers were doing extra adaptation for 17% of their students or more, with the highest reported number being 42%. These adaptations, in combination with the adaptations done for the remaining students, resulted in a high amount of time spent adapting for reading comprehension. Of the teachers (n=16, 80%) who provided a clear amount of time spent providing these adaptations, 56% (n=9) reported spending 3.5 hours per week or more adapting texts.

**Challenges.** A significant number of teachers (n=10, 50%) emphasized that students had different prerequisites regarding reading skills. They mentioned the importance of parents focusing on their children starting to read early and the extent of this support. Another frequently mentioned cause (n=8, 40%) was the support students received through kindergarten and the school system. Here, the quality of educators and the economic conditions in kindergartens and schools were mentioned as important factors, with one saying, *“It matters a lot how the school is tailored to the students. With greater resources in the school, students will benefit more.”* Further, some teachers (n=4, 20%)

highlighted societal changes as a significant cause of what they perceived as a marked negative trend in reading abilities in recent years. It was explained that students generally read less, thus negatively affecting their overall reading level. One teacher pointed out that reading has faced competition from other digital devices, suggesting that this has had a detrimental effect on attention spans and reading endurance. Another teacher believed there had been a clear negative trend in reading skills in the Norwegian school system since the introduction of tablets/computers to all students, considering it to be a direct cause of this trend.

When teachers adapt texts for students, they make sure the difficulty level of the text fits the student, as well as differentiate how the text is adjusted based on which learning difficulties the students have. A teacher clarified this issue by saying, *“If two students in the class need a simplified text, I often think they need the same one when, in fact, they should each get one.”* This is one of the reasons why adapting texts is time-consuming and demanding, as teachers often need to adapt texts in more ways than just having different difficulty levels. Interviewed teachers expressed how they adapted texts to students with ADHD, reading and writing, language, and cognitive difficulties. For students with ADHD, the teachers emphasized the need for short, concrete, interesting, and well-structured texts. This could involve creating useful summaries of the texts. For students with language difficulties, the focus was more on simplified language and especially on replacing difficult words. There was a high focus on oral solutions for students with reading and writing difficulties. This could either be through text-to-speech programs or by discussing topics orally. Teachers also emphasized the importance of repetition and practice time for these students. For students with cognitive difficulties, teachers mentioned the importance of connecting topics to their personal experiences. The texts should also be simplified, engaging, and provide concrete information.

**Solutions.** In practice, providing personalized education varies from teacher to teacher and is currently done by changing teachers' methods and tailoring the tasks and texts the students work with. Some teachers (n=9, 45%) adapt what methods they use, with one saying, *“I try to make good PowerPoints that both simplify what is written in the textbook, as well as drawing out the essence.”* Another teacher uses a reading technique to ensure every student follows along; *“We always read and listen at the same time; for those with reading difficulties, it often helps to have the text read out loud.”* On the other hand, some (n=4, 20%) adapt by offering different amounts and difficulty levels of tasks. This includes harder tasks and texts for the stronger students and simpler ones for those struggling. A teacher explained this strategy: *“I always have to make sure to have extra tasks for the quickest students. I spend a lot of time finding tasks in the book or online for the weaker students so they can also get a feeling of mastery.”* Adaptation of texts was mentioned by many teachers (n=12, 60%), especially having texts of the right level, with one stating, *“We have access to*

texts divided into levels. This way, it is simpler for those who struggle with reading. We have a book divided into moon-texts that are simpler than sun-texts. I adapt tasks according to reading level so every student will accomplish something.” This includes content length, sentence length, ease of language, difficulty levels of terms, text structure, and how well the students can engage with the text.

Acquiring texts of the correct level falls on the teacher in most situations, with 65% (n=13) of the teachers mentioning that they adapt texts they have found. The advent of the digitalization of the school system has helped this. One of the teachers highlighted that *“In many ways, it’s easier since the students got digital textbooks; it’s easier to give them individual tasks. And I can choose the text amount and adjust it for the students.”* Additionally, public tools are available for all teachers, such as support websites for the different curriculum books and tools available for students to assist in reading comprehension, like programs for reading out loud, books of a lower level, and digital books. Only two teachers (10%) took the next step into digitally assisted adapted education by using AI to write and adapt texts for them, with one stating, *“I use ChatGPT, it generates texts, and if there are two or more levels, I get it to make more texts.”*

#### B. Artificial Intelligence in Educational Settings

**Teachers’ Opinions on AI.** All teachers were somewhat familiar with artificial intelligence (mostly ChatGPT). Most teachers had used ChatGPT (n=14, 70%), and almost half had used it for an educational purpose (n=9, 45%) (e.g., as a writing partner, for research, to make illustrations, to create texts on certain words, and to introduce it to students). Overall, most (n=15, 75%) were positive towards AI integration. Only one teacher was negative to using AI: *“A lot of what you learn is new skills, not only knowledge. [...] The students must learn how to struggle with a hard task, this way they will feel a sense of mastery when they complete it”*. Another teacher approached AI as a supplementary tool highlighting human control: *“I think it could be a positive thing, but it depends on how it is used. If you let it take over and don’t think for yourselves, it would be inconvenient, and you would not get anything useful out of it. It could be useful if it is used as a tool to supplement but not take over.”* Similarly, five teachers (25%) specifically underscored a fear that the wrong use of ChatGPT could take over too much and lead to the students not learning the process of learning and their texts losing the “human factor.”

**Opportunities and Negative Aspects of AI.** The most frequently mentioned opportunities of AI were that it could be used for personalized education (n=8, 40%), with one saying, *“It could be used for level adapted reading. I could add multiple criteria, such as interests and sentence design to the AI and receive a text.”* Another teacher mentioned that AI could be used as an assistant for substitutes and help with some students, mentioning, *“It can be used for writing or reading difficulties, and in cases where you have a substitute teacher, they can get some support from the AI.”* Saving time

was also stated by some participants (n=5, 25%), and one teacher mentioned it as the foremost reason for using AI: *“First and foremost, it is time-saving.”* Using AI to make tasks was noted by 25% (n=5) of the teachers, and one of them talked about their idea for an AI-powered app: *“You could make an app with multiple choice questions that know the student and then spread out questions according to the level of the student.”* A few teachers (n=3, 15%) shared a positive outlook on AI, albeit with the caveat that the current system may not support it, with one stating, *“I think it’s good, I think it is underutilized in the school, and there are a lot of opportunities, but you have to rethink the educational system.”*

The most prominent critique of AI was a lack of trust in the accuracy of AI’s answers, especially when it comes to younger students using it. A teacher explained this concern: *“I think many students lack the basic general knowledge and source criticism not to trust ChatGPT. They may take its facts for granted and not read through and evaluate whether it’s correct or wrong.”* Additionally, some teachers (n=5, 25%) mentioned that students may use it to cheat and that it is difficult for teachers to notice or prove it. Another group of teachers (n=6, 30%) displayed a concern that implementing AI in school without providing a proper education on how to use it could have a negative effect on students’ learning outcomes. One teacher raised their concerns by asking, *“Will they remember what they learned from ChatGPT? And will the students learn the process of acquiring information themselves?”*

**AI Integration.** Regarding the use of AI in education, seven teachers (35%) highlighted various ways AI could contribute to adapting teaching to students. Four (20%) suggested that AI could help strengthen weaker students. Two teachers suggested that AI could be used to generate individually tailored texts. Furthermore, one teacher explained that a student’s specific challenges and interests could be incorporated into the text, creating an optimized reading practice for a particular student. Another suggestion mentioned by two teachers (10%) is to utilize the strengths of AI in an AI-based assessment tool: *“Assessment of students takes up much time. If an AI could continuously assess the students, it would have a better foundation for accurate evaluation.”* One teacher also proposed how AI could be used for personalized education by leveraging the potential of an enhanced text-to-speech version.

A desire to focus on teaching students how to use AI and understand its possibilities and limitations was expressed by five teachers (25%). This group wanted to use different methods, such as using AI to teach students about source criticism, making effective prompts, searching for information, acquiring knowledge, and finding inspiration for topics they can write essays about.

#### IV. DISCUSSION

Personalized education has been increasingly a standard in the Norwegian educational system. Teachers endeavor to

provide personalized learning for students using various resources, such as printed materials, support websites, or electronic documents. However, it requires additional effort to properly meet each student's needs, preferences, and learning styles. This study explored current issues affecting personalized education and teachers' experiences and opinions on using AI for this purpose. With the advent of large language models like ChatGPT, Google Bard, and GitHub Copilot, coupled with their widespread proliferation, an exciting opportunity has arisen to use AI for text adaptation to individual students' levels of comprehension. However, teachers' opinions on AI and competence in its use are crucial for the prevalence of the technology to be integrated successfully into education.

In line with previous research [6], in our study, almost all teachers, regardless of age, years of experience, and geographical location, held a positive attitude toward using AI for educational purposes. We initially expected the younger generation to be more open to accepting AI. Still, the study shows a homogenous distribution of opinions, with no definitive separation based on the above-mentioned demographics. This could show that the teachers, in general, are open to using AI in the educational context. However, despite their positive outlook, very few teachers have experienced using AI for text adaptations to personalize their students' learning journey. This leads us to highlight the importance of education for prospective teachers in teacher education programs and active teachers to integrate, such emerging technologies effectively, as we observed that most teachers in the study had an abstract idea of how AI would be utilized in education. Most envisioned it as a chat solution, not a possible learning tool.

Teachers are at the center of personalized education; therefore, addressing their concerns about AI is important to understand how to support them with their work on AI-assisted learning. There are six main challenges under human-centered AI: human-AI interaction, human well-being, governance and independent oversight, responsible design of AI, privacy, and design and evaluation frameworks [15]. Similarly, through the interviews, we found teachers' most prominent concern to be where the AI gets its information and, generally, a worry about the truthfulness and accuracy of AI-generated content. Additionally, the teachers reported fear of misuse of the technology by educators and students during human-AI interaction. They believe teachers should use AI to support the learning practices of their students properly and be careful about providing clear guidelines on the ethical use of AI, as students may use it for cheating.

Therefore, in a similar vein, ethical issues in the use of AI [16] and its practical implementations should be integrated into the curriculum to help students familiarize themselves with the technology and gain more insight into its proper use. This integration is important for all levels of students, from primary to secondary schools to higher education, to prepare

them for the future, as AI will likely continue to transform the world profoundly.

We found that a lack of time is one of the biggest challenges in providing personalized education. The teachers spent significant time tailoring texts for multiple students in the class. Even though personalized education has been a priority in Norwegian schools, teachers experience an increased time challenge due to escalated non-pedagogical tasks [2]. This, combined with the decrease in teacher education programs and a high number of inundated teachers [1], paints a picture of a future where the challenges regarding sufficient time could be even greater. A possible solution to mitigate the problem could be to automate parts of the personalization through AI technology.

Molenaar [17] describes a model of six levels of AI-automation regarding personalized learning ranging from no AI assistance through AI teacher assistance to full automation, where AI takes all controls and handles the tasks automatically without teacher involvement in the process. The model explains the roles and responsibilities from both educators' and learners' perspectives. Based on the results of our study, we observe that teachers are not ready for full automation, as they highlighted the importance of human judgment and control on AI-generated content and mostly see AI-assisted solutions as supplementary learning material that can help teachers deliver better teaching. Although there is a surge in the use of AI in almost every area, including education, both teachers and students need more time to digest the technology and thereby fully embrace it. When considered in the context of education, we suggest the role of AI in the integration should be appropriately clarified.

A key part of our study was investigating how teachers adapt the education for students with various learning difficulties. It is, however, important to remember that all students have equal right to personalized learning. With teachers' current time constraints, they may feel obligated to prioritize and focus on students struggling to follow the rest of the class. This could result in them not having sufficient time to properly adapt to their stronger students and therefore not reaching their potential learning outcome. By improving the teachers' efficiency when adapting to their weaker students, teachers can save time, which can then be used to adapt to their stronger students, resulting in a better learning outcome for all levels of students.

## V. CONCLUSION AND FUTURE WORK

AI-assisted solutions can democratize education by scaffolding students' learning journeys based on their individual needs, preferences, and learning styles. As teachers play a central role in personalized education, their opinions on the use of AI within the educational context are crucial for the pervasiveness of the technology. Based on the results of our study, we conclude that a lack of time is a prominent challenge in providing a personalized learning environment. Teachers see AI as an opportunity to mitigate

their ongoing challenges and enhance students' engagement. However, distrust in the accuracy of AI-generated texts and fear of misuse of the technology by both educators and students are common concerns. The teachers have little experience using AI in an educational setting, indicating a need for training to use the technology properly. This study focused on one aspect of personalized education (i.e., text adaptation for students with reading comprehension challenges), teachers' current practices, and opinions on AI. Students' learning styles and personal characteristics affect their learning preferences [18], suggesting that future research should focus on the "student" aspect of AI integration for personalized education. Additionally, with the widespread proliferation of generative AI, there is a need to explore the effective use of prompts to get maximum benefit from AI integration in education.

#### REFERENCES

- [1] Samordna Opptak, "Pressemelding 24.04.23," 24 April 2023. [Online]. Available from: <https://www.samordnaopptak.no/info/om/sokertall/pressemelding-240423-bm.pdf> [retrieved: April, 2024]
- [2] C. Pedersen, R. B. Reiling, F. F. Vennerød-Diesen, R. Alne and A. Skålholdt, "Evaluering av norm for lærertetthet: Sluttrapport" [Evaluation of the Norm for Teacher Density: Final Report], NIFU, 2022.
- [3] M. L. Bernacki, M. J. Greene, and N. G. Lobczowski "A systematic review of research on personalized learning: Personalized by whom, to what, how, and for what purpose (s)?" Educational Psychology Review, April 2021, pp. 1675-1715, doi: 10.1007/s10648-021-09615-8.
- [4] H. Dumont and D.D. Ready, "On the promise of personalized learning for educational equity," NPJ Science of Learning, Aug 2023, vol. 8, Art.no. 26, doi: 10.1038/s41539-023-00174-x
- [5] Norway. Education Act, § 1-3 Adapted Education. Amended 2018.
- [6] A. Al-Badi, A. Khan, and Eid-Alotaibi, "Perceptions of Learners and Instructors towards Artificial Intelligence in Personalized Learning," Procedia Computer Science, April 2022, vol. 201, pp. 445-451, doi:10.1016/j.procs.2022.03.058
- [7] M. Ninaus and M. Sailer, "Closing the loop – The human role in artificial intelligence for education," Front. Psychol., Aug. 2022, vol. 13, doi:10.3389/fpsyg.2022.956798.
- [8] H. P. Maffon et al. "Architecture of an intelligent tutoring system applied to the breast cancer based on ontology, artificial neural networks and expert systems," The Sixth International Conference on Advances in Computer-Human Interactions, *ACHI*, IARIA, Feb 2013, pp. 210-214, ISSN: 2308-4138, ISBN: 978-1-61208-250-9
- [9] T. Makati, "Machine learning for accessible web navigation," Web for all conference, (W4A '22), April 2022, Art. no. 23, pp. 1-3, doi:10.1145/3493612.3520463.
- [10] S. Abou-Zahra, J. Brewer, and M. Cooper, "Artificial Intelligence (AI) for Web Accessibility: Is Conformance Evaluation a Way Forward?" Web for all conference (W4A '18), April 2018, Article 20, pp. 1-4, doi:10.1145/3192714.3192834.
- [11] Z. Rasheed, S. Ghwanmeh, and A. Z. Abualkishik, "Harnessing Artificial Intelligence for Personalized Learning: A Systematic Review," Data and Metadata, Dec 2023, vol. 2, pp. 146-146, doi: 10.56294/dm2023146
- [12] A. Bhutoria, "Personalized education and Artificial Intelligence in the United States, China, and India: A systematic review using a Human-In-The-Loop model," Computers and Education. Artificial Intelligence, April 2022, vol. 3, doi:10.1016/j.caeai.2022.100068.
- [13] K. C. Li and B. T.-M. Wong, "Artificial Intelligence in Personalised Learning: A Bibliometric Analysis," Interactive Technology and Smart Education, May 2023, vol. 20, pp. 422–445, doi:10.1108/ITSE-01-2023-0007.
- [14] V. Braun and V. Clarke, "Using thematic analysis in psychology," Qualitative Research in Psychology, Jan 2006, vol. 3, no. 2, pp. 77-101, doi:10.1191/1478088706qp063oa
- [15] O. Ozmen Garibay et al. "Six Human-Centered Artificial Intelligence Grand Challenges," International Journal of Human-Computer Interaction, April 2023, vol. 39, pp. 391-437, doi: 10.1080/10447318.2022.2153320.
- [16] J. Borenstein and A. Howard, "Emerging challenges in AI and the need for AI ethics education," AI and Ethics, Oct 2021, vol. 1, pp. 61-65, doi: 10.1007/s43681-020-00002-7
- [17] I. Molenaar, "Personalisation of learning: Towards hybrid human-AI learning technologies," in OECD Digital Education Outlook 2021: Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots, OECD, Oct 2021, pp. 57-72, doi: 10.1787/589b283f-en.
- [18] Y. Inal and H. Guner, "Ensuring success in a large scale software project: An examination of the learning styles and characteristics of the potential end users," Gazi University Journal of Science, vol. 28, pp. 535-540, 2015.