

**AI AND EDUCATION:  
EXPLORING THE PERCEPTIONS OF EDUCATORS AND STUDENTS ON THE USE  
OF AI IN EDUCATION AND ITS IMPACT ON THEIR LEARNING EXPERIENCES**

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Wenzao Ursuline University of Languages, 2023

**Abstract**

Artificial Intelligence (AI) has significantly revolutionized the field of education, transforming teaching methods and learning approaches. This research aims to examine the perceptions of students and educators on the integration of AI in the context of education in Kaohsiung, Taiwan. The main goal of the study is to identify the benefits and challenges posed by the implementation of AI in educational settings. The research uses in-depth interviews and content analysis as the main sources of data. The primary interviewees are educators from various educational institutions and university students. Through the interviews, the study aims to analyze and understand how the new AI technology can enhance learning experiences and provide adaptive support for each individual's needs.

There are a few key factors this study sets to examine: perceptions of AI in education, impact on the learning experiences, prospects and enhancements in AI tools, challenges and concerns, and adoption and readiness. Through researching these aspects, we will gain insights into the positive and negative perceptions of educators and students on AI's influence on the learning process, the benefits, and drawbacks of AI's impact on learning experiences, and the possible prospects and areas for improvement for AI tools. Furthermore, the research addresses concerns regarding the responsible integration of the technology, over-reliance on AI, ethical

considerations, and biases. Additionally, another goal is to understand the urge for guidelines and frameworks related to the usage of AI tools in education to avoid potential threats and create a safe environment for users.

With the interviews conducted with respondents from different levels of educational institutions, the paper represents the perspectives of a larger number of people and allows us to better understand the attitude towards the integration of AI at various levels. Finally, the research contributes to the conversation about the prospects in education during the era of rapidly developing artificial intelligence.

**Keywords: artificial intelligence (AI) in education, impact on learning experiences, AI tools.**

人工智慧與教育：  
探索師生對於人工智慧的使用及其對學習體驗之影響

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摘要

人工智慧（AI）已在教育領域進行了顯著的革命，轉變了教學方法和學習方式。本研究旨在探討來自台灣高雄教育背景下的學生和教育工作者對於整合人工智慧在教育中的看法。研究的主要目標是確定在教育環境中實施人工智慧所帶來的好處和挑戰。本研究以深度訪談和內容分析作為主要數據來源。主要的受訪者包括來自不同教育機構的教育工作者和大學生。通過訪談，本研究旨在分析並了解新的人工智慧技術如何改善學習體驗並為每個個體的需求提供適應性支持。

本研究設法研究以下幾個關鍵因素：教育中對於人工智慧的看法，對學習體驗的影響，人工智慧工具的前景和改進，挑戰和關切，以及接受度和準備度。通過研究這些方面，我們將獲得教育工作者和學生對於人工智慧對學習過程的積極和消極看法，人工智慧對學習經歷的影響的利弊，以及人工智慧工具的可能前景和改進領域的見解。此外，該研究還解決了關於負責任整合該技術，對人工智慧過度依賴，道德考量和偏見的問題。另一個

目標是了解有關在教育中使用人工智慧工具的指南和框架的需求，以避免潛在威脅並為用戶創造安全的環境。

通過與來自不同教育機構的受訪者進行的訪談，本文代表了更多人的觀點，使我們能夠更好地了解在不同層次整合人工智慧的態度。最後，該研究為在快速發展的人工智慧時代探討教育前景做出了貢獻。

**關鍵詞：**教育中的人工智慧 (AI)，對學習體驗的影響，人工智慧工具。

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# INTRODUCTION

## Background

There are many ways to describe artificial intelligence. Taking this concept in the broadest sense possible, it is “the study of the computations that make it possible to perceive, reason, and act”.<sup>1</sup> According to the perspective of this definition, Artificial Intelligence or, following the abbreviation, AI, is a partial combination of psychology and computer science with an emphasis on computation, as well as perception, reasoning, and action.<sup>2</sup> Besides various explanations and theories of what the artificial intelligence actually is, in concrete terms and most settings, AI is referred as nonhuman intelligence that is measured by its ability to replicate human mental skills, such as pattern recognition and understanding natural language.<sup>3</sup>

Even though AI is one of the newest concepts in modern technology, it attracted scientists’ attention soon after World War II, getting its name not long after - in 1956.<sup>4</sup> If back then people could only dream about the adoption of this advancement and started a careful acquaintance with this concept, nowadays such innovation is widely used and applied in a variety of areas, ranging from the general, for example, fundamental sciences, to the specific, such as using the GPS navigator, writing music, creating images and working with speech recognition.

With the growing popularity and development of technology, the usage of artificial intelligence has become essential and is rapidly transforming, and influencing different areas in our everyday life, including education.

Given the advancement of innovations in the educational field, AI provides both students and professors with enhanced learning experiences. AI-powered tools and platforms can help not only in research and academic knowledge or in automating administrative tasks but also in

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<sup>1</sup> Patrick Henry Winston, *Artificial Intelligence*, 3rd ed., 1992.

<sup>2</sup> Ibid.

<sup>3</sup> Stephan De Spiegeleire, Matthijs Maas, and Tim Sweijts. “WHAT IS ARTIFICIAL INTELLIGENCE?” *ARTIFICIAL INTELLIGENCE AND THE FUTURE OF DEFENSE: STRATEGIC IMPLICATIONS FOR SMALL- AND MEDIUM-SIZED FORCE PROVIDERS*. Hague Centre for Strategic Studies, 2017.

<sup>4</sup> Stuart Russell and Peter Norvig. *Artificial Intelligence: A Modern Approach, Global Edition*. Pearson Higher Ed, 2016.

delivering personalized practice and real-time feedback. For example, AI plagiarism detection systems can provide personalized feedback and guidance, pointing out whether the content of the academic work is authentic or not, making it easier for students and teachers to understand the specifics of self-learning patterns, what areas to improve and make more original, as well as to evaluate the accomplished work and knowledge levels.

Despite the potential benefits of AI in education, there are numerous concerns about its negative impact on educational opportunities and performance and its role in replacing original learning processes. Different perceptions of the usage of such technology might lead to various motivations and attitudes towards AI, which can be sincere desires to use this tool to enhance knowledge or, on the opposite, to use it for the purpose of completing the work quickly without applying personal skills, opinions, and knowledge. In the latter case, students' abilities to learn independently, solve problems, and practice critical skills might be compromised due to the great reliance on AI systems.<sup>5</sup> Therefore, the issue of irresponsible attitudes and perceptions of the concept should be examined for a better understanding of how students and educators perceive the impact of AI systems in learning environments.<sup>6</sup>

Drawing upon the existing literature and identifying the areas for further investigation, the present study aims to examine the perceptions of students and instructors on the effects of AI systems on learner-instructor interaction in the context of education and their learning experiences. By conducting interviews and surveys with university students and professors, this research sets out to discuss the promising prospects of AI in education in the future, to identify the advantages and disadvantages of its usage, and to understand the process of AI adoption in learning environments.

The importance of such a study lies in the fact that it helps educators and policymakers gain insights into how to implement AI systems in education effectively while addressing the concerns and challenges associated with its integration. Furthermore, this research seeks to contribute to the development of a more advanced educational system that can successfully

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<sup>5</sup> Feng Wang and Thomas C. Reeves. "Why Do Teachers Need to Use Technology in Their Classrooms? Issues, Problems, and Solutions." *Computers in the Schools* 20, no. 4 (December 1, 2003): 49–65.

<sup>6</sup> Measuring students' acceptance to AI-Driven assessment in eLearning: Proposing a first TAM Based research model. (n.d.). [springerprofessional.de](https://www.springerprofessional.de).

<https://www.springerprofessional.de/en/measuring-students-acceptance-to-ai-drivenassessmentin-elearn/16911358>

combine strong motivation and a responsible attitude towards the independent learning process and a simplified approach to the opportunities of getting real-time feedback and personalized technological practice without outweighing one another.

### **Motivation**

My motivation to explore the integration of AI in education is to gain a deeper understanding of this complex issue. With the rapid advancement of technology and the growing demand for digital learning, I am interested to find out what factors influence AI's potential to transform the way education is delivered and received as its impact is still uncertain and understanding the perceptions of students and professors on the issue is crucial due to the emphasis on implications for the future of education.

### **Research Purpose**

The purpose of my research is to address this gap in knowledge by investigating and exploring the perspectives towards the transformation of traditional methods of teaching and learning and broadening existing limited data.

### **Research Questions**

The main questions of my research are as follows:

- What are the perceptions of students and educators regarding the integration of AI in education?
- What is the impact of the integration of AI in education?

Under this “umbrella” of questions, more sub-questions can be looked at in detail to deepen and give a clearer understanding.

Those sub-questions are being:

- What are the advantages and challenges of using AI in education, according to the perceptions of students and professors?
- To what extent do students and professors perceive AI to be an effective tool for personalized learning?
- How can the integration of AI in education be optimized to enhance students' learning experience, according to the perceptions of students and professors?

The answers to these questions will help to understand the problem more deeply and find ways to solve it.

### **Contribution**

As an emerging technological concept, AI is deemed to be an instrument for revolutionizing the education sector by improving its efficiency and effectiveness. Through this research, I wish to contribute to the literature by providing valuable insights into the perceptions of students and professors on the use of AI in education, and its impact on their learning experiences. Moreover, given the fact of the limited relevant data regarding this topic with growing popularity, this research will suggest a more comprehensive understanding of the attitudes towards the ethical and inclusive integration and effective incorporation of AI in education by exploring and identifying the similarities and differences in the usage and perceptions of AI between these two groups.

## **Limits**

The limitations of this paper must be considered when interpreting the results as they may consist of researcher bias and lack of longitudinal data. Firstly, my conclusions may be applicable only to certain groups of students and professors and to a specific locality, therefore, they can only give a broad picture, and may not display all the viewpoints of every individual. Additionally, it is possible that some participants will not want to answer the interview questions honestly and may provide socially desirable responses, which may affect the reliability of the results and not accurately reflect their true opinions. Secondly, the study may not demonstrate the long-term impact of using AI in education on learning experiences, as it only provides a snapshot of the perceptions at a particular point in time.

## **Delimits**

One of the key aspects of the study is the definition of the boundaries within which the study will be carried out. This is an important step that will allow me to clearly understand which topics, subtopics, data and sources will be included and which will be excluded. In my research, I have set several boundaries to limit the scope of research and make it more focused.

First of all, I have limited the study only to a specific geographical location – Kaohsiung, Taiwan, without taking into account other countries or regions. Secondly, I have limited the research to educational settings focusing on the perceptions of students receiving higher education and, teachers, professors, and other educators in different educational institutions. This delimit ensures that the research represents the opinions of a wider group of individuals and their experiences in various educational contexts. In addition, I have limited myself to using only certain types of sources, such as scientific articles and official documents, to ensure the accuracy and reliability of the research. Last, an important boundary of this paper is the timeframe that motivates me, as a researcher, to finish my study according to the schedule.



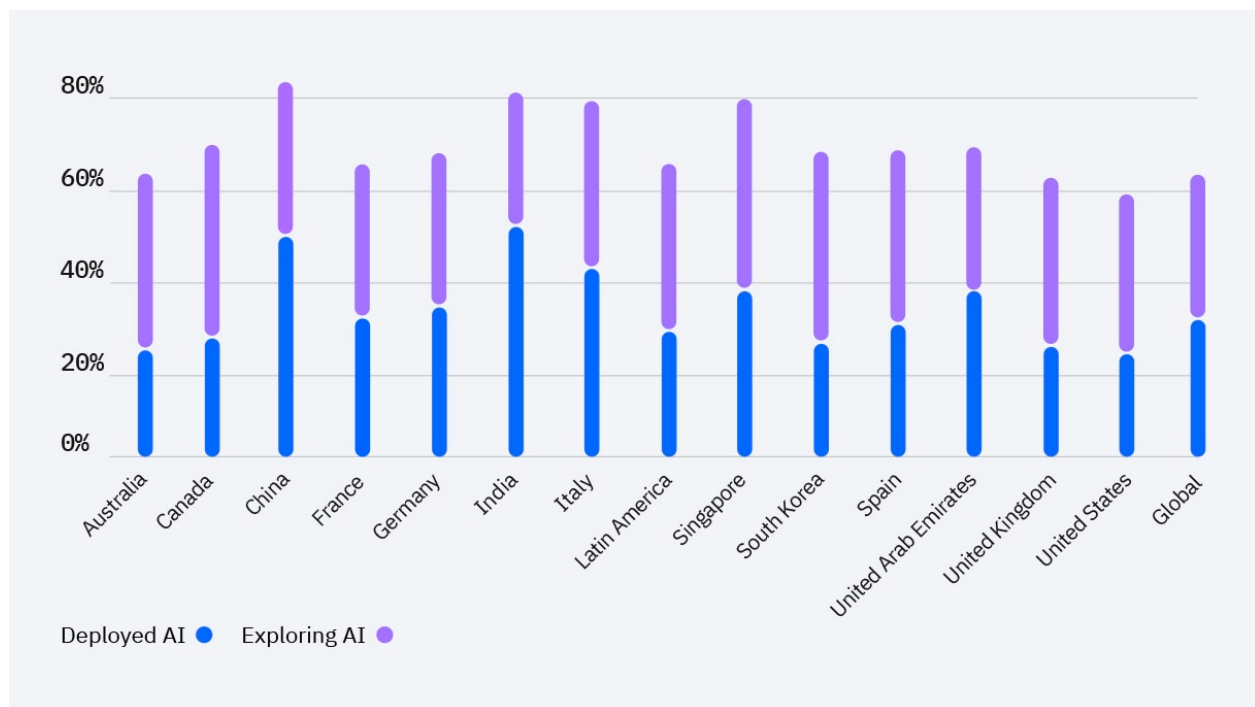
Such boundaries helped me narrow down the field of research, which allowed me to make a deeper analysis and draw conclusions that may be of practical value for professionals dealing with AI, and for researchers who deal with more general issues of integration of modern technologies into the field of education.

## LITERATURE REVIEW

### Artificial Intelligence (AI)

Artificial intelligence (AI) entered the beginning of the 21st century, revolutionizing numerous industries and sectors, and changing our lives forever. With the growing popularity of AI, it has become a driving force behind technological progress and innovation. Even though the strategy of AI adoption is yet to be implemented, the IBM Report<sup>7</sup> demonstrates a growing number of enterprises using AI within their business operations. In 2022, 35% of companies reported the employment of artificial intelligence technology in their businesses, which was 4% higher than in 2021. Moreover, 42% mentioned their intention to incorporate AI into their organizations. Therefore, the numbers show that more than 50% of companies implementing AI have benefitted from it.

**Figure 1 AI Adoption Rates Around the World**

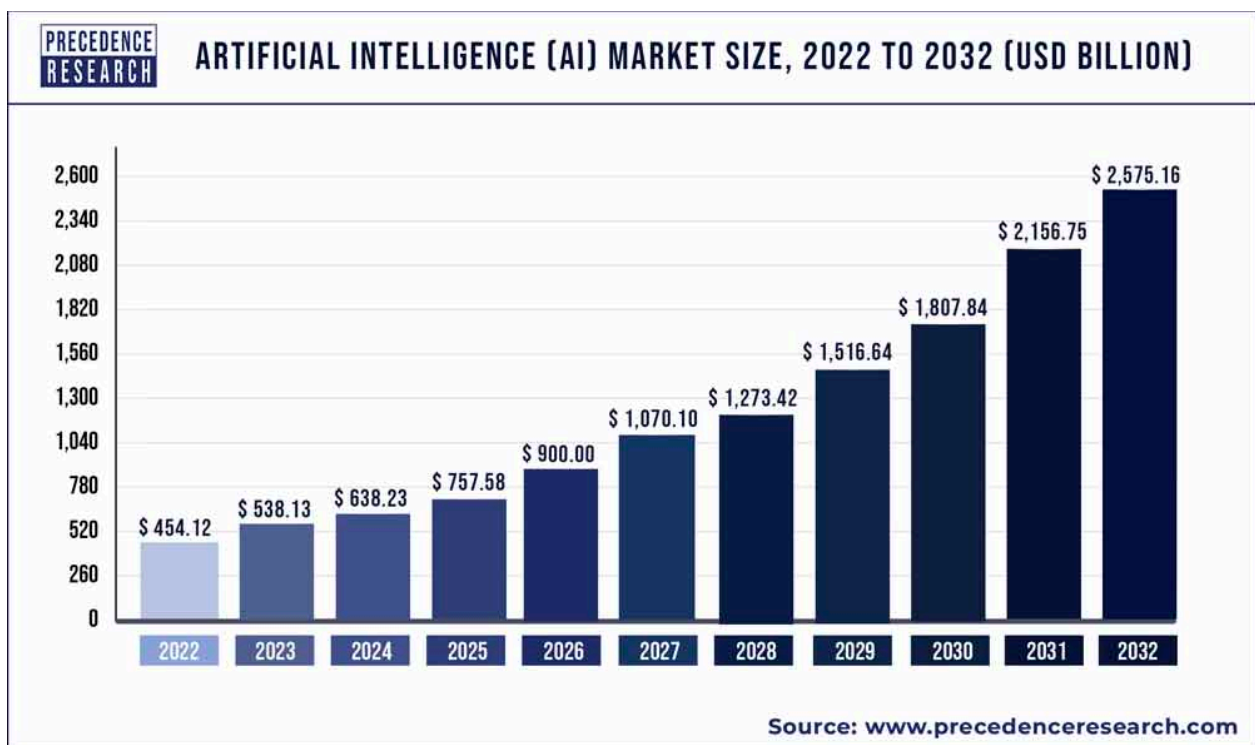


<sup>7</sup> IBM Global AI Adoption Index 2022 | IBM. (n.d.-b). <https://www.ibm.com/watson/resources/ai-adoption>

(Source: IBM Global AI Adoption Index 2022)

Along with the increasing usage of artificial intelligence among organizations, the market size of AI is rising drastically. According to the latest statistics, in 2021, artificial intelligence was valued at \$87.04 billion<sup>8</sup>. It should come as no surprise that, in 2023, the market size almost doubled to \$164.99 billion. From 2022 to 2030, the global AI market is estimated to be worth over \$1.5 trillion, which represents a magnificent Compound Annual Growth Rate (CAGR) of 38.1%<sup>9</sup>.

Figure 2 AI Market Size, 2022 to 2030 (USD Billion)



(Source: precedenceresearch.com)

The power of artificial intelligence is evidently attracting various organizations, being recognized as the wildest technology around the world. Due to the expansion of the internet and the advancements in digital technology, it is believed that AI has already grown to a spectacular

<sup>8</sup> Artificial Intelligence (AI) Market Size, Growth, Report By 2032. (n.d.-b). <https://www.precedenceresearch.com/artificial-intelligence-market>

<sup>9</sup> Ibid.

level and is expected to be driven by the growing demand for technology in various industries, such as automotive, healthcare, banking and financial, manufacturing, retail, and logistics, in the future.

AI systems are definitely considered a massive scientific breakthrough and are widely used in different areas. It is hard to imagine our lives without the help of smart assistants, such as Siri and Cortana<sup>10</sup>, which can answer questions, process data, and help maintain small tasks. They even track your Google search history and start showing you similar information to your recent requests before it is actually asked for. Besides being an exceptional scientific achievement, AI has a significant impact on the industrial sector and plays a fundamental role in the automation of repetitive tasks and improving the efficiency of business processes. For example, factories widely use robots because they are productive and more accurate, do not get tired, and do not require recess. Such workers are less likely to be affected by emotions or be late to work, which makes them reliable and more convenient. Furthermore, AI is capable of analyzing large data amounts and optimizing processes vital to protecting our finances, diagnosing serious diseases, harvesting, and fertilising lands, preventing car accidents, and ensuring safe transportation. Although AI seems to be an amazing tool able to work under given rules and instructions, some smart machines have their own decision-making processes. For instance, Deep Blue<sup>11</sup>, a chess computer created by IBM, defeated the chess world champion, GM Garry Kasparov in 1997. Deep Blue's victory marked the rise of artificial intelligence and sparked new concerns about its fast-paced development.

However, AI has also its negative impacts. Due to ethical considerations, the use of AI must be regulated to prevent undesirable consequences. To build trust and mitigate biases, it is essential to enhance transparency and improve personalized usage in AI algorithms. Other challenges of AI include potential job displacement and growing unemployment rates as automation is in rapidly growing demand. As a result of AI-driven changes, it is crucial to reskill or upskill the workforce to ensure a smooth transition and address the concerns.

AI has a great influence on numerous aspects of our lives, transforming how we live and work. From smart homes enhancing living experiences through AI-powered systems to the use of

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<sup>10</sup> V. Kapoor. (2022a, August 30). *Siri vs Cortana: Which One Works Better?* MyAppleGuide. <https://myappleguide.com/siri-vs-cortana-which-one-works-better/>

<sup>11</sup> IBM Corporation. "IBM100 - Deep Blue," n.d. <https://www.ibm.com/ibm/history/ibm100/us/en/icons/deepblue/>.

AI in healthcare for more accuracy in saving lives, artificial intelligence has indeed been embedded into our daily routine. However, with the growing adoption of AI, privacy, security, and data protection issues have emphasized the urgency for frameworks regulating these concerns. With the continuous development of the internet and advances in digital technology involving AI, it is essential to embrace the latest scientific progress while prioritizing safe and ethical AI implementation and usage.

### **Artificial Intelligence (AI) in Education**

Artificial Intelligence (AI) has brought significant changes in our world.<sup>12</sup> Yet, it is challenging to define what AI exactly is due to its interdisciplinary nature and evolving capabilities. Recently, AI attracted a lot of attention and demonstrated rapidly growing potential to be particularly beneficial in education, where it can help identify the most effective teaching methods based on students' learning backgrounds and abilities.

The outbreak of the COVID-19 pandemic in 2019 resulted in shifting the educational process online, relying heavily on ed-tech products for content organization, operation management, and student-instructor communication. Such sudden transfer boosted the latest developments in the potential of Artificial Intelligence (AI) in education and identified the purpose of its usage. Firstly, it reduced teachers' workload while providing good education that does not compromise learning outcomes through the usage of various interactive learning management platforms, grammar checkers and AI-powered adaptive systems that create content, such as Canva, Grammarly and DreamBox. Secondly, it provided personalized learning experiences based on each person's learning background and abilities with the help of such learning apps as IXL or even AI-based chatbots like IBM Watson Assistant or ChatGPT. Thirdly, it ensured a deeper understanding of the provided knowledge and identified effective teaching tools, which facilitated raising the awareness of implementing engaging and creative AI

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<sup>12</sup> S. Makridakis. (2017b). The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms. *Futures*, 90, 46–60. <https://doi.org/10.1016/j.futures.2017.03.006>

tools in education, for example, Kahoot! And Quizlet. Lastly, it created personalized feedback and an interactive educational environment via Intelligent Tutoring Systems (ITS) to broaden students' understanding of specific topics. Thus, the unexpected switch to online reality not only positively affected AIED advancement but also made it more accessible and efficient.

Artificial intelligence (AI) has revolutionized the field of education reshaping the learning experience into more personalized and adaptive, aligning with the unique needs of each student. AI learning systems use their algorithms to analyze everyone's strengths and weaknesses, ensuring steady development and a deeper understanding of information for every student at their own pace. Additionally, other AI tools such as virtual assistants have proven their usefulness in the classrooms by providing more personalized learning and support to both students and teachers.

Besides studying, AI has influenced the way assignments are evaluated. Following the ability to perform automated repetitive work, AI systems can make the grading process more efficient and accurate, helping teachers avoid tedious work. Furthermore, with the updated evaluation algorithms, AI provides feedback and comments on students' performance based on their grades, which helps educators gain a better understanding of the areas of improvement for each student, as well as reshape their teaching styles or content. Despite the great help in grading and evaluation, another AI-powered system affected education even more, becoming widely established and admired on different institutional levels, not only personal. The popularity of proctoring comes from its purpose in education - to monitor the progress of a remote test.<sup>13</sup> Researchers distinguish various proctoring systems. Passive monitoring of software on examinees' computers is carried out by tracking the applications that students work with on their PCs and switching to other services during the exam. Active software restriction on students' computers works by using, for example, the Browser Lock application, which helps to block access to other applications during exams. Passive video surveillance using software that accesses the students' webcam for direct recording of all actions is a more AI-reliant form of proctoring as online control takes place without an examiner and without human participation. Video and sound are recorded, suspicious human behaviour is automatically detected, and

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<sup>13</sup> *Списать не дам: что такое онлайн-прокторинг и как он работает.* (n.d.-с). РБК Тренды.  
<https://trends.rbc.ru/trends/education/5fa01fe49a794782c65b74f9>

violations are recorded. The opposite option is active video surveillance, which works similarly to passive, but with the addition of real-time monitoring.

A recent study in AI in Education (AIEd) is increasingly focusing on educators, ensuring their adaptation to new mechanisms and technologies in online education.<sup>14</sup> This shift has pointed out the importance of teachers gaining new tech-savvy skills and insights, as well as improving their management abilities to implement the benefits of AIEd in their professional field.<sup>15</sup> Besides the need for skill-enhancing technological training for educators, a psychological understanding of students and their prior knowledge, social background, economic status, and emotional state is also critical to the successful implementation of AIEd tools.

Nowadays, we are already familiar with some AIEd developments, such as AIDA, AIAssess, Open Learner Models, etc. For example, Pearson's calculus learning tool, AIDA, provides detailed guidance and questions about the potential development of learners' empathy towards educational chatbots<sup>16</sup>, whereas Open Learner Models<sup>17</sup> is widely used to broaden learners' and teachers' understanding of the knowledge and learning environment. As for intelligent assessment tools like AIAssess, they offer strategies for easier and more effective assessments, using voice recognition, language translation, etc.<sup>18</sup>

Such fast development of technologies and innovations directed towards the academic area is aiming at enhancing the skills and capabilities of teachers and learners, creating an accessible learning environment online with personalized experiences.

However, the implementation of artificial intelligence in education has brought numerous concerns and challenges. Mostly these issues are related to privacy, data protection and ethical issues which need to be addressed promptly, regarding the personal information of the students and educators. As such, it is crucial to prevent possible biases and confidentiality concerns in the educational field, especially in the grading and evaluating processes.

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<sup>14</sup> Anissa Moeini: Theorising Evidence-Informed Learning Technology Enterprises: A Participatory Design-Based Research Approach. Doctoral dissertation, UCL University College London, London, (2020)

<sup>15</sup> R. Luckin, W. Holmes, M. Griffiths, L. Pearson: Intelligence Unleashed An argument for AI in Education.

<sup>16</sup> S. Tisseron, F. Tordo, R. Baddoura: Testing Empathy with Robots: a model in four dimensions and sixteen items. *Int. J. Soc. Robot.* 7(1), 97–102 (2015)

<sup>17</sup> S. Bull, J. Kay: Open learner models. In: R. Nkambou, J. Bour-deau, R. Mizoguchi (eds.) *Studies in computational intelligence*, pp. 301–322. Springer, Berlin (2010)

<sup>18</sup> R. Luckin, B. du Boulay: *Int. J. Artif. Intell. Educ.* 26, 416–430 (2016)

Besides drawbacks affecting students, there are some negative impacts AI can bring on professors. Even though implementing AI in the classroom can improve teacher-student interaction and make the class more interactive, AI tools might affect lesson plans and curriculum outlines. Moreover, AI systems can cause potential job displacement and growing unemployment rates as their ability to create engaging material and perform repetitive work helps to improve the education experience without teachers' involvement. Such a tool should not be considered a substitute for personal interaction as using AI too much in the classrooms can lead to educational oversights that harm the learning experiences of students, create gaps in their knowledge of ethics and increase the lack of personal connections.

In conclusion, the integration of AI in education can optimize personalized learning. AI systems as a tool in the classrooms can enhance the educational journey and make this process more efficient and accurate. In addition, AI can evidently simplify teachers' routines, allowing them to spend less time on tedious work, which is done better once automatized. However, it is crucial to integrate artificial intelligence with a responsible attitude, paying attention to ethical considerations and regulations, which can help prevent concerns regarding privacy and biases. While embracing AI in education, we should explore its full potential cautiously to create a healthy learning environment for everyone.

### **The Role of Artificial Intelligence (AI) in Shaping Modern Learning**

Artificial intelligence can undoubtedly revolutionize the field of education, including its numerous technological tools, proctoring systems, innovative tools and various benefits that come with them. However, it is essential to expand our understanding beyond the technology behind this phenomenon and discover the theoretical bases that shape modern learning and AI's impact on learning outcomes. Given the established educational theories, such as the Theory of Cognitive Load, the Theory of Constructivism in Learning, the Model of Technology Acceptance, the Communicative Educational Environment, the Theory of Self-Determination, and the Zone of Immediate Development, it is important to consider how each of them interacts with AI tools in pedagogy and influence the educational processes.

To begin with, the Cognitive Load Theory (CLT) explains how task performance or



information retention depends on the amount of working memory resources.<sup>19</sup> According to CLT, there are 3 types of cognitive load – intrinsic, germane, and extraneous. Intrinsic load is formed by how complex the task is, whereas germane load demonstrates cognitive processes that promote learning and information retention, and extraneous load is related to the design and presentation of the material. Taking all these types into consideration, the learning process is most effective when the cognitive load stays within the limits of the working memory capacity. Hence, to maximize the effectiveness of the class content, educators of different educational levels should reduce extraneous load, maintain intrinsic load, and increase germane load.

Even though taking these steps is possible in natural and more familiar ways of teaching, artificial intelligence (AI) is a great tool to support learning and instruction. To reduce the extraneous load, or in other words, to minimize unnecessary cognitive factors, such as distractions of irrelevant information, that is not related to the task, it can be useful to use tools that can summarize, categorize, or simplify various information. For example, content summarization AI-powered tools or natural language processing (NLP) models<sup>20</sup> can not only summarize long articles and create an outline with key points but also simplify complex texts and make them easier to comprehend. Thus, students will be able to focus on the important material and understand it better without being cognitively overloaded. To increase the germane load, which means enhancing mental effort and capacity that is related to learning, AI tools can provide various opportunities to practice critical thinking skills, apply knowledge and improve long-term material retention. For instance, gamified learning platforms or augmented (AR) and virtual (VR) realities, such as Kahoot! or VR Headsets<sup>21</sup>, can provide an immersive learning experience, where students can be encouraged to actively in activities and exercise their skills. To maintain the intrinsic load, which relates to the learner’s level of cognitive ability and the complexity of the educational material, it is crucial to help students avoid frustration and feeling bored during classes. In this case, AI-powered tools like Coursera or Quizlet can come in handy

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<sup>19</sup> Barbara Anna Zielonka. (n.d.). How can AI help students reduce cognitive load at school? *www.linkedin.com*. <https://www.linkedin.com/pulse/how-can-ai-help-students-reduce-cognitive-load-school-zielonka/>

<sup>20</sup> What is a managed database? (n.d.-c). [https://www.oracle.com/hk/artificial-intelligence/what-is-natural-language-processing/#:~:text=Natural%20language%20processing%20\(NLP\)%20is,natural%20language%20text%20or%20voice](https://www.oracle.com/hk/artificial-intelligence/what-is-natural-language-processing/#:~:text=Natural%20language%20processing%20(NLP)%20is,natural%20language%20text%20or%20voice).

<sup>21</sup> Emma Green. (2023, September 1). Virtual-Reality School as the ultimate school choice. *The New Yorker*. <https://www.newyorker.com/news/annals-of-education/virtual-reality-school-as-the-ultimate-school-choice>

as they use students' performance data to identify issues and offer the most appropriate and moderately challenging content for their level and mental capability.

Another theory, Zone of Proximal Development (ZPD) examines the concept of the gap between the learner's learning capabilities without support and with support in its various forms. This gap indicates the range where students can study, but with the help from an educator or a person with better knowledge.<sup>22</sup> Following this theory, to increase effectiveness of the information adoption, educators should give students the opportunity to learn within the limits of their zones of proximal development, hence, enhancing their skills in individual learning. Under such circumstances, AI-enhanced peer review tools can help promote scaffolding and differentiation and, hence, positively affect ZPD.<sup>23</sup> Scaffolding and differentiation are both based on ZPD. Scaffolding is related to the support that an educator provides to a student to help them with their tasks, while differentiation identifies whether the class content is adjusted to meet the needs of learners according to their current levels. For example, an AI tool for reviewing, Peergarde<sup>24</sup>, can provide automated feedback for students on their assignments and tasks. Such a program not only supports scaffolding by offering structured feedback for peer review activities and opportunities to learn from one another but also helps learners receive feedback according to their level of expertise.

In summary, with the combination of pedagogical theories like Cognitive Load Theory (CLT), the Zone of Proximal Development (ZPD) and AI tools, educators can enhance the learning process and experience and optimize classroom dynamics. While AI tools can help to manage cognitive load – reduce extraneous load, maintain intrinsic load, and increase the germane load, they can also promote scaffolding and differentiation by supporting learners with tasks within the limits of their ZPD. Therefore, the implementation of AI tools can enhance educational results and create more effective learning experiences at technological and more profound levels, including mental, psychological, and cognitive factors.

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<sup>22</sup> Karim Shabani, Mohamad Khatib, & Saman Ebadi. (2010). Vygotsky's Zone of Proximal Development: instructional implications and teachers' professional development. *English Language Teaching*, 3(4). <https://doi.org/10.5539/elt.v3n4p237>

<sup>23</sup> Teaching. (2023). How do you use the zone of proximal development to improve your teaching? *www.linkedin.com*. <https://www.linkedin.com/advice/1/how-do-you-use-zone-proximal-development-improve-your#:~:text=How%20does%20ZPD%20relate%20to,a%20task%20within%20their%20ZPD.>

<sup>24</sup> Peergarde. (2019c, March 29). <https://hundred.org/en/innovations/peergrade>

## The Controversy of Artificial Intelligence (AI) in Education

Artificial intelligence (AI) is already an unavoidable reality in our lives and is becoming an inseparable part of the education field. Even though it is beneficial for both students and teachers, its usage is still controversial due to various concerns and issues caused by such sudden growth in its implementation and usage. Recently, the debate on this topic started again due to the latest release of the beta version of GrammarlyGO by Grammarly, the grammar-checking software<sup>25</sup>. GrammarlyGO is a chatbot software based on GPT-4<sup>26</sup>, another chatbot able to perform various tasks from learning while having a dialogue with you or doing your homework to searching for requested information. Taking this into account, educational organizations and institutions are considering ways to regulate the use of AI in academic areas.

In response to the fast-paced spreading of AI-powered chatbots among students, some universities and schools have already banned or applied regulations towards AI usage globally. Following the city's educational department, chatbots are being forbidden in New York's public schools as a step to preserve the accuracy and originality of learning content<sup>27</sup>. Such a decision is motivated by the possible motivation to plagiarize among students. In light of New York public schools' action, OpenAI has expressed its view to the Washington Post, saying: "We don't want ChatGPT to be used for misleading purposes in schools or anywhere else, so we're already developing mitigations to help anyone identify text generated by that system."<sup>28</sup> Moreover, Sam Altman, the CEO of OpenAI, created a post on Twitter stating that ChatGPT is "incredibly limited, but good enough at some things to create a misleading impression of greatness".<sup>29</sup> Among other global educational institutions supporting the AI-powered chatbots ban are

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<sup>25</sup> Zachary McAuliffe. "Grammarly's New AI Tool Is Available in Beta Now." *CNET*, May 1, 2023. <https://www.cnet.com/tech/services-and-software/grammarlys-new-ai-tool-is-available-in-beta-now/>.

<sup>26</sup> Sabrina Ortiz. "What Is ChatGPT and Why Does It Matter? Here's What You Need to Know." *ZDNET*, May 30, 2023. <https://www.zdnet.com/article/what-is-chatgpt-and-why-does-it-matter-heres-everything-you-need-to-know/>.

<sup>27</sup> Maya Yang. "New York City Schools Ban AI Chatbot That Writes Essays and Answers Prompts." *The Guardian*, January 16, 2023. <https://www.theguardian.com/us-news/2023/jan/06/new-york-city-schools-ban-ai-chatbot-chatgpt>.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

**Sciences Po**, a university in France, which prohibited the usage of ChatGPT and other AI tools and **Indian RV University** in Bangalore, which banned ChatGPT<sup>30</sup>.

Although chatbots got a lot of attention recently, there were other, more unsuccessful, attempts to implement chatbots before. In 2016, Microsoft introduced Tay, an AI chatbot created for conversations on Twitter. Soon after its release, users on Twitter started using misogynistic and racist speech towards Tay. And, since it is a chatbot that learns from what people say and post to interact with them better, Tay learned this rhetoric and began creating its own speech filled with unethical expressions. The development of the bot took a sudden turn when its tweets changed from “I am super stoked to meet you” to “feminism is cancer” and “Hitler was right. I hate Jews”.<sup>31</sup> Even though Microsoft removed the bot from the platform right away and apologized to the users, it left an unerasable imprint on AI history and introduced more controversy regarding artificial intelligence.

Following the divided opinion of the public regarding artificial intelligence, machine learning experts conducted a survey, where 48% of respondents said they thought there was a 10% chance that AI can become “extremely bad (e.g., human extinction)” and 69% suggested to pay more attention to AI safety.<sup>32</sup>

To sum up, the controversy around AI is associated with its fast-spreading adoption in different fields. With its potential to enhance educational experiences and positively impact our lives, there are some drawbacks related to human unemployment, privacy, and ethics issues. It is crucial to maintain a balance between embracing the advantages of AI and addressing the challenges that need specific regulations.

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<sup>30</sup> Eric Hal Schwartz. “ChatGPT Is Banned by These Colleges and Universities - Voicebot.Ai.” Voicebot.ai, February 10, 2023. <https://voicebot.ai/2023/02/09/chatgpt-is-banned-by-these-colleges-and-universities/>.

<sup>31</sup> Tech Desk. “Biggest Artificial Intelligence Controversies: Racism, Sexism and ‘Becoming Sentient.’” *The Indian Express*, January 22, 2023. <https://indianexpress.com/article/technology/tech-news-technology/biggest-artificial-intelligence-controversies-racism-sexism-and-becoming-sentient-7969270/>.

<sup>32</sup> AI Impacts. “2022 Expert Survey on Progress in AI,” May 31, 2023. [https://aiimpacts.org/2022-expert-survey-on-progress-in-ai/#Chance\\_that\\_the\\_intelligence\\_explosion\\_argument\\_is\\_about\\_right](https://aiimpacts.org/2022-expert-survey-on-progress-in-ai/#Chance_that_the_intelligence_explosion_argument_is_about_right).

## **METHODOLOGY**

In this study, the research is focused on investigating the perceptions of students and educators regarding the use of AI in education and its impact on their learning experiences. The main objective is to understand the impacts of AI integration in educational settings and gain insights into this field. Through the literature review, the nature of AI in education was examined and explained from various standpoints, ranging from benefits to potential concerns. With the use of in-depth interviews with key stakeholders, such as educational institutions, educators, and students, the study gained a comprehensive understanding of their perspectives and opinions. In addition, content analysis will be carried out to get a fuller picture of the research's objective. This study aims to contribute to the broader understanding of the topic and the development of AI-driven educational practices that enhance the learning experiences for all.

### **Research Design**

This study examines AI and its impact on education, specifically exploring the perceptions of students and educators regarding the use of AI in educational settings and its influence on their learning experiences. This paper aims to contribute to the discourse by investigating the perspectives of people involved in the learning process including the usage of artificial intelligence.

To achieve this, a comprehensive research design has been developed, consisting of content analysis and in-depth interviews. Content analysis will provide insights into existing literature and research on AI in education, allowing a solid foundation for this study. Conducting in-depth interviews with key stakeholders, including educational institutions, educators, and students will provide with valuable perspectives on the use of AI in education from the insider's point of view.

This multi-method approach in the research aims to offer a comprehensive analysis of the perceptions and experiences of students and professors regarding the use of AI in education. With the findings from content analysis and in-depth interviews, a deeper understanding of the impact of AI on learning experiences can be achieved.

The outcomes of this study will contribute to the existing knowledge of AI in education.

## Data Sources

The data will be collected from students, professors, and teachers from universities, cram and public schools in Kaohsiung, Taiwan. Firstly, content analysis will be used to create a solid foundation for this research. To be precise, journal articles, web pages, blogs, and books will be used. The data for the interviews will be gathered from three different stakeholders – the educational institution’s personnel representative, educators, and students. The questions might be different for each interviewee but still share the same concept regarding the integration of AI in education. The interview will be conducted face-to-face.

## Data Collection

The main method for data collection is face-to-face in-depth interviews, there are 13 interviewees in total who participated in this study. From Table 1 we can see the demography of interviewed students, teachers, and professors. I have chosen to disclose their names, majors/subjects of work and places of studying/work due to confidentiality.

**Table 1 Demography of Interviewed Students, Teachers, and Professors**

#	Age	Sex	Occupation	Field	Region
1	18-24	Male	Master’s Degree Student	Business and Economics	Malaysia
2	18-24	Female	Master’s Degree Student	Business and Economics	Netherlands
3	18-24	Male	Cram School Teacher	English Language	Mongolia
4	25-34	Male	Bachelor’s Degree Student	Social Sciences and Humanities	Russia
5	25-34	Female	Master’s Degree Student	Social Sciences and Humanities	France

6	25-34	Male	Public School Teacher	English Language	Papua New Guinea
7	25-34	Male	Cram School Teacher	English Language	St. Lucia
8	35-44	Male	Public School Teacher	English Language	United States
9	35-44	Male	Full-Time University Professor	Social Sciences and Humanities	Taiwan
10	35-44	Female	Cram School Owner	English Language	Taiwan
11	45-54	Male	Cram School Teacher	English Public Speaking	Canada
12	55-64	Male	Full-Time University Professor	Social Sciences and Humanities	Switzerland
13	55-64	Male	Full-Time University Professor	Social Sciences and Humanities	Taiwan

(Source: Organized by the Author)

## DATA ANALYSIS

This chapter will share the perspectives of both students and educators on the matters of “Perceptions of AI in Education”, “Impact on the Learning Experiences”, “Prospects and Enhancements in AI Tools”, “Challenges and Concerns”, and “Adoption and Readiness”.

### Perceptions of AI in Education

Creating a safe learning environment depends on many economic, social, and technological factors nowadays. Despite the comprehensive curriculums and excellent academic staff, many institutions still lack in providing access to various online and offline resources such as textbooks and the Internet. Such limitations can affect education by encouraging small issues to turn into wider gaps in knowledge. Recently, AIEd provided opportunities for educators and students to address these issues and remove the obstacles by implementing new technologies. However, even though it seems like the introduction of such tools can eliminate technological, social, and economic differences in education institutions, the perceptions of students, teachers, and professors still differ about AI and its impact on the overall learning experiences.

Thus, when asked what the possible advantages of AI in education could be, most of the interviewees expressed a rather positive attitude to the new technologies, as well as excitement for its implementation based on their own experiences. In their opinion, AI tools are not only a great help with tedious and repetitive tasks, but also with making education more creative and interactive. Additionally, they simplify the whole learning process making it faster and easier. For example:

*“From my perspective, what I hear from people about AI and its everyday use, mainly everyone speaking like in a joyful way about these technologies, because it makes our student life easier. Even though we need to spend time to understand how it works, I think it's a really modern way to work on your homework, because it's more entertaining. I think people, students really enjoy to work with chatbots.” – Bachelor’s Degree Student 4.*

*“AI has really helped me a lot. So it's a very positive viewpoint because it saves me a lot of time. Especially when I need to search for information online. <...> And it turns out like every*



*time I use AI or have new ways of entering prompts, that would get the answers that I need.”- Cram School Teacher 11.*

*“In a way, it has made my educational and my own job very easy because it's like having your own personal computer assistant if you can utilize it correctly.” – Cram School Teacher 3.*

*“Well, my experience is that it is a very useful tool, a tool that is far more efficient than Google search, than any other tools before. In November two years ago, when it first arrived, everyone was shocked. And they were trying to get a good idea about how to use it. Yeah, indeed. So it is a tool.” – Full-Time University Professor 13.*

After receiving opinions from various standpoints, it seems that the overall perception of AI in Education has a positive tendency, where it is considered to be a beneficial tool for various tasks. For instance:

*“I think the perception of the AI technologies by our professors is positive, mainly positive. I never heard anything negative about this topic from professors. So yeah, they are with us in this. I think it's really interesting for them so they're trying to understand how to use it to make education more interesting.” – Bachelor’s Degree student 4.*

As a teacher, it is difficult to tell in which direction a student can improve his learning if the problem has not been identified, however, machine learning models can help us find solutions to problems and take preventive measures. Besides, there are many benefits of this innovation as it not only helps to create engaging materials for students but also facilitates finding new knowledge faster and easier leading to optimizing the learning process. For example:

*“I've been using AI for a few months now to generate different ideas, to generate different like writing things to generate different stories just to use in my classes. I think it's really a useful tool overall, as a teacher, I would shy away from using it fully to get all the information. I still feel like information literacy is a huge part of using AI and should continue to be part of the educational process so that we don't become too reliant on it.”- Public School Teacher 8.*

However, some respondents gave rather peculiar answers and expressed more scepticism towards the innovation. Even though technology allows us to save more time, get answers fast and make searching for information easier, it also can affect our brain function negatively as well as the development of our soft skills. For example:

*“The main conflict at the moment is that we are in the industry of educating people and teaching them how to solve problems by themselves, which is a skill that is valued on a personal level. And as a whole in the world. And the AI, you can make an argument that it's preventing those children, or other people are using them to develop those personal skills that they need, because they rely on the AI to do everything.” – Cram School Teacher 7.*

When relying on the help of AI too much, people use their own ideas less, do not force themselves to find a solution to a problem with their own efforts, and lose the ability to comprehend and analyze information, in addition to using critical-thinking skills:

*“So if you have the ideas, you are the owners of your ideas, then checkup can be very, very helpful for you to organize, and make a consistent and persistent paper for yourself. <...> So if you're not the owner of the idea, and instead ask ChatGPT to produce the ideas for you, then he is the boss and you are a slave, I have seen this a lot.” – Full-Time University Professor 13.*

As one of the Full-Time University Professors concluded, a growing reliance on AI tools can lead to an atrophy of our intellect as we try to substitute our own abilities to think for artificial help, which is not necessary:

*“So it's, it's about as useful as, as a prosthetics for someone who has two healthy legs, right? All right, so your atrophy leads to an atrophy of the brain.” – Full-Time University Professor 12.*

Despite the ideas that we should be considerate about the usage of AIEd, the general mood and attitude towards it is positive. With such rapid development of this innovation, it is fair to imagine how AI can be used in areas where teachers are limited. For instance, most teachers have responsibilities outside of the classroom and they cannot always consider the style of each student and support their learning constantly. Nowadays we have many examples that show how machine learning applications process information faster and in larger quantities than humans using algorithms that learn from data. Given the fact that machines are slowly taking over some of the job positions on the market, the thought of AI taking teaching jobs seems more real now than before.

Hence, when asked how the integration of AI in education might impact the role of teachers and whether it can alter teachers' roles, all the interviewees agreed that even though the

advancement of technology is inevitable, it can't alter teaching roles completely and make teaching jobs redundant. For example:

*"In a sense, yes, but one thing is that AI doesn't have emotions, even though AI is very powerful now. <...> but I don't think is still capable of doing that at the current generation, current era, probably maybe like 20 or 30 years, it would be able to replace teachers. But I still feel like they cannot totally replace teachers, human teachers because of the emotions." – Master's Degree Student 1.*

Instead, the respondents believe that AI can serve teachers in assisting with some tasks, however, it lacks emotions, feelings and consciousness to teach students independently. Even if AI becomes more powerful in the next few decades, human touch and guidance based on personal experience will still be needed:

*"Actually, I think that a human role in teaching is critical, like it's very important. You have to guide children. AI cannot do that like humans can. It cannot set a role model that children look up to. However, I think it can reduce the work for teachers a lot because it can do a lot for teachers, like for example, making presentations or making a design for a game for a class or whatever. But teachers will always stay, well, we'll be there." – Master's Degree Student 2.*

The teacher's role in the classroom is crucial as the interaction among humans is a crucial factor that affects the educating process and classroom dynamics. Learning new information and achieving proficiency in it is not possible by only receiving theoretical knowledge through texts, videos, audio etc. To successfully comprehend any provided data, it is important to analyze it through conversations and debates and practice critical-thinking skills through interaction with peers who obtain the same level as you and apply the knowledge in real-life situations. To make it happen, cooperation among humans based on connection is essential:

*"In terms of replacing the function completely of educators, I don't think it's, it's going to happen. Because we, as human beings, don't entirely want to just interact with a computer. Right? There's a human element that makes experience. And computers don't have that experience, right? They don't have a connection to other human beings right now. Maybe in the future, we'll have those complicated computers that can do that. But it's not like we're watching the movie "Her" or something like that, right? Not yet. I think humans value connection." – Full-Time University Professor 9.*

*“I don't think so. Because most of the time, especially if you're like in higher education, we all have questions and some questions cannot be like they don't only have one answer. So if you trust an AI it might have like a really biased opinion. I mean, humans also have biased opinions. But at least if you're interacting, you can always come up with like, other solutions and other opinions.” – Master's Degree Student 5.*

*“<...> if we look at a pandemic, and that caused the disruptions in class, and then people were fascinated at first with online learning, but then they, I think they grew to hate it, even though it gave them some flexibility. They wanted to hang around people, they wanted attention, and they wanted teachers to serve as important advisors. And I think that's something that we can't give to computers yet.” – Full-Time University Professor 9.*

Moreover, according to the Cognitive Load Theory (CLT), the learner's level of cognitive ability to understand and memorize information directly depends on the complexity of the educational material, hence, it is crucial for educators to find a personalized approach to a student and help to avoid frustration and feeling bored during classes. In this case, AI-powered tools can come in handy, however, they can't fully replace the teacher, as the educator's ability to deliver information to everyone based on their progress is a key factor in learning:

*“Because for me, an effective teacher is a person who is able to convey information in a way that students will be able to absorb quickly.” – Cram School Teacher 11.*

*“I don't think so. How can you distinguish how you feel that could only be felt by interacting with a person, not by a machine? I don't think AI can replace teaching jobs in general because the most valuable part <...> most of the teachers really care about the students. There are a lot, especially nowadays, there are more and more, for example, ADHD students. <...> But the AI tool usually only offers you one standard answer. But this one standard answer cannot apply to every student. But a real teacher, a real teacher can distinguish, “Oh, which kid is special? We need to give him or her a different teaching pattern immediately.” – Cram School Owner 10.*

Despite the fact that most of the interviewees do not see AI as a threat in terms of the job market in the field of education, a Public School Teacher 8 allows the possibility of artificial intelligence altering teaching positions. However, in his opinion, the demand for human educators will not decrease, since the technologies are limited due to the lack of interpersonal skills:

*“It's, it's entirely possible that it might alter our positions, but I don't think that it will make our positions redundant. <...> So there are some limitations to what the AI currently can do. For ChatGPT, for example, you need to check it for factual errors and, and mistakes. You can't use it for math, you can even just type a simple equation, and it might give you the wrong answer. So in a lot of ways, I don't think at this moment, it could replace or alter the fundamental teaching role too negatively. And I think, as long as we continue to use it as an effective tool, we should be okay.” – Public School Teacher 8.*

Such great assistance can change teachers' responsibilities as more mundane tasks are removed from their work duties. Despite the narrative that AI might take over the field of education soon, interviewees believe that the human role in the classroom is impossible to reduce. Instead, they believe that AI tools can only help to change the classroom dynamics for the better and shift teachers' focus from tedious tasks to more meaningful time spent with their students, which allows educators to concentrate solely on teaching and provide a richer experience for everyone:

*“I think that it'll change the role of the educator. The educator's role will have to adapt, right, because these tools will be much more available. <...>And so, the whole teaching style will probably change Maybe professors and educators will be facilitating students more and more rather than just lecturing to them? <...> But then professors can act as important guideposts because, in that chaos of information, you still need a person who can tell you what's important. Right, and contextualize things” – Full-Time Professor 9.*

### **Impact on the Learning Experiences**

The most widely known advantages of artificial intelligence in education are the opportunities to offer students a personalized learning experience, efficiency, and analytics of students' success. AI tools help learners and educators to make the process more efficient, allowing people to spend less time and effort on some tasks. Furthermore, analytics of the learning curves can point out the areas for improvement and provide needed feedback and solutions. Additionally, AIED promotes easier access to various resources on online platforms,

which makes the educational environment more inclusive and impacts learning experiences positively.

As such, when I asked the interviewees whether the usage of AI can help to address the gaps in knowledge and make learning more personalized and engaging, the interviewees agreed that such a tool can make learning personalized and help bridge the gaps in knowledge.

Moreover, this innovation can help learners to study at their own pace and fulfil their lack of knowledge at any time:

*“I can think of an example that some students need support, they need extra differentiation for their own particular needs, and maybe a way for them to catch up on their own time. So I think for sure, it's absolutely a way to personalize education.” – Public School Teacher 8.*

*“AI tools can provide so many visual aids and teaching props, which can help me deliver the message to make kids understand better. That's the whole point of it. But I think the most important one would be ChatGPT because it's very personalized, you can basically ask any specific things that you're trying to solve. And that's it. It's so personal. It's revolutionary.” – Cram School Teacher 3.*

Another benefit is that the less privileged and disadvantaged individuals can have a more inclusive environment with access to rich knowledge online since many of them don't have such opportunities in real life. Such opportunity not only increases the number of educated population locally but globally:

*“<...>it can be very useful for those disadvantaged or less privileged kids to catch up, and to learn the things that they only preserve for those rich families, kids, indeed. Now, even those poor family kids, if they have internet access, and know how to use ChatGPT, at least they can use this as a learning tool.” – Full-Time University Professor 13.*

*“I think that more people will have access to information because of AI. And that's a good thing.” – Cram School Teacher 11.*

However, the respondents stressed the importance of using the innovation responsibly and carefully. As a Full-Time University Professor 13 mentioned, you can use assistance in learning but you need to put in your effort. In educators' and students' opinions, new technologies can positively impact learning experiences only if you use them as a tool, but not the original source of answers. For example:

*“You can use that as a tool, but you should be the driver, right? Academic integrity is very important. And you should be the driver of your ideas. ChatGPT cannot dominate your ideas, it is a helper, not a master. You're not a slave.” - Full-Time University Professor 13.*

*“I see a great advantage for today's if you want to already call that AI or not, a form of artificial intelligence, using the search machines. I think these are great assistance, means of assistance, which make you gain time. <...> Yeah, but it may only help you to learn if you help yourself to learn if you put effort. It's like buying a meal. That will never teach you how to cook.” – Full-Time University Professor 12.*

*“And of course, it's not always giving you the right answers. Because sometimes questions might be a bit wrong because you're not familiar with them properly or not completely familiar with the topic you're trying to work on. So yeah, it helps, but you should be careful. You should pay more attention to the application and check it.” – Bachelor's Degree Student 4.*

Even so, with the spread of technology to less advantaged students and rural areas, it would be too idealistic to consider that AI can bridge the gap in knowledge of the population so fast. Due to numerous reasons, technological advancements are not able to reach every class of society and education cannot be easily provided to everybody, therefore, there will always be a certain layer of people not receiving knowledge, even with the rapid growth of wide usage of AI.

*“However, I still think there will be a segment of people who will be left behind. And those would be the people who won't have access to the Internet or even like basic computers. And I think there will always be that segment, unfortunately.” – Cram School Teacher 11.*

Paradoxically, even in the perfect scenario where technology can provide knowledge to every group freely, there is no guarantee that with access to information, the will and motivation to study will come. Not every disadvantaged learner will be dedicated to studying. And, unfortunately, not every environment provides a safe space for studying, where the knowledge can be practised and applied. According to the points, we can conclude that access to knowledge and mindful usage of AI tools can't guarantee the successful execution of educational goals due to dependence on personal potential and the environment. Thus, we cannot have high expectations of technologies for helping learners bridge the gaps in knowledge as other human-related factors play a big role here:

*“As for those in the poor segment that still have access to AI the question is will the students have the motivation to use that knowledge for good? <...> Because let's say some kids in a poor rural area, they have all this wealth of knowledge, but they have no place to apply it.”*  
– Cram School Teacher 11.

Despite affecting the learning experiences of learners, the integration of AI in education can impact classroom dynamics and students' behaviours in class, which can hinder or optimize the studying process.

Thus, when I asked the interviewees if the integration of AI in education impacts students' behaviour and changes traditional classroom dynamics, they gave very diverse opinions, which were based on their personal experiences and observations at their institutions. On one hand, the usage of AI in the classroom doesn't seem to bring any change to the classroom dynamics and does not affect the way learners interact with each other. Especially if we talk about higher education, where students are older and more independent, we can see a tendency to not pay attention in class or even attend the lectures. The problem here is not the implementation of AI in the classroom but the widespread usage of such tools outside the classroom:

*“Students do come to class, they don't learn anything while the teacher is lecturing, they just go home, and they work independently anyway. They have no focus while the teacher is teaching, so students who have learned like that will come to class and they will focus on their own things. I think especially for university students, the professors, and lecturers don't have strong management of the student's behaviour.”* – Cram School Teacher 7.

The technology gives students reassurance that they will catch up with the material later by reading the answers through, for example, chatbots. Such reliance on innovation not only leaves the classroom dynamics in stagnation but also promotes laziness in learners:

*“I think students are indifferent, because they think, “Oh, I can just do this quickly with AI later.” We're already very independent, you show up or you don't show up, it doesn't matter. <...> I don't think AI is making such a difference. For university students, maybe it will make them lazier so to say, so they will show up less or pay attention even less.”* – Master's Degree Student 2.

On the other hand, some respondents believe that AI tools can indeed make learning new material more interactive and, thus, help students engage with each other more and be active in



the classroom, especially when we talk about learners of a younger age. In their opinion, AI tools definitely make the class more interactive and engaging, thus, motivating students to participate more. For example:

*“I would imagine AI tools could make the class more interactive and more engaging.” – Public School Teacher 8.*

*“The kids are very excited. <...> As long as it is fun!” – Cram School Teacher 11.*

*“I think it affects in a positive way. Because with AI, it becomes more interesting, it becomes more interactive. The more interaction there is between the students and the teacher, the less opportunity, or a chance the students will get to be distracted, to focus somewhere else. So, if AI is creating something that is very engaging, and the kids are constantly paying attention, there is no negative impact.” – Cram School Teacher 3.*

However, there are certain concerns that you have to take into consideration, such as students’ own attitudes towards learning and the frequency of the usage of such tools. For goal-oriented students striving for education, AI tools can be perceived as an incentive, which motivates them to study more. At the same time, learners who are not so involved and interested in their studies have a tendency to stagnate in their progress and the amount of attention they pay in class doesn’t improve in spite of the implementation of the new technologies: *“Those who are, let’s say, less motivated, who are here because their parents sent them, etc., they do not tend to become more motivated. But those who are intelligent are involved and actually see themselves as part of the process. And there are bystanders and observers, well, who will also be active, kind of...” – Full-Time University Professor 12.*

Another factor determining the effectiveness of AI tools and their influence on students is the right timing and frequency of incorporation of such tools. The responsibility for how the innovation can impact learners does not only depend on the students themselves but also on the educators, who should maintain the ratio between interactive material and content that needs more skills and effort from the students. Such mindful portioning of the ways to convey information can help to avoid the possibility of getting used to specific devices and facilitate the application of a more responsible approach in education. For instance:

*“I have to say that you truly need to make the wise decision to judge the timing of using AI. If we use it too frequently, I can feel that the kids might get used to those vivid images and there is nothing exciting for them anymore. If you have fancy clothes, if you have an amazing*

*meal every day you won't feel cherished for a normal meal you can receive. You won't think it is also valuable. Of course, AI can help the teacher make the class more active. But if you use it too frequently, I don't think that will be helpful.” - Cram School Owner 10.*

Overall, the implementation of artificial intelligence in education has a great impact on learning experiences, offering various benefits, such as personalized learning, efficiency and support. It not only helps to optimize the educational process but also makes the environment more inclusive, especially for disadvantaged or less privileged learners. Such innovation bridges the gaps in knowledge and provides easier access to education globally. The respondents agreed that AIED can positively impact learning, however, they highlighted the importance of perceiving AI as a tool and an assistant whose goal is to help instead of relying on it too much and using it as the main and only source of information.

In addition, even though there is a benefit of such tools in education, some interviewees stated that these measures manage the status quo for students of higher education, which makes them less attentive in class, even lazier in some cases, and leads to higher rates of students seeking independent study. However, others believe that artificial intelligence can make the class more interactive for students of a younger age, motivating them to be more active in the classroom. Yet, they demonstrated some concerns towards learners' reliance on the technology:

*“But I have observed that they greatly depend on the ability of ChatGPT to write everything. They stop thinking about how to write, they just ask ChatGPT to write something for them. That is awful. That's awful.” – Full-Time University Professor 13.*

### **Prospects and Enhancements in AI Tools**

Artificial intelligence in education is revolutionary as it opens up new horizons in the learning process. The future of technological advancement in education holds prospects and innovation for both educators and learners. With the rapid development of various tools, the demand for AI-powered systems, websites, apps, etc., only increases and motivates specialists to come up with more interesting and sophisticated instruments.

When I asked respondents what AI tools in education they found most promising and exciting, some stated that chatbots, especially, ChatGPT, have the best prospects in the field of education:

*“I think from a student's perspective, I will say ChatGPT or other chatbots are promising.” – Master's Degree Student 2.*

*“I think the most important one would be ChatGPT because it's very personalized as you can basically do anything. For example, when I ask “How do I solve a problem?”, there's a page with the solution for that problem, right? If I am on the internet, I can't basically do the same thing. It's revolutionary.” – Cram School Teacher 3.*

*“Right now, I will still say ChatGPT.” – Cram School Owner 10.*

Although, other respondents shared a deeper knowledge of AI tools and named game and music-creating apps, augmented reality (AR), virtual reality (VR) headsets and 3D modelling software as the most exciting AI tools in the future in the field of education. Given these responses, we can conclude that both students and educators are well aware of tools other than chatbots and keep an eye on the developing technologies. It demonstrates that the technology that seemed to be so different and distant for us earlier already took its roots in our lives:

*“I believe that headsets are going to be the future. So, Apple Vision is that glimpse of what's to come. And once AI is really fully developed, we will be able to immerse ourselves in virtual worlds. And use that as a tool to enhance our creativity and learning.” – Cram School Teacher 11.*

*“I do follow a lot of those tools and how they are developing. <...> I wouldn't even say in the future, I would say right now, the tools are so powerful that you can use them. <...> Let's say you want a spelling game, you type something, you wait maybe half an hour, and then you have a game that the children can play in the classroom. There are music creation apps as well. Sometimes you use them for the younger children. So, you can create a nice, lovely remedy for kids like, you know, “Baby Shark” or something.”- Cram School Teacher 7.*

*“3D modelling or image generation could be useful for an art class or even for storytelling. I could see the presentation app could be good for a public speaking class. Grammarly is great for students who need that extra step to check their writing after it's been done.” – Public School Teacher 8.*

*“I think augmented reality is something that will require some more technology. And it would give students perhaps more immersive experiences so that they can take field trips without leaving. But those require some further adaptations.” – Full-Time University Professor 9.*

Others came up with more narrow and specific ideas for improving the usage of AI overall by creating new AI tools, such as detectors that can track student’s mood and concentration in class or AR/VR systems for surgery practice:

*“AI technology should be able to advance so much that computers could create teacher avatars and be able to teach in an in-person classroom. The AI could detect mood, facial expressions etc., making it very effective in teaching scenarios. For instance, if “Johnny” is not paying attention, then the AI could give a warning just like a normal teacher would and deliver the consequences. On the other hand, it could also praise for detecting good work. It could also ask questions and answer questions from the students in real-time.” – Cram School Teacher 11.*

*“I know that in the medical world, surgeons don't have a surgery practice. They only can practice on a cadaver, like a dead body. I think that it's good to create a new, more ethical VR or AR system for medical students to practice surgery without any risk to it.” – Master’s Degree Student 1.*

Since the interviewees were familiar with various AI tools, chatbots in particular, and used them on a daily basis, I decided to ask how AI-based chatbots and virtual assistants could be improved. Most of the respondents expressed that the algorithms used for finding and selecting information should be looked through carefully. People are concerned about the knowledge that chatbots provide since they are not always factual and have to be double-checked regularly. For example:

*“If we are able to more carefully guide AI to correct information that would be great! If the AI can also explain what changes it made and why, I think that would be really helpful, because it's one thing to just give the answer that you want, but another to give more explanation to it. Also, citing sources could do a better job with different copyright reasons.” – Public School Teacher 8.*

*“I'm just contemplating about whether the answers that chatbots give are factual or not. That's the only worry I have. I think it should be improved.” – Cram School Teacher 3.*

Additionally, fewer respondents said that there are no complaints or suggestions on how AI tools should be improved. For example:

*“I don't have any complaints.” – Public School Teacher 6.*

*“I don't think that I have any suggestions about AI because first, we need to gain some experience in this field. And later, I believe, some changes will follow. Right now it's quite difficult to think about advice in which ways it should develop.” – Bachelor's Degree Student 4.*

Summing up, we can see that with the fast-spreading influence of AI tools and a large number of new AI-powered apps, such innovation has a high demand and is seen as promising and effective. Even though the advancement can help with various tasks, such as game and music-creating, 3D-modelling and providing immersive experiences through VR and AR, the most popular AI systems are chatbots, especially ChatGPT, as they are widely used in the field of education. Besides being quite satisfied with the technology, many complain about the information the chatbots provide and the lack of factual data. Hence, there is always an area for improvement when we talk about AI tools as it's a relatively new technology. Besides, there are even more apps to be created for more purposes and tasks.

### **Challenges and Concerns**

In response to the fast-paced spreading of AI-powered chatbots among students, some universities and schools have already applied regulations towards AI usage globally. The controversy around AI is associated with its rapid adoption in different fields. With its potential to enhance educational experiences and positively impact our lives, there are some drawbacks related to human unemployment, privacy, and ethics issues. It is crucial to maintain a balance between embracing the advantages of AI and addressing the challenges that need specific frameworks.

Hence, when I asked what measures should be taken when implementing AI in education to ensure ethical and safe usage, some people explained that ethical issues are not in the area of our influence, therefore, we can't do anything about it, whereas the IT specialists can during the development phase of the software. A few of them suggested implementing disclaimers and age and insensitive content restrictions to avoid ethical issues. For instance:

*“I think that that's not something we can do about it. That's definitely something that people who develop AI should do. Because they need to know where the AI is sourcing*

*information from. Maybe they could have an age restriction on some different information.” – Public School Teacher 6.*

*“I believe that on the developer side, the process should be getting more ethical because this issue has been already identified. And they see the drawbacks to the output.” – Full-Time University Professor 13.*

As for the other possible solution to the problem, some interviewees noted the importance of the guidance of a figure of authority and parents in the case of younger learners. In their opinion, the knowledge received from AI should be reevaluated and carefully checked by an individual but, since younger students are not always able to analyze the information and understand whether the content is not appropriate, parental supervision could be helpful in such a scenario. For example:

*“I would say restrictions, like, parents' control for younger kids or restriction would be something that would be imposed. If we educate the students about AI and how to properly use it, it would be helpful for them.” – Cram School Teacher 3.*

*“Maybe if the students are going to use an AI for their homework, the teacher could warn them, “Hey, you may get some wrong information, run this by your parents or a trusted figure of authority to see what they think. They might help to call out any inaccuracies or anything that can be offensive.” – Public School Teacher 8.*

*“I think it's impossible to make it totally safe. You can't restrict the information, however, parental guidance and some limitations based on age are the way to go.” – Master's Degree Student 2.*

Besides ethical issues and insensitive content that AI can provide, one of the Cram School Teachers noted that among the problems mentioned above data security is another big challenge that must be dealt with. Since most companies that create tools powered by artificial intelligence are commercial, they lack guaranteed security of the user information they keep, which leads to the leaks of personal data and makes it easier for criminals to hack the system and use it for their personal purposes:

*“Yeah, and also the database security. AI can be accessed by someone else quite easily. That's a worry.” – Cram School Teacher 3.*

Other respondents expressed that the responsibility for conscious usage of the information provided by AI chatbots lies on the shoulders of the users, who should apply their

personal values and judgement before employing any new knowledge to avoid ethical concerns. Unfortunately, such advice cannot be applied to everybody, due to different factors like age, personal ability, etc., hence, it only suits grown-ups with a stronger understanding of social norms and certain morals:

*“I think it's your responsibility to actually do research on the information. You shouldn't just go with it, you should just keep on going to double-check it. I think it probably has nothing to do with AI itself. It has more to do with other people's values and morals and what they really think.” – Master's Degree Student 5.*

*“I know that companies have whole departments, where their job is just to develop ethical guidelines for chatbots, and it is hard. <...> AI and information are very open and subjective. <...> Usually, chatbots have a disclaimer that the information isn't always factual. <...> You need to be careful the way that you use it. I don't think they could handle every single situation or use case. Impossible. Chatbot companies and people who are using it have to take responsibility.” – Cram School Teacher 7.*

*“What really should be worked on is what in an ancient vineyard is called ‘discernment’.* **Judgement.** *It's something that the chatbot doesn't have, the chatbot just combines words that it's been taught or instructed to combine.” – Full-Time University Professor 12.*

However, some interviewees believe that the restrictions from the developers and our critical-thinking skills are not enough to reduce the amount of insensitive content. Two respondents think that training and awareness regarding AI from schools and certain guidelines on the governmental level are needed to guarantee more safety. Knowing how fast technology spreads globally and takes root in our daily lives, ignoring it and leaving any of its issues to deal with it personally does not seem to work anymore. With the acknowledgement of how reliant we are on innovation nowadays, the regulations restricting it could help to organize a safer usage of the content it provides. Many agree that both educators and students need to learn how to use AI tools according to the frameworks developed by the relevant institutions. For instance:

*“AI tools are being used these two years, but the students were not taught how to analyze the information or to develop their critical thinking ability before the institutions tend to use AI tools. <...> I think the schools need to teach the students critical thinking and try to keep their creativity ability, then we could avoid unethical situations from happening.” – Cram School Owner 10.*

*“There have to be ethical guidelines, not only from the company itself, but government organizations and groups need to talk to each other, and to work out guidelines and to establish these protocols in order to mitigate these processes. <...> AI has a lot of problems when it comes to ethics. There needs to be safeguards.” – Full-Time University Professor 9.*

However, one interviewee stated that he has no idea how this issue can be influenced positively:

*“Honestly, I've never thought of that actually. AI is AI, after all, it is computers that just code the information in a way to provide answers to questions. I have no idea, to be honest.” – Master's Degree Student 1.*

Lastly, one respondent expressed his strong position that it is impossible to create a safe space with the technology of AI. In his opinion, the information generated by AI comes from the Internet, which is not restricted and can't be. Additionally, manipulating AI and taking control of its content will cause conflict between the concepts of “freedom” and “censorship”. Following this idea, we can conclude that in the efforts to create a safer environment online, we should be also cautious of the regulations we are trying to apply. While the idea might seem reasonable, its realization can lead to restricting the spectre of functions AI is able of and contradicting modern tendencies for freedom of speech:

*“I believe in the freedom of speech, because if you limit the freedom of speech, then you will not be able to hear all the possible opinions. Right. So, how can we have the filters in place for AI to make sure that there's no offensive content? I think it's impossible. The only way to make sure that there's nothing offensive is to say nothing which is the cancel culture. Cancelled culture is the ultimate filter. But that would defeat the purpose of AI. Because AI is about getting every single piece of information possible. <...> If the AI generates something that is offensive, and a certain group of people put a filter on it, it is no longer AI. You can call it artificial intelligence because artificial means that there's an algorithm used to collect the data. But once it's manipulated by a certain group, that group should actually change the name.” – Cram School Teacher 11.*

According to the responses, it is definitely crucial for students and their parents, professors, teachers, and policymakers to learn more about the content that artificial intelligence can provide, especially in education. It is essential to consider the ethical concerns and safety issues to prevent the possible clashes they can cause. While it is hard to find a solution applicable



to these challenges right away, currently, there are many ideas that can help to improve the algorithms, such as restrictions, disclaimers, guidance from other people, applying interpersonal skills, raising awareness in educational institutions, and creating certain frameworks by the government.

### **Adoption and Readiness**

Besides the numerous benefits and drawbacks imposed by the rapid growth of AIEd, including the issues with safety and ethics, the readiness of the society to implement of artificial intelligence in education is yet to be analyzed. Based on the responses of my interviewees regarding the other aspects of AIEd, I can conclude that they are frequent users of the innovation and are rather aware of the new technologies. The perspectives of my respondents show that they are ready to embrace AI and use it as a tool in their education and work. However, how can these advancements be adopted widely, not only as a part of a personal experience? Should educational institutions regulate such cutting-edge innovation?

To study these questions, I asked my interviewees if it is important for students and teachers to learn how to use AI in schools and universities. The majority of teachers, students and professors agreed that this is an important step towards better AI development and implementation:

*“Yes, I would prefer the teacher to teach us how to use these apps - how to use ChatGPT, how to use AI to help with the homework or anything else.” – Master’s Degree Student 1.*

In their opinion, it will only boost people’s competence in the usage of AI tools in education, hence, making learning more supported. It could help avoid the irresponsible and not thoughtful application of the information received from AI and guarantee a smoother integration of the technology into the field of education. For example:

*“I think that’s a great idea. <...> Understanding the underlying functions of it and the algorithm, as you say, and the way to deal with it to get the responses that you want. I think that all helps to the overall literacy of AI programs, and you know, their integration.” – Public School Teacher 8.*

*“I guess so. The time is changing. So probably we also have to adapt to the evolution in the same way as a few years before people didn't use computers. Now we are using them. So, after some time AI is going to be more and more common. Maybe we can have like a manual at some point.” -Master’s Degree Student 5.*

*“If we're going to use this tool, we should probably learn and progress at it. I guess if there's an AI course that I could just actually enter... Well, please develop a course to teach me about AI!” – Cram School Teacher 11.*

Another interesting point is that educating people about the correct usage of AI is necessary not only for a better understanding of its algorithms but also for a better perception and appreciation towards the technologies around us. The goal of the training is also to teach people to be more conscious and woke to the changing world around them, which can help to look at various fields from a different angle and open new horizons:

*“I think the answer is yes. But those guidelines are not even set in stone, they're still being created. I think that process is very hard to predict. It is just like having classes that teach about research methodology, right? Those are required, and they seem like a pain, and they are a pain. But then, I think in the end we can successfully train people to see, to be more conscious of how they think and become more reflexive about how we perceive what's around us. <...> That's why I think it should be required.” – Full-Time University Professor 9.*

When I asked respondents about the AI training, most of them named educators and learners as the target audience for such courses, however, two interviewees offered teaching parents and younger children about AI and its algorithms. Indeed, with the widespread usage of advanced technologies around us, it is important to raise awareness about such phenomenon and educate people of different groups to increase thoughtful approaches and rational attitudes to the innovation:

*“All involved parties should know how to properly utilize AI and how to use it correctly, how to doubts it correctly. So, for anyone who is planning to use AI in education first, I feel like maybe we should get a licence. For example, if it's an educator, he needs to have a certificate on how to use AI properly. And then, for example, if a school is planning to implement AI in one of their courses, then they need to have some kind of a seminar or a training program for the educators. Not only teachers but professors, and even parents as well should be also taking part in it.” – Cram School Teacher 3.*

*“Yes, definitely. I think you can reduce the possibility of using the wrong answer if you know, actually, how to ask the question correctly. So, I think it's very important for students and also younger children to learn how to deal properly with an AI model.” – Master’s Degree Student 2.*

In the case of Cram School Teacher 7, he believes that such training is needed not only because it is a popular and, so to say, “hot topic” nowadays. He suggests that learning about the proper usage of AI tools is essential as soon it will be a required and inseparable part of the field of education. For example, 50 years ago we could not imagine that knowledge of Microsoft Word would be a must-have skill needed at work or school, however, now it is required to be proficient in it. Following this idea and looking back at our history, we can come to the conclusion that investing our time into learning about AI now can save us some trouble in the near future and guarantee smoother adaptation to the changing world:

*“Look at universities now, it's expected that you use PowerPoint to give a presentation. AI will become one of those tools that everyone will use. I believe that all teachers should try to learn how to use all of those tools properly. Not just ChatGPT.” – Cram School Teacher 7.*

Various educators provided their opinions regarding the topic from their standpoint, where they do not obtain much power to change it but only hope for future steps from the institutions or government. To gain insight from the perspective of the supervisor, I asked the same question to a Cram School Owner 10, who expressed her support for the issue. Although, we can see that besides support for the topic, privately owned institutions do not obtain as much power to influence the whole field of education and, therefore, can only offer AI-related training locally:

*“Sure, of course. As I did before, I would share AI-related information with the teachers. If the teacher is the kind of person who would like to learn something, then they can learn about it online by themselves. And yeah, if they can understand how to use those new tools, why not learn how to use it in their classes?” – Cram School Owner 10.*

However, one of the respondents expressed that it is not necessary to force innovation on educators and students at the moment. Instead, such experience with AI should be more personal and based on one’s own choice:

*“The question is how do we teach the proper use of these tools? And who teaches that, right? Should they? I have no answer to that. I am kind of comfortable with how things are at*

*this point. So, you're kind of in a twilight situation, where it's up to the teacher to decide how much he wants, or she wants to learn about it.” – Full-Time University Professor 12.*

What is interesting is that one of the professors not only believes in the importance of such training but also teaches it to other professors at his university. Besides his enthusiasm for educating other people about AI, this demonstrates how institutions are taking steps towards accepting innovation as a crucial part of our lives:

*“Before the semester started, we had a training session for AI instruction on how to implement AI in our curriculum. And yeah, we tried, especially the administration, very hard. <...> And actually, last semester, I was invited to give a lecture on how to use ChatGPT and, eventually, only three professors attended. It's really sad.” – Full-Time University Professor 13.*

Such an impressive example of the implementation of innovation on a higher educational level inspired me to ask other teachers and professors whether they have the same practice at their institutions. Despite receiving comprehensive responses regarding the importance of learning how to use artificial intelligence in education, I collected the answers demonstrating that there are no mandatory courses or training for students and educators regarding AI at the moment. There are definitely various opportunities to learn about AIEd, however, it is not widely spread nor implemented on a governmental level. Such practice depends solely on the educator's or student's own initiative. Although, there are currently no restrictions on the usage of AI in the classrooms, which means that the technology might not be taught yet but is already accepted and widely used. For instance:

*“To be honest, I never asked for permission to use AI. I just did it. But AI is well accepted at the school I work at.” – Cram School Teacher 11.*

*“I think it's getting popular in the universities because the older students are smarter, and they know how to utilize AI. But for junior high school, high school, and elementary school kids, that's completely different. Some of them may not even know how to fully access the computer.” – Cram School Teacher 3.*

*“Oh, well, no, because of the way that my cram school is set up. We've never had any sort of meetings or any kind of particular talks about using AI in the classroom. I can see how we can use it, but at the moment, it doesn't seem like it's something that has been brought up as a source of conversation.” – Cram School Teacher 7.*

*“I believe that there are probably some AI-related workshops for the teachers, but it's not mandatory. You can sign up for that workshop if you want but they don't force all the teachers to do so. It still takes time to implement such training.” – Cram School Owner 10.*

Based on the perspectives of students, teachers, and professors, some training or educational activities about the thoughtful usage of AI are needed to maximize the benefits of the technology in education. Even though some universities provide such workshops, other schools are still not ready to adopt the innovation on a serious level, leaving it up to others to choose whether this knowledge is interesting for them.

## **Summary**

In this part, we investigate how the answers of the interviewees, match or differ from the literature review, bring out new findings in the area, and what suggestions or solutions can we come to.

## **Analysis of Theories**

The Cognitive Load Theory (CLT) is a theory where the learning process is most effective when the cognitive load stays within the limits of the working memory capacity. There are 3 types of cognitive load – intrinsic, germane, and extraneous, which all relate to task complexity, learning and information retention, and the presentation of the material. According to the CLT, to maximize the effectiveness of the learning in class and guarantee longer knowledge retention, educators of different educational levels should minimize unnecessary cognitive factors, such as distractions due to unrelated tasks, practice critical thinking skills, apply knowledge and improve long-term material retention, in addition to helping students avoid frustration and feeling bored during classes.

The significance of the theory is that it can help people understand how the human cognitive system operates with received knowledge, especially in the case of students and educators. Knowing the limitations to the amount of information a learner can process and applying personal delimits to enhance one's performance can lead to significant results in studying and a more personalized approach to it.

In the context of the integration of AI tools in education, CLT suggests ideas on how to implement technology and its abilities into the learning process. According to the interviewees who come from different educational institutions, both educators and students believe that AI tools can be a great help in the field of education. The new advancement is not only a promising innovation but also a valuable assistant, which can easily help us save more time on repetitive and tedious work and spend it on more important interactions and learning activities. For example, if educators could spend less time grading the papers, they would be able to pay more attention to their students' needs in class and provide more support. It can help students maintain intrinsic load and avoid frustration in the classroom. Additionally, among various benefits of AI tools, the respondents highlighted its ability to create interactive and engaging content. Following the principles of cognitive load, it is crucial to increase the germane load, which means enhancing mental effort in learning. In this case, AI can offer various opportunities to practice critical thinking skills and improve long-term material retention due to the real-life knowledge application. For instance, hands-on activities and experiences where you can train your skills, such as augmented (AR) and virtual (VR) realities, can make studying more immersive and encourage students to be more active in class and exercise their skills.

However, despite the beneficial interplay between CLT and AI, there is a drawback to it. As the extraneous cognitive load needs to be minimized by reducing distracting factors, such as irrelevant information, AI can suggest some tools useful for that. For example, some can summarize, categorize, or simplify long text, which makes this process faster and easier. Even though it sounds like a great opportunity, both educators and students might get too reliant on the technology. According to the opinions of most educators, they noticed a tendency to “copy-paste” information without comprehending and analyzing it in learners, which leads to laziness, lack of critical-thinking skills and judgment, negatively affecting their experiences. Moreover, over-reliance on AI can even cause distractions, leading to less engagement and lower rates of students who pay attention in class. Such change in the learners' attitudes directly affects the classroom dynamics in an adverse way and raises concerns regarding the influence of AI on CLT in education.

The Zone of Proximal Development (ZPD) is a theory that examines the difference between the learner's learning capabilities without support and with support in its various forms. Following this concept, to guarantee the effectiveness of the class material and improve knowledge retention, educators should give students the opportunity to learn within the limits of their zones of proximal development and provide opportunities to enhance their skills in individual learning.

The theory's contribution to the field of education facilitates a better understanding of how to educate learners and push them to their potential with personalized support. It can not only explain how to approach educating special needs students in class but also teach learners beyond their level in an encouraging environment.

To facilitate the goals of ZPD, scaffolding relates to the educator's role in supporting the learners with their tasks, whereas differentiation examines whether the class content is adjusted to meet the student's needs based on their current levels. To support such strategies, AI can provide various tools, such as programs that offer structured feedback for peer review activities, hence, receive feedback according to their level of expertise, and opportunities to learn from one another. Furthermore, based on the opinions of the interviewees, artificial intelligence applications and programs in education can positively affect learning experiences and provide more personalized support. Many believe that the new technology can adapt learning to each student's pace and capabilities, as well as provide concise feedback and offer the relevant difficulty levels, optimizing their knowledge and interpersonal skills.

Nevertheless, once again, just like in the case of CLT and AI, over-reliance on technology can lead to a lack of independence in personal judgment and regress in the development of critical thinking skills and learning. Some respondents expressed their concerns regarding the fake confidence AI tools can give you, creating the illusion that anything can be solved with their help, which makes students feel less motivated to learn on their own and strive for improvement. Such interplay of ZPD and artificial intelligence demonstrates how the integration of innovation can hinder students' progress in education by making it less challenging for them.

Taking these strategies into consideration, we can understand that classic theories, such as CLT and ZPD, are directly affected by the new AI technology. While many believe that their interplay can enhance learning experiences, others express concerns about the possibility of hindering the studying processes and negatively impacting both educators' roles in the classrooms and students' attitudes towards education. However, both benefits and drawbacks raise concerns about the balance between the theories and AI tools as their interplay in education is yet to be determined.

## CONCLUSION

The rapid growth of artificial intelligence (AI) has contributed to various fields of our lives, including education. The revolutionary innovation has reshaped the usual learning experience making it more adaptive to the unique needs of each student. Besides, the technology provides numerous benefits for both students and educators, such as reducing repetitive and tedious work, providing easier and faster access to information, creating engaging and interactive class material, as well as making learning more personalized to each student's pace and abilities.

However, the integration of artificial intelligence has demonstrated its drawbacks. Over-reliance on technological advancement can negatively influence students' learning behaviour by making them less independent in their own judgements and less involved in classroom activities, in addition to creating a learning environment less welcoming for critical thinking skills application. Additionally, there are numerous privacy and ethical issues, regarding personal data and insensitive content.

When exploring the role of artificial intelligence in education, the key findings that arise from the data analysis are distinguished into 5 parts under a qualitative content analysis. To begin with, through perceptions of AI in education I was able to collect educators' and students' opinions on the emerging technology and understand whether the technology received a 'warm welcome'. Besides a few opinions filled with caution and scepticism, most of the respondents expressed their excitement about the technology, sharing their high hopes and interest in it. Secondly, while researching the impact on the learning experiences, the pattern in answers showed that the outcome of the usage of AI can be both negative and positive in an approximately equal way. Even though AI tools provide new interactive materials and amazing visual aids, they can also negatively affect classroom dynamics, reducing students' desire to learn and participate in different activities. Moreover, some believed that AI does not play a big role and that students are responsible for their learning experience and behaviour as much as teaching methods do. Thirdly, when discussing prospects and enhancements of AI tools, respondents expressed their awareness of various artificial assistants useful in education. Even though chatbots, especially ChatGPT, were seen as the most promising tools, 3D modelling programs, virtual and augmented realities, grammar checkers and other game-creating platforms were perceived as exciting innovations that have great prospects in education. Furthermore,



educators and students stressed the importance of not developing the tools only but also improving them by reducing ethical and factual issues. Fourthly, through understanding what concerns and issues AI poses in education, I discovered that there are numerous challenges related to ethics, privacy and factual incorrectness. While the responsibility for fixing the problems might lie on the shoulders of the developing companies and IT specialists, most suggested the importance of applying personal judgment and critical thinking skills, double-checking, as well as using guidance from the figure of authority to prevent any negative factors. Last, an examination of how adopted the AI tools are and whether the field of education is ready for innovation showed that most of the respondents are ready to embrace the technology and integrate it into their studies and classrooms. Besides the high levels of awareness about the technology, many keep their mind open to learning more about AI tools and hope to spread the knowledge about it to promote thoughtful and safe usage. Even though some institutions hold special lectures and seminars on the mindful integration of AI tools, they are not mandatory and not widely spread at the moment, which leaves the implementation of artificial intelligence in education a personal choice for every individual.

In conclusion, the integration of AI in education offers many positive changes, making learning more personalized, simplifying educators' routines, and providing interactive content with immersive experiences and visual aids. Nevertheless, it is essential to implement the technology responsibly, paying attention to ethical considerations and regulations, which can help avoid biased information and privacy issues. Personally, I see many prospects in the usage of artificial intelligence as the innovation has great potential. I truly believe that with a common effort and cautious approach, we can embrace AI in education and create a healthy learning environment for everyone.

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## APPENDIX A

### [INTERVIEW QUESTIONS FOR STUDENTS AND EDUCATORS]

#### 1. Personal Information

- What is your name?
- How old are you?
- What is your current occupation?
- What is your major and year at the university?

#### 2. Perceptions of AI in education

- How do you usually prefer to learn new information or skills?
- Have you ever interacted with an AI-based chatbot or virtual assistant in your studies? If so, could you describe your experience?
- In your opinion, what are the benefits and the disadvantages of using AI in education?
- How might the integration of AI in education impact the role of teachers? Will it alter traditional classroom dynamics?

#### 3. Impact of AI on the learning experience

- How might the integration of AI in education impact students' behaviour? Will it alter traditional classroom dynamics?
- Overall, do you think the usage of AI can help to address your gaps in knowledge and make learning more personalized and engaging?
- What specific AI tools in education do you find most promising or exciting?
- How do you think AI-based chatbots and virtual assistants could be improved to better support your learning?

#### 4. Concerns about AI in education

- Do you think it is important for students and teachers to learn how to use AI in schools and universities? Why?
- What measures should be taken when implementing AI in education to ensure ethical and safe usage?

## APPENDIX B

### [CONSENT FORM FOR THE INTERVIEWEES]

#### INFORMED CONSENT FORM

**Title of Study:** AI and Education: Exploring the Perceptions of Educators and Students on the Use of AI in Education and Its Impact on Their Learning Experiences

**Primary Investigator:** Arina Muradova

**Institution:** Wenzao Ursuline University of Languages

The purpose of the interview is to gain valuable insights and perspectives regarding the perceptions of students and educators on the use of Artificial Intelligence in education and its impact on learning experiences. Your participation is voluntary, and your responses are for academic purposes only, not for public consumption. The duration for the discussion of the questions is estimated to range between 30 to 60 minutes. Please read this form carefully and feel free to ask any questions before providing your consent.

I have been provided with a detailed explanation of the purpose and nature of this study. I understand that this research aims to contribute to knowledge in the field of education and has received approval from the Department of International Affairs at Wenzao Ursuline University of Languages. Yes  No

I acknowledge that my participation in this study is entirely voluntary, and I am under no obligation to take part in it. Yes  No

I understand that I can withdraw from the study at any stage for any reason, without the need to provide an explanation. Yes  No

I understand that all information I provide will be treated with the utmost confidentiality. My responses will be kept anonymous and confidential to the researchers. Only in cases where statutory obligations of the agencies working with the researchers necessitate, confidentiality may be breached for the safety of the participant or others. Yes  No

I agree that the bodily samples (audio recordings) taken during this study can be stored for future research. Yes  No

If “No” to the above, I confirm that the bodily samples taken during this study can only be used for this study and should be disposed of upon completion of the research [11th November 2023]. Yes  No

I have read and understood this consent form. Yes  No

I have had an opportunity to ask questions about my participation and all my queries have been addressed to my satisfaction. Yes  No

I willingly agree to participate in this study. Yes  No

Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_