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ARTIFICIAL INTELLIGENCE IN EDUCATION

UMĚLÁ INTELIGENCE VE ŠKOLSTVÍ

BACHELOR'S THESIS

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The aim of the thesis is to describe the issue of artificial intelligence in education, to discuss its recent development, and to mention the potential benefits and drawbacks of AI in schooling.

RECOMMENDED LITERATURE:

Bittencourt, I. I., Cukurova, M., Muldner, K., Luckin, R., & Millán, E. (2020). Artificial Intelligence in Education (Vol. 12163). Springer International Publishing.

Holmes, W., Bialik, M., & Fadel, C. (2023). Artificial intelligence in education. In: Data ethics: building trust: how digital technologies can serve humanity. (pp. 621–653). Globethics Publications.

Popenici, S. (2023). Artificial intelligence and learning futures: critical narratives of technology and imagination in higher education. Routledge, Tayor & Francis Group.

Roll, I., & Wylie, R. (2016). Evolution and revolution in artificial intelligence in education. International Journal of Artificial Intelligence in Education, 26, 582-599.

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Abstract

This thesis focuses on the integration of Artificial Intelligence (AI) in the field of education. It explores the historical development, theoretical principles, and practical applications of AI in education. The thesis also examines the advantages and challenges associated with implementing AI in educational environments, including ethical considerations, privacy concerns, and credibility. By analyzing real-life examples this study offers valuable insights into how AI can impact personalized learning, student performance evaluation, and administrative efficiency in schools. The practical part is concerned with the role of AI in school settings and its effect on education by conducting a survey. The survey showed that students are more positive and frequent users of AI than teachers, who tend to be more skeptical. Despite this, both groups show support for integrating AI into education.

Keywords

Artificial intelligence (AI), Education, Educational technology, Data Administration, Self-development, Machine Learning, Personalized Learning, Intelligent tutoring systems

Abstrakt

Tato práce se zaměřuje na integraci umělé inteligence (AI) do oblasti vzdělávání. Zkoumá historický vývoj, teoretické principy a praktické aplikace umělé inteligence ve vzdělávání. Práce se rovněž věnuje výhodám a problémům spojeným s implementací AI ve vzdělávacím prostředí, včetně etických aspektů a ochrany soukromí a důvěryhodnosti AI. Na základě analýzy reálných příkladů tato studie nabízí cenné poznatky o tom, jak může AI ovlivnit personalizované učení, hodnocení výsledků žáků a efektivitu administrace ve školách. Praktická část práce se zabývá rolí AI ve školním prostředí a jejím vlivem na vzdělávání za pomoci dotazníku. Průzkum ukázal, že studenti mají pozitivnější vztah k AI a jsou častějšími uživately umělé inteligence než učitelé, kteří mají spíše skeptický vztah k AI. Navzdory tomu obě skupiny podporují začlenění umělé inteligence do vzdělávání.

Klíčová slova

Umělá inteligence (AI), Vzdělávání, Vzdělávací technologie, Administrativa dat, Seberozvoj, Strojové učení, Personalizované učení, Inteligentní výukové systémy

Rozšířený Abstrakt

Vzdělávání hraje zásadní roli v rozvoji společnosti a utváření budoucnosti jednotlivců i komunit. V dnešní neustále se rozvíjející společnosti se využití technologií pro zlepšení kvality života používá hned v několika odvětví a právě zmíněné vzdělávání není výjimkou. Jedním z nejprůlomovějších technologických pokroků je umělá inteligence, která zahrnuje stroje schopné napodobit lidskou inteligenci. Umělá inteligence nabízí řadu možností, jak zlepšit oblast vzdělávání.

Tato práce se zabývá využitím umělé inteligence v oblasti školství. Cílem bylo popsat a prozkoumat roli umělé inteligence ve vzdělávání, proniknout do jejích teoretických základů a zjistit jaké výhody, nebo popřípadě komplikace, představuje při aplikaci ve vzdělávacím prostředí. Kromě toho tato práce zvažuje etické důsledky, jak umělá inteligence ovlivňuje vzdělávání. Zkoumáním současných trendů i rozvíjejících se možností AI ve vzdělávání navíc poskytuje vhled do jejího potenciálního vlivu na budoucnost vzdělávání.

První kapitola pojednává o integraci umělé inteligence do vzdělávání a zdůrazňuje její základní principy, historický vývoj, technologický pokrok a konkrétní aplikace. Věnuje se rozdílům mezi silnou (obecnou) a slabou (úzkou) umělou inteligencí, a zdůrazňuje strojové učení a neuronové sítě jako klíčové součásti umělé inteligence. Nadále popisuje vývoj umělé inteligence od jejích teoretických počátků až po praktické aplikace ve vzdělávání, přičemž se zaměřuje zejména na nedávný pokrok v oblasti zpracování lidského jazyka, jeho myšlení a to vše díky počítačovému vidění. Tento progres vedl k inovativním vzdělávacím nástrojům, jako jsou inteligentní naučné programy a interaktivní výukové hry prostřednictvím virtuální reality.

Druhá kapitola se zaměřuje na problémy a benefity při integraci umělé inteligence ve školství. Má potenciál způsobit revoluci ve školství tím, že nabídne personalizované vzdělávání pro jednotivce a zlepší efektivitu školní správy. Její integrace však představuje několik výzev. Patří mezi ně etické obavy týkající se ochrany osobních údajů a možných předsudků, odpor učitelů a studentů kvůli obavám o bezpečnost práce a kvalitu vzdělávání, finanční a technické překážky a v neposlední řadě riziko zneužití k podvádění a plagiátorství. Navzdory těmto výzvám může umělá inteligence zlepšit personalizované učení tím, že přizpůsobí vzdělávací obsah individuálním potřebám, poskytne spravedlivější a rychlejší hodnocení a zefektivní administrativní úkoly, což by vedlo k efektivnějšímu a účinnějšímu vzdělávacímu systému.

Třetí kapitola se věnuje využití umělé inteligence pro generování obsahu a získávání materiálů, což závisí na její důvěryhodnosti. Jedná se o komplikovanou problematiku a zdůrazňuje potřebu důvěryhodných informací, transparentních algoritmů a spolehlivých zdrojů dat. Rovněž se zabývá kvalitou obsahu generovaného umělou inteligencí, významem etického sběru dat a budoucím vývojem v oblasti vzdělávání založeného na umělé inteligenci.

Zdůrazňuje potřebu lidského dohledu pro zachování kritických a tvůrčích standardů a zabývá se popřípadnými problémy spojených s algoritmickou zaujatostí, etickými aspekty a zajištěním spravedlnosti a inkluzivity vzdělávacích technologií založených na umělé inteligenci.

Čtvrtá kapitola shrnuje vliv umělé inteligence ve školách s různým zaměřením a na různých stupních vzdělání. Vylepšuje lékařské vzdělávání a výzkum na vyšších stupních vzdělávání nejen na středních školách, ale i na základních školách. V oblasti financí je umělá inteligence integrována do vysokoškolského vzdělávání pro pokročilé aplikace, jako je algoritmické obchodování a odhalování podvodů, a základní koncepty umělé inteligence jsou zaváděny na středoškolské i základní úrovni. V inženýrském vzdělávání se využívá pro optimalizaci návrhů a autonomní systémy ve vysokoškolském vzdělávání, přičemž základní koncepty a praktické aplikace se vyučují na středních a základních školách. V oblasti jazyků a lingvistiky pomáhá AI při lingvistické analýze a učení jazyků prostřednictvím NLP a interaktivních nástrojů na všech úrovních vzdělávání. Vzdělávání v oblasti environmentálních věd využívá umělou inteligenci pro analýzu dat, modelování klimatu a monitorování životního prostředí od základního až po vysokoškolské vzdělávání. Taky rovněž zdůrazňuje široké přínosy v dalších odvětvích včetně výroby, zákaznického servisu, dopravy, zemědělství a kybernetické bezpečnosti, a zdůrazňuje roli umělé inteligence při zvyšování efektivity, produktivity a inovací.

V poslední kapitole prostřednictvím dvou průzkumů tato práce zkoumá, použití a názory na umělou inteligenci ve vzdělávacím prostředí. Tyto rozsáhlé průzkumy nám zajistily vhled do názorů a zkušeností studentů a učitelů ohledně AI ve vzdělávání. Průzkum byl proveden online, kvůli zajištění anonymity, a byl veden v českém jazyce, aby se předešlo nedorozuměním. Respondenti museli být aktivními studenty střední nebo vysoké školy nebo učiteli na jakékoliv škole.

Průzkum obsahoval otázky s výběrem z jedné nebo více odpovědí a otevřené textové odpovědi, které umožnily účastníkům podrobněji popsat své názory a zkušenosti s AI. Celkem se průzkumu zúčastnilo 124 respondentů, z toho 69 studentů ve věku od 16 do 23 let a 55 učitelů ve věku od méně než 26 let do více než 55 let. Analýza průzkumu ukázala, že studenti mají obecně pozitivní postoj k AI, zatímco učitelé jsou více neutrální nebo negativní.

Studenti vykazovali vyšší frekvenci používání AI ve srovnání s učiteli, což naznačuje jejich větší obeznámenost a komfort s těmito technologiemi. Konkrétně 38 studentů používalo AI několikrát měsíčně, 15 několikrát týdně a 7 denně. Mezi studenty, kteří AI nepoužívali, hlavními důvody byly "k ničemu ji nepotřebuji" a "naše škola to nepovoluje". Učitelé vykazovali nižší frekvenci používání AI, přičemž 23 z nich používalo AI několikrát měsíčně, 16 několikrát týdně a pouze 1 denně.

Výsledky také ukázaly, že studenti i učitelé používají AI především pro vzdělávací účely, následované generováním obsahu a vyhledáváním zdrojových materiálů. Programování a překlad textů byly méně běžné aplikace AI mezi studenty, zatímco učitelé měli podobné priority jako studenti v používání AI pro vzdělávací účely.

Většina respondentů podporuje začlenění AI do vzdělávacího systému, ačkoliv učitelé jsou v tomto ohledu opatrnější. Studenti častěji vnímají AI jako důvěryhodný zdroj, zatímco učitelé jsou skeptičtější. Například 29 studentů za něj AI považovalo a pouze 16 učitelů bylo stejného názoru. Obě skupiny se shodují, že psaní závěrečných prací by nemělo být kvůli AI zrušeno, což poukazuje na důležitost kritického myšlení a schopnost vlastního výzkumu.

Výsledky naznačují potřebu strukturovaného vzdělávání o AI, zejména pro učitele. Instituce by měly poskytovat pravidelná školení, aby učitelé mohli efektivně integrovat AI do výuky. Spolupráce s vývojáři AI na poskytnutí důkazů o spolehlivosti a etickém použití AI by mohla zvýšit důvěru učitelů v tyto technologie.

Průzkum ukazuje, že studenti jsou otevřenější a pozitivněji naladěni vůči AI ve vzdělávání ve srovnání s učiteli. Pro úspěšné začlenění AI do vzdělávacího systému je důležité zajistit adekvátní vzdělávání a podporu pro učitele, aby mohli plně využít potenciál těchto technologií. Vytvoření programů, které nejen učí technické dovednosti potřebné k používání AI, ale také zdůrazňují pedagogické výhody, by mohlo pomoci zmírnit obavy a odpor vůči integraci AI. Workshopy, praktická školení a příklady úspěchů uživatelů by mohly urychlit přijetí a efektivní využití AI ve třídách.

PAVLOV, Jan. *Umělá inteligence ve školství* [online]. Brno, 2023 [cit. 2023-12-14]. Dostupné z: https://www.vut.cz/studenti/zav-prace/detail/155990. Semestrální práce. Vysoké učení technické v Brně, Fakulta elektrotechniky a komunikačních technologií, Ústav jazyků. Vedoucí práce Jana Jašková.

Author's Declaration

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I declare that I have written this paper independently, under the guidance of the advisor and using exclusively the technical references and other sources of information cited in the project and listed in the comprehensive bibliography at the end of the project.

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Brno, May 24, 2024   --
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Acknowledgment

Contents

List of abbreviations

AI - Artificial Intelligence
VR - Virtual Reality
NLP – Natural Language Processing

1. Introduction

Education is one of the most important pillars of society. Education lays the foundation for the future of both individuals and communities. In today's rapidly changing world, it is crucial to look into ways to make education better using technology. There have been various attempts to implement new technologies across different fields. One of the most innovative fields where technology can transform is Artificial Intelligence. AI refers to the area of computer science that is connected to making computers or other machines exhibit human intelligence.

Overall, AI has a lot of possible applications in education, and the technology's application to the field has gained significant traction in the most recent years. The application of AI in education can revolutionize not only how students learn but also how teachers teach and many more elements of the process. In terms of basics, AI in the educational context overall tends to be about more personalized learning and making the learning process more adaptive. Algorithms, used in AI, can process large amounts of data to identify learning patterns for each student and adjust the material to fit their needs. This approach is essential because everyone has their own method of learning and it can help teachers to address this diversity.

The purpose of this thesis is to examine the role of AI in education. The thesis will review the theoretical basis of AI technology and explore its benefits and downsides in terms of its application to education. Furthermore, the thesis will consider the legal and ethical implications of the technology.

Finally, analyzing the modern trends and future opportunities of AI in education will give an understanding of the possible impact on education. This research paper will try to analyze the phenomenon of AI in education from various perspectives. It will consider opportunities and challenges, cases, and influencing aspects regarding students, teachers, and educational institutions. By the end of the research, one should be able to understand how AI can change education and what society needs to do to harness this change properly.

Disclaimer: generative AI was not used when making this paper.

2. Theoretical Framework

To truly grasp the concept of artificial intelligence in education, one must have a deep understanding of its core principles, historical background, current technological advancements, specific applications, and how it is connected with existing learning theories. AI essentially involves the creation of computer systems that have the ability to perform tasks traditionally related to human intelligence, such as problem-solving, speech recognition, and learning (Flasiński, 2016). The key feature of artificial intelligence is machine learning - a process where algorithms enable computers to learn from data and improve their performance over time. Krishna (2023) claims that the technological advancements in Natural Language Processing (NLP) and educational-focused machine learning algorithms have played a significant role in driving this progress.

It is important to know the difference between General AI - which can handle any intellectual activity a human can do - and Narrow AI - which is designed for specific tasks. (Tahiru, 2021) Fundamentally, AI comprises machine learning techniques that employ algorithms to enable computers to learn and adapt. Neural networks emulate the processes of the human brain and enhance the AI system's capacity for learning (Banerjee et al., 2020). NLP lays the foundation for AI to read, understand, and generate text similar to natural human language - making communication between computers and humans smoother than ever before. Additionally, computer vision empowers AI systems to comprehend visual input and draw meaningful conclusions - an increasingly vital aspect of education.

The theoretical framework expands to include the evolution of AI algorithms. It traces their development from conceptual frameworks to practical uses in education. It is important to understand the underlying theories as AI revolutionizes traditional teaching methods (Banerjee et al., 2020). The combination of AI and learning theories represents a significant milestone, giving educators new perspectives on how to effectively incorporate these tools into their teaching practices. By exploring the various applications of AI in education, valuable insights are gained that can help with diving deeper into its potential as it becomes increasingly integrated into educational processes.

2.1 History and Evolution of AI

The history and development of AI can be traced back several decades, characterized by significant turning points that have shaped its journey from theoretical concepts to practical applications. The origins of AI can be found in ancient myths and folklore, where there were imaginings of artificial beings possessing human-like intelligence (Flasiński, 2016). However, the formal establishment of AI as a separate area of research goes back to the middle of the twentieth century. In the 1950s and 60s, visionaries like Alan Turing and John McCarthy laid the foundation for AI by proposing the idea of robots with human-like intelligence. McCarthy, in particular, played a crucial role in popularizing the term "artificial intelligence" and defining its goals during the Dartmouth Conference in 1956, often considered as AI's birth (Flasiński, 2016).

Flasiński (2016) also states that in the following decades, there was significant progress in symbolic AI, primarily focusing on rule-based systems and expert systems. However, initial excitement for AI declined during what is known as the "AI winter" in the 1970s and 80s due to budget constraints and a recognition of technological limitations at that time. The revival of AI in the 1990s witnessed a shift from rule-based systems to data-driven algorithms powered by machine learning (Flasiński, 2016). This period was dominated by neural networks and advanced approaches to AI.

AI has experienced significant growth thanks to factors such as increased data availability, enhanced processing capabilities, and advancements in machine learning techniques (Flasiński, 2016). For AI systems to comprehend and generate human language effectively, they rely on NLP technology. This evolving technological landscape holds immense potential for revolutionizing education through the implementation of personalized and adaptable teaching approaches that can reshape the learning environment.

2.2 Advancements in AI Technologies in Recent Years

Artificial intelligence has experienced remarkable progress in the past few years, transforming the way people interact with technology and impacting various aspects of our daily lives. According to Halili (2019), there have been significant advancements in machine learning, computer vision, and natural language processing techniques. The progress in natural language processing has enabled computers to understand and generate texts that resemble human writing, which means enhancing communication between humans and AI.

Furthermore, AI systems now possess the ability to interpret visual information through advancements in computer vision, enabling tasks such as facial recognition and image categorization. The rapid integration of AI can be observed in virtual assistants, recommendation systems, autonomous vehicles, and smart home devices (Halili, 2019). These applications have not only improved efficiency in various tasks but have also raised important ethical concerns regarding privacy, security, and responsible AI research.

Del Bonifro et al., (2020) declare that the influence of AI can be felt throughout everyday life as it revolutionizes how people use technology and carry out routine activities. For instance, personal voice assistants like Siri, Alexa, and Google Assistant have become integral parts of our daily routines by providing information, and reminders and performing functions through voice commands. AI-powered recommendation systems customize movie suggestions, and product recommendations tailored to individual interests based on their online behavior. Additionally, it changed the transportation industry with the development of autonomous vehicles equipped with advanced AI systems. As the widespread of AI continues to grow significantly across different domains ethical dilemmas arise concerning data privacy issues algorithmic biases as well as potential social implications associated with emerging technologies.

Vincent-Lancrin & Van der Vlies, (2021) state that the rapid advancement of artificial intelligence has brought about important ethical concerns that require careful consideration and responsible development. Concerns are growing as AI systems become increasingly intelligent, particularly regarding privacy, security, and ethical handling of data. The utilization of vast amounts of personal data for training AI systems raises issues related to consent, transparency, and potential abuses. Instances of algorithmic biases in AI systems that result in discrimination underline the importance of fairness and equality in their development. To gain public confidence and mitigate potential harm, it is crucial for AI technology to align with societal values and ethical standards.

Artificial intelligence has transformed both technological advancements and societal norms and dynamics. AI-driven technologies have had a profound impact on our communication methods, decision-making processes, and social interactions. Within social media platforms, AI alters content recommendations and moderates online interactions, thereby influencing information spread patterns as well as community dynamics (Effenberger a Pelánek, 2020). The presence of AI in workplace automation and augmentation significantly impacts employment structures and job responsibilities. As societal norms continue to evolve, it is necessary to evaluate the ethical, cultural, and economic

consequences of AI to ensure that these new technologies beneficially serve individuals as well as society.

2.2.1 Recent Advancements in AI Technologies in Education

Advancements in the field of AI technology have opened up exciting new possibilities in education. There are various AI applications in education that aim to enhance the learning experience. According to Roll & Wylie (2016) for example, Intelligent Tutoring Systems use AI algorithms to offer personalized guidance and support to students, tailoring educational content to their individual needs. This creates an adaptive learning environment that goes beyond traditional one-size-fits-all approaches. Learning Analytics is another aspect of AI in education that uses data-driven insights to analyze student performance, identify learning patterns, and inform instructional strategies (Roll & Wylie, 2016). These analytics provide educators with valuable information for making informed decisions and overall improving academic outcomes.

Virtual Reality (VR) combined with AI is an intriguing combination of technologies for education. VR and AI enable immersive and interactive learning experiences. Real-life case studies have shown the advantages of using instructional AI systems. Institutions and instructors have reported higher engagement levels, better retention rates, and more personalized learning options for students (Popenici, 2023). By simulating real-world scenarios, these immersive experiences can enhance understanding of concepts.

Popenici (2023) also states that the case studies showcasing the effective implementation of AI systems demonstrate their practical applications. The ability of AI to solve educational problems, improve student outcomes, and streamline administrative tasks highlights its value.

These achievements demonstrate the potential impact of AI on education and can serve as examples for other institutions interested in adopting AI technology. The future holds promising advancements in AI for teaching, which will result in more sophisticated applications. Predictive analytics, for instance, may eventually be able to anticipate learning needs and provide customized learning paths. Additionally, the use of NLP and AI could enhance interaction between students and virtual tutors, making learning more interactive and responsive (Roll & Wylie, 2016). AI has the potential to enhance both efficiency and personalization in education, leading to a more inclusive and successful learning experience as it enhances the interaction between students and AI.

2.3 Role of AI in Education

The potential impact of Artificial Intelligence on education is significant, marking the arrival of a new era characterized by innovation and efficiency. AI has the ability to revolutionize traditional teaching methods by offering personalized and flexible learning opportunities. Its capability to analyze vast amounts of data enables the creation of tailored learning programs for each student, taking into account their specific needs and preferences (Holmes et al., 2023). Going beyond the limitations of conventional education, this personalized approach ensures that every student can progress at their own pace and fully grasp concepts. The integration of AI in education aims to enhance student outcomes and overall learning experiences while seamlessly aligning with educational objectives. Moreover, AI can improve teaching methodologies and provide teachers with valuable insights into students' performance and learning styles.

Furthermore, AI significantly contributes to enhancing diversity and accessibility in education. AI technology can be utilized to increase the accessibility of educational resources, overcoming barriers related to socioeconomic status and geographical limitations. For instance, AI-powered language translation systems can facilitate learning for multilingual students and foster inclusivity in educational settings (Holmes et al., 2023). Additionally, through adaptive learning resources and assistance, AI applications can support students with diverse learning needs, ensuring that education is accessible to a broader range of learners. For example, people with disabilities can benefit from using AI.

The incorporation of AI into traditional educational systems has led to significant changes in the way teaching and learning take place. One notable benefit is that AI technology can enhance traditional teaching methods, providing valuable support to instructors. For instance, automated grading systems can expedite the time-consuming task of assessing assignments, allowing instructors to focus more on student engagement and educational activities (Lameras & Arnab, 2021). By combining the strengths of human knowledge with technological advancements, this collaborative approach between AI and traditional teaching methods ensures a comprehensive and well-rounded learning environment.

AI plays a revolutionary role in education by seamlessly integrating into existing educational systems and promoting goals such as improving inclusion and accessibility. With its ability to offer personalized learning experiences, enhance teaching strategies, and remove barriers to learning, artificial intelligence has the potential to completely transform the

educational landscape (Lameras & Arnab, 2021). The collaboration between AI and conventional education aims at enhancing learning by complementing human knowledge with technology for the benefit of both students and teachers.

The integration of AI into the field of education brings about a significant shift, promising a future where learning becomes personalized, inclusive, and supported by the collaboration between human expertise and technological advancements. To navigate this technology and education effectively, it is crucial to comprehend the historical background, theoretical foundations, and current breakthroughs in AI. The practical implementation of AI in education, exemplified by intelligent tutoring systems, learning analytics, and AI-enhanced learning approaches, showcases its benefits. Beyond serving as a mere technical advancement, AI plays a crucial role in creating an educational environment that is more adaptable, accessible, and successful.

3. Challenges and Benefits of AI in Education

AI has gained recognition for its impact on different aspects of human life and for bringing remarkable developments across various industries. In the field of education, AI is opening doors to an era of innovation. It offers possibilities for simplified learning experiences that are informed by intelligence. This kind of innovation requires educators, policymakers, and learners to possess a deep understanding and thoughtful consideration as it presents both opportunities and different challenges that need to be explored.

3.1 Challenges (disadvantages) of AI in Education

The adoption of artificial intelligence in the field of education holds considerable potential for many advantages. However, it is important to acknowledge and confront the challenges that must be overcome in order to achieve the smooth incorporation of AI into the classroom environment (Borenstein & Howard, 2021). By identifying and addressing such challenges, a deeper understanding of the problems involved in fully utilizing the power of AI in education can be gained.

3.1.1 Ethical Considerations and Privacy Protection

Integrating artificial intelligence into the field of education presents several challenges, particularly regarding ethics and privacy. AI systems heavily rely on vast amounts of student data, including personal information and academic records. This data plays a crucial role in AI algorithms that aim to provide personalized educational experiences (Vincent-Lancrin & Van der Vlies, 2021).

In today's digital age, ensuring the protection of confidential information is very important. Research emphasizes that it is necessary to protect student's academic records, behavioral data, and other personal details from unauthorized access and misuse (Qin & Wang, 2022). Educational institutions bear the responsibility of ensuring thorough data protection while adhering to privacy standards. Failure to comply with these regulations may result in security breaches, unauthorized disclosure of data, and potential harm to student's privacy. Furthermore, it is vital to recognize that AI algorithms have the potential for unintentional discrimination in areas such as grading and assessment. Careful construction and training of AI systems are necessary to avoid biased outcomes that disproportionately affect specific student populations. Hence, the ethical concerns associated with artificial

intelligence in the field of education extend beyond data protection. There is also concern about fairness and ensuring equal treatment between students.

3.1.2 Acceptance by Teachers and Students

Research by Tahiru (2021) discovered that the effectiveness of integrating AI into the field of education relies on how much educators and students embrace these technological advancements as educators may need assistance in incorporating AI into their teaching methods, as they might have concerns about whether AI will replace traditional teaching or take their role in the classroom as the fear of unemployment, a challenge faced by many industries, is also significant in the education sector. Teachers may also worry about how AI will impact the quality of education provided, questioning if it can offer the same level of complex and compassionate support that human instructors deliver. To successfully introduce AI into educational environments, it is crucial to build trust and gain acceptance from educators through development programs and training.

From a student's perspective, there is a concern regarding the implementation of artificial intelligence in education. Some students worry that their learning experience might lose its personal touch due to AI replacing human interaction with electronic interfaces (Qin & Wang, 2022). Therefore, it is important to recognize and address these concerns to make an understanding among students that AI acts as an additional tool to enhance their learning journey rather than replacing it.

3.1.3 Financial and Technical Constraints

The successful integration of AI in the education sector relies heavily on substantial financial support and the establishment of a strong technical foundation. Educational institutions must invest in advanced technology and software while also ensuring proper training for their staff members. Some educational establishments, especially those located in regions with limited resources, may need assistance in acquiring essential resources, which could potentially result in an increase in educational differences in terms of digital access.

Students who attend well-funded schools have the opportunity to benefit from enhanced educational experiences made by AI technology. However, students from less privileged backgrounds also need access to these resources. The significant gap in education technology may increase already existing inequalities in education, especially as society

becomes more reliant on technology and the digital divide becomes a serious issue. Moreover, the ongoing maintenance and updates required for AI systems can place a financial burden on educational institutions which can lead to a problem with sustaining such systems (Wei & Hindman, 2011). To prevent further deepening of preexisting disparities, educators must thoroughly assess budget and technological limitations before implementing AI.

3.1.4 Misuse

The use of AI, in the education sector is a matter of concern. While AI brings many benefits there is also the risk of students misusing it for misconduct, such as plagiarism, cheating in exams, and automating homework completion. Plagiarism detection software, which was previously beneficial for educators, can become problematic when students utilize AI techniques to evade detection. To address this challenge, educators and educational institutions need to adopt a sophisticated approach (Qin & Wang 2022). It is crucial to make initiatives that promote honesty and educate students about the responsible use of AI in order to tackle this issue in education.

3.2 Benefits of AI in Education

AI in education is a field full of promise that could transform teaching and learning through a range of advantages. There are several benefits when implementing AI into educational environments that go well beyond those associated with more conventional approaches (Chen et al., 2020). By addressing the various demands of both students and teachers, this technological advancement promises to make education more dynamic, effective, and responsive.

3.2.1 Personalized Education

The idea of personalized education brings about a significant change from the traditional standardized approach to learning, which responds to a wide range of individuals. The potential of AI to customize education based on the unique needs of learners has the power to revolutionize teaching and learning methods. Artificial intelligence systems consistently gather data on student performance, learning styles, and preferences (Owoc et al., 2019). This amount of information enables the development of personalized learning patterns, allowing for a customized selection of appropriate resources, tasks, and assessments for each student. Qin & Wang (2022) claim that for instance, if a student struggles with a

particular concept, they can receive additional practice exercises, while those who understand the concepts quickly may have access to more advanced materials. This adaptability ensures that students are appropriately challenged, resulting in improved comprehension and engagement. Implementing personalized education not only accommodates various learning styles but also promotes student responsibility and independence by giving them a greater sense of ownership over their educational journey.

3.2.2 Improved Assessment and Analysis of Student Performance

Traditional methods of evaluation, such as standardized tests and manual grading, have faced significant criticism due to their limitations. However, artificial intelligence offers a potential solution by providing automated grading and real-time performance analysis (Pedro et al., 2019). Automated grading systems have the advantage of evaluating a wide range of assignments, from multiple-choice questions to complex problem-solving tasks. This technology greatly speeds up the evaluation process, allowing educators to devote more time to teaching activities and providing support to students (Luckin & Holmes, 2019). Furthermore, automated grading systems help reduce human bias and promote a more consistent and fair evaluation process.

On the other hand, AI-powered analytics offer a comprehensive view of student's academic achievements. According to Qin & Wang (2022), educators cannot only track academic scores but also identify learning patterns, detect performance trends, and pinpoint areas where students may struggle. With this data, educators can adapt their teaching approaches, provide targeted assistance, and identify areas for improvement. Consequently, using this data-focused approach enhances the quality of education by enabling teachers to make timely decisions based on data, which positively impacts student accomplishments.

3.2.3 Streamlined School Administration

The importance of AI in managing schools cannot be overstated. Educational institutions often face labor-intensive administrative tasks that are prone to errors and consume a lot of time when done manually. AI technologies play a crucial role in streamlining and automating these operations. Scheduling can be a complex process with various complications and constraints. AI-powered scheduling algorithms excel at creating optimized timetables that consider factors like classroom availability, teacher preferences, and student requirements (Qin & Wang, 2022). This not only simplifies the procedure but

also ensures efficient resource allocation. Artificial intelligence also brings benefits to enrolment management (Qin & Wang, 2022). Intelligent enrolment systems effectively match students with courses that align with their individual preferences and abilities, ensuring their educational path aligns with their interests and skills.

Moreover, the use of artificial intelligence in digital record-keeping improves the efficiency of managing student data, making it easily accessible while reducing the chances of inaccuracies. The result is an administration characterized by increased efficiency and reliance on data, leading to fewer logistical challenges and better resource management. As a result, this improves the overall standard of education and enhances the learning experience for students and teachers alike.

4. Credibility of AI in Education

As can be seen from the chart the two main reasons why students and teachers use AI right after educational purposes are generation of content and searching for source materials. Both answers rely heavily on the credibility of the AI. That is why this topic needs to be discussed.

The multilayered problem of AI credibility in the education field encompasses many other sub-factors, including the dependability of presented information, the transparency of algorithms, and the fidelity of data resources. The authenticity of AI platforms in education is that they can give up-to-date and accurate information and then enrich the users with knowledge that is entirely based on the writings that come from credible educational institutions, authorized peer-reviewed journals, and educational authorities (Gill et al., 2024). What is more, transparency is important in ensuring that AI-based educational technologies meet their destination. Users must know the processes and methodologies behind AI systems to be able to assess the true outcomes of proper data generation, validation, and visualization. With integrity, thoroughness can be ensured, which allows for the identification and correction of the cracks, if any, that can develop in the machine learning system. Interestingly, the value of AI in education is added to the fact that, with the assistance of AI, teachers can individualize the instruction and give the students a learning experience that will be customized for them (Nazaretsky et al., 2022). Large databases of learning types, cognitive skills, and learning effectiveness can support AI as predictors, enabling it to adjust educational content and techniques to maximize interaction, assimilation, and information retention. Nevertheless, the dominance of biases in AI algorithms is an essential problem, and this problem should be the major objective of efforts to bridge the inequities and promote equity in educational outcomes.

4.1 Quality of Generated Content

Many factors affect the ability of AI to produce educational materials, including the previously mentioned advancement of NLP algorithms, the amount and quality of available data, and the involvement of human teachers who give suggestions. AI generates material that is cohesive, accurate and matches the subject matter of the teaching content, learning standards, and instruction goals. Thus, the quality of AI-generated content improves along with the growth of AI technology such as pre-trained language models, semantic

comprehension, and context sensitivity (Cao et al., 2023). With these upgrades in AI, AI-made educational materials can see much promise in terms of quality and success. Nevertheless, the right to be critical, creative, and solution-driven should prevail, and, therefore, human regulation will still be indispensable. However, while AI can manage content production and distribution, it cannot replace the human factors of teachers in their role as evaluators of the educational value and impact of AI-generated materials.

4.2 Data Collection in Education

The data collection concept in education is broad and includes elements like student demographics, academic performance metrics, learning patterns, and feedback mechanisms. AI draws data for awareness, individuality, and tracking. Evidence-based education policies guarantee the constant development of teaching and learning skills (Dhara et al., 2022). Specifically, educational data needs to be ethically collected to protect non-student privacy, autonomy, and confidentiality. It is imperative to have simple and established standards of data acquisition, storage, and usage that strictly go beyond regulations and ethical standards. Data collection and processing should be accountable and completely transparent regarding how the data is processed. By paying particular attention to ethical issues and secure data governance, AI-based educational technologies can benefit from data utilization in terms of a diverse number of contributors while guaranteeing their legal rights and welfare.

4.3 Future Development in Education

The path of AI in education has bright prospects for creating new methods of learning in the future while making the process accessible, open, and effective. The application of AI in education through machine learning, natural language processing, and the use of algorithms can only open ways for interactive, personalized, and individualized learning platforms responding to the features and needs of different younger generation learners (Maghsudi et al., 2021). Furthermore, AI in educational platforms is useful because you can get ongoing feedback, add individual information, use limitless internet resources to acquire some literature, and so on. Students can have customized technological tools at their disposal, which can be in the form of different routes for individual learners, simulative items with interactive characteristics, and diverse emergence mechanisms for those who have different cognitive powers and personality traits. In this way, students can reach their educational goals and objectives in a unique, individualized way. The digital divide, which is a lack of access to

technology, algorithmic bias, ethical dilemmas, as well as social and cultural consequences, and the barriers regarding the initiation of AI-based educational innovations in the learning process for everyone of any background or position, is a very sensitive problem that should be solved while advancing the features (Bulathwela et al. 2004). Hence, bias in algorithms is to be checked, diversification of data sets to represent more learners is required, and safeguards have to be in place to ensure that there are no discriminatory outcomes or stereotype perpetuation. In addition, ethical frameworks and guidelines ought to be formulated for the creation and implementation of AI technologies in education, covering principles like transparency, accountability, fairness, and privacy.

Ethical considerations and the responsible use of AI will, in the long run, equip educators with the necessary skills to reinforce learning and create diverse and fair educational opportunities globally. The future application of AI in education development promises an outstanding introduction of new approaches and methods to instruction and training, will enable more people to get an education, and will promote lifelong learning. However, transforming this potential into tangible benefits is a complex task that requires appropriate mitigation strategies for ethical, technical, and socio-cultural factors to uphold the principles of equity, inclusion, and responsibility. Taking up the ethical and responsible use of AI will help educators and policymakers use its transformative ability to make the educational landscape more inclusive, accessible, and effective, not only for the minority population but for many learners as well (Miao et al., 2021).

5. AI's usage analysis in specific fields of study and application across educational levels

5.1 Healthcare

In the healthcare sector, AI is transforming practices at all educational levels. Medical schools and research institutions in higher education use AI for advanced data analysis, drug discovery, and personalized medicine research, enhancing medical training and fundamental scientific understanding (Johnson et al., 2021). At the secondary level, students are introduced to AI concepts such as AI principles, bioinformatics, and medical imaging analysis during the course so that they can build a solid foundation for future healthcare professionals. Even at the primary school level, basic health education programs incorporate AI ideas, which introduce students to the role technology plays in healthcare and later nurture curiosity and awareness.

5.2 Finance

AI begins to be felt in finance at the primary education level and keeps being a career changer even at the higher education level. At the higher education level, finance and economics departments implement AI to power algorithmic trading, risk assessment, fraud detection, and market analysis, exposing students to the field of finance instead of preparing them for jobs (Boobier, 2020). Secondary education teaches students about common monetary concepts and AI applications, equipping them with a fundamental understanding of how AI is transforming financial systems. In primary education itself, financial literacy programs teach the use of AI features such as online banking, online payments, and fraud detection systems, among others, which are building blocks of financial awareness.

5.3 Engineering

Engineering education and AI are inseparable in higher and formal education. AI is vital in the higher education field, particularly in mechanical, civil, and electrical engineering, where it enhances design optimization, predictive maintenance, and the creation of autonomous systems, bringing about the advancement of engineering. The secondary level offers students basic AI concepts, accompanied by practical applications such as robotics and computer-aided design, from which they can learn the foundations of engineering (Chiu et al., 2021). Teaching basic engineering concepts at the elementary level can incorporate AI-related

activities such as programming simple robots and explaining automated ones, thereby engaging young learners.

5.4 Language and Linguistics

AI has a great influence on language education and linguistics as it improves the learning process on various levels. In higher education, AI is utilized for linguistic analysis, which involves NLP, sentiment analysis, and machine translation; thus, the boundaries of language are pushed forward (Wang et al., 2023). At the upper secondary level, curricula in language and linguistics adopt AI and include NLP algorithms, machine translation, and speech recognition technologies to make the insights of linguistic studies more vibrant. The secondary level of language education, for example, already pulls the students in through interactive apps, voice assistants, or translation tools so that they can have more fun and easier access to language learning.

5.5 Environmental Science

AI is used at all levels of environmental science education, from primary education to higher education. In environmental research in higher education, AI applications help in data analysis, climate modeling, and natural disaster prediction to improve the level of understanding and readiness. According to Fan et al. (2023), the role of AI at the secondary level is to teach applications such as remote sensing and GIS analysis, thereby improving students' views of environmental systems. At the elementary level, basic environmental learning has AI applications such as wildlife monitoring through image diagnosis and air pollutant monitoring through data analysis, which makes children aware of the environment from kindergarten.

5.6 Faculties Benefiting Most from AI

The incorporation of AI in many sectors opens up immense possibilities for streamlining work processes and improving outcomes by transforming operations. According to George and George (2023), the departments that will be positively affected the most by AI are healthcare, finance, education, and customer service. The production of AI provides several benefits for manufacturing, such as the ability to optimize production processes, predict maintenance needs, ensure quality control, and streamline supply chain management using increased efficiency and cost savings. AI-powered chatbots and virtual assistants are

key players in many customer services, including providing recommendations, helping to satisfy customers, and streamlining support processes. As a result, this has a positive impact on customer satisfaction and response time.

Integrated AI in each of these domains indicates a big leap in the fields of effectiveness, prosperity, and dissemination of innovations. Autonomous vehicles and route optimization, along with traffic management systems, are the areas where AI can do a great revolution in transportation operations, leading to a safe and well-organized transportation network. AI can be one of the tools used in agriculture for crop monitoring, precision farming, and predictive analytics, among other techniques that will optimize yields while minimizing resource utilization and environmental impacts. Beyond this, the area of cybersecurity stands to gain a lot from AI use in the sense that it can identify and respond to cyber threats as they occur, hence strengthening defenses and data protection. Moreover, machine learning can do a lot of things in research and development for many industries by analyzing data, running complex simulations, and even finding new information or inventions that can stimulate the development of these industries (Cioffi et al., 2020). Along with the automation of AI across a multifaceted class of fields, it is anticipated that the life-changing experiences of breakthroughs at new levels of efficiency, productivity, and advancement will be the result.

6. Survey

As mentioned before AI is increasingly finding its way into various aspects of society, including education. Teachers and researchers continue to explore how AI can enhance teaching and students' experiences as technology advances. By conducting a comprehensive survey, we gain insights into the perceptions and experiences of both students and teachers regarding AI in education.

6.1 Methodology

This part is concerned with the method used to conduct the questionnaire. The survey was in online form, where the participants had to choose between different answers or fill in some text. The survey was completely anonymous, and it was distributed via email, direct link, or QR code. Also, the survey was conducted in the Czech language to avoid any misinterpretations. The only requirement for the respondents to participate in the survey for students was to be actively studying in high school or university and for teachers to be actively teaching at any education level.

6.1.1 Survey form

The survey consisted of multiple-choice questions, Likert scale ratings, and open-ended text responses. Multiple-choice questions allowed respondents to select from a range of predefined answers, providing structured data on specific aspects of AI in education. Likert scale questions, ranging from 1 to 5, gauged the intensity of respondents' attitudes and experiences, with 1 representing the most negative and 5 the most positive. Open-ended questions enabled participants to elaborate on their answers, offering deeper insights into their perceptions and experiences with AI.

6.1.2 Respondents

As mentioned before, the participants were people who are still active in education settings. The total amount of respondents was 124 people, The student survey features 69 respondents whose age ranges from 16 years to 23 years as illustrated in Figure 1. The student respondents were predominantly aged between 16 and 19 years, accounting for 40 individuals. This age group is often more adaptable and open to new technologies, including AI. The next largest group was those aged 20 to 23 years, with 26 respondents. Only three

students were older than 23, and none were younger than 15, as younger students were excluded due to a lack of experience with AI.
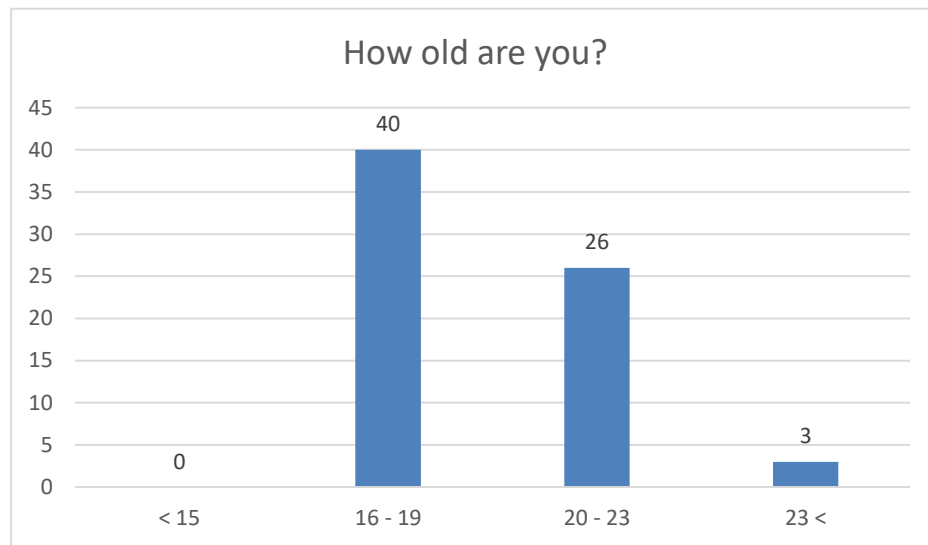

Fig. 1 Age (students)

On the other hand, the teacher survey features 55 respondents whose ages range from less than 26 years to more than 55 years, as illustrated in Figure 2. Teacher respondents had a wider age range, with the majority being between 45 and 55 years (22 respondents). The majority of teachers, being older, may be less familiar with new AI technologies and could show more resistance when adopting AI into their teachings or require more training as their opinion on AI tends to be more negative than their colleagues. Younger teachers under 36 indicate that their opinion of AI is not as negative. The reason could be that younger teachers are typically more tech-savvy.
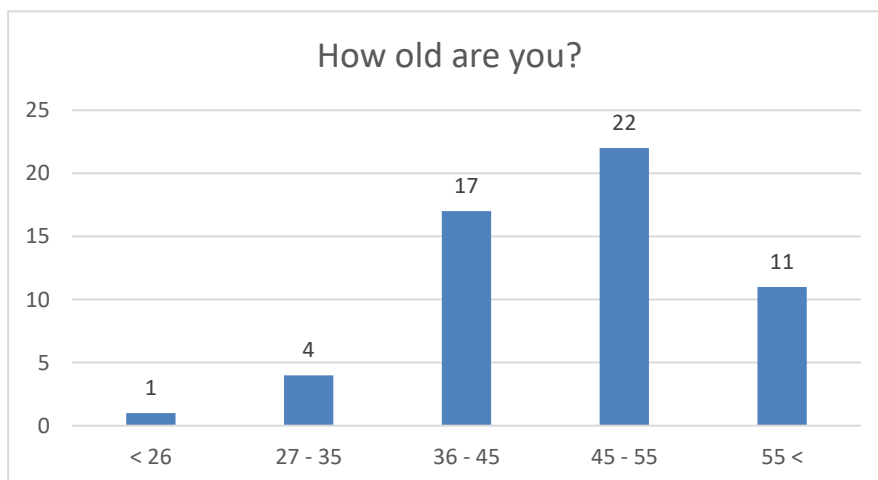
Fig. 2 Age (teachers)

The school categories in the two surveys are vocational secondary school, university, gymnasium, higher vocational school, elementary, and others; as illustrated by Figures 3 and 4. The student survey shows that the majority of the respondents, specifically 42, are enrolled in vocational secondary school. Also, 24 respondents are in universities, 3 are enrolled in gymnasium, and no respondents study in higher vocational schools.

When it comes to the distribution of the survey among the students, the university respondents, most of them were students attending the Brno University of Technology, mainly the Faculty of Electrical Engineering and Communication, and the Faculty of Mechanical Engineering. With some exceptions, attending Masaryk University, Faculty of Education. The majority of students attend a vocational school specifically Gustav Habrman Technical High School in Česká Třebová. Most of the students attend technical schools, which was the intention of the survey as they have more experience using AI in school settings.
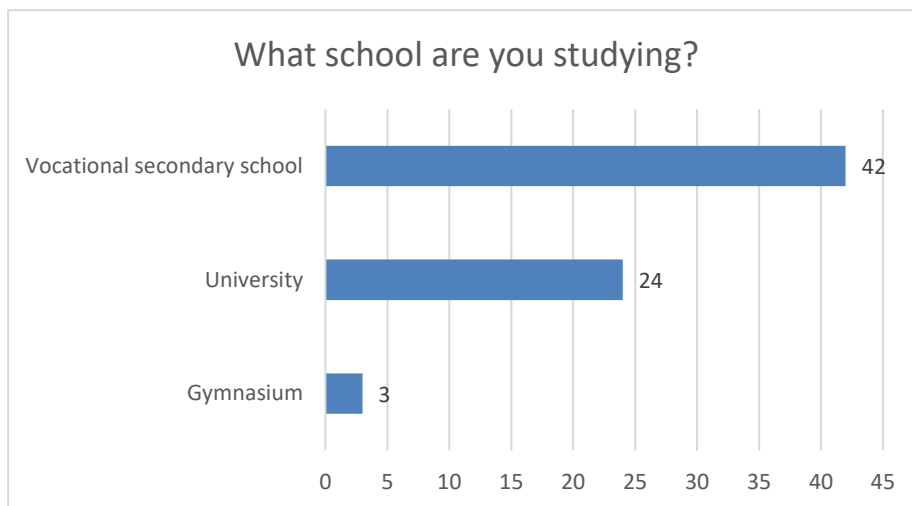
Fig. 3 School attended (students)

Similar to the student survey, the majority of the respondents teach in vocational secondary schools. However, the teacher survey features an extra category, the elementary school where 17 educators teach. In addition, 16 respondents teach in universities while no respondent teaches in any of the following survey categories: higher vocational school, gymnasium, and other. The inclusion of elementary school educators in the teacher survey demonstrates that it is broader compared to the student survey. Most of the teachers were attending the same school as the students. The only exception is the previously mentioned inclusion of elementary schools which mainly consist of teachers from the Elementary School

of Art Lomnice. The inclusion of elementary school teachers ensures that the survey presents a wide perspective of AI integration at all levels of learning. This expands the research to cover the perceptions and uses of AI from its application in the initial stages of learning to its utilization in advanced levels of higher education.
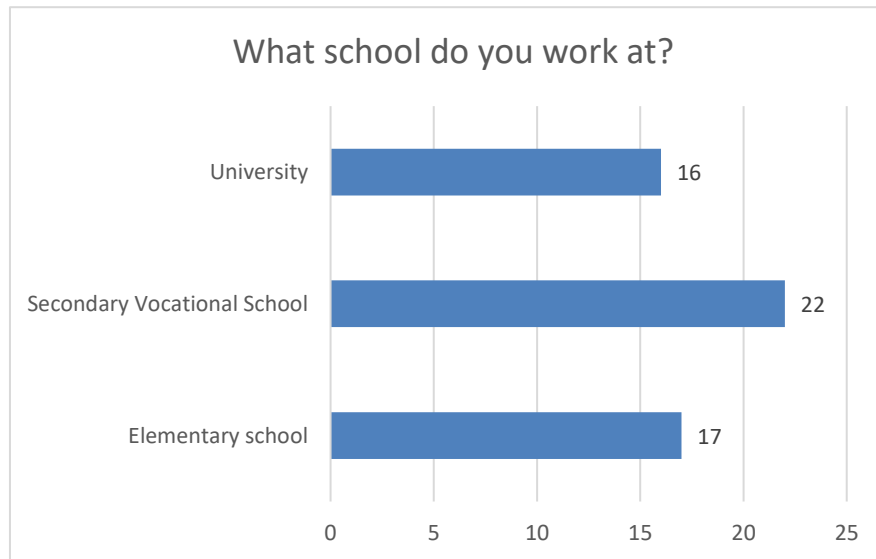

Fig. 4 School attended (teachers)

6.2 Survey results

This analysis intends to evaluate the survey results retrieved from the participants and compare them to research on the same topic research that already exists.

Figure 5 and Figure 6, show that the two surveys assess the respondents' attitudes towards artificial intelligence in education. The survey results indicate that students generally have a positive attitude towards AI, with 39 respondents being positive and 8 very positive. Only a few students had negative or very negative attitudes.
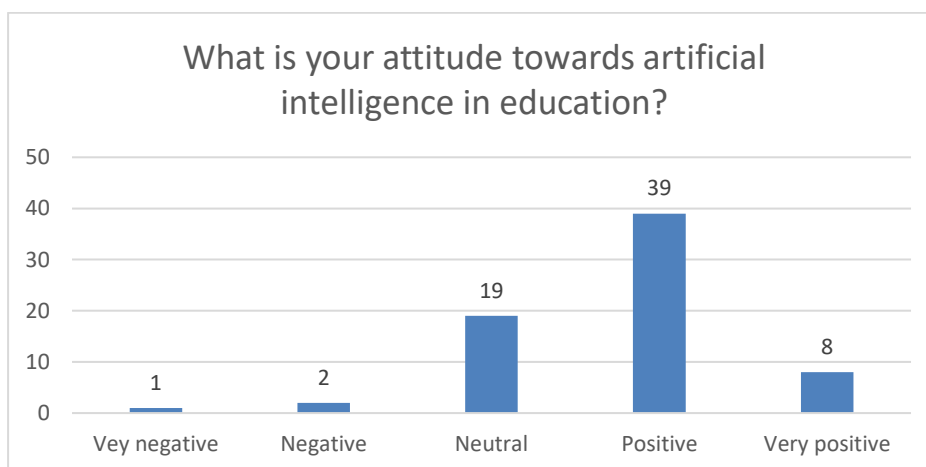
Fig. 5 Attitude towards AI (students)

On the other hand, teachers showed more neutral or negative attitudes towards AI. While 29 were neutral and 19 positive, a notable number were negative or very negative. This caution among teachers can be linked to concerns about the practical implementation of AI in classrooms, its impact on their teaching methods, and the need for additional training. These findings align with Celik et al. (2022), who highlighted teachers' apprehensions regarding AI integration. To address this, educational institutions should implement programs that not only teach the technical skills required to use AI but also emphasize the pedagogical benefits. Workshops, hands-on training, and success stories from early adopters can help mitigate fears and resistance. Additionally, fostering a collaborative environment where teachers can share their experiences and learn from each other could accelerate the acceptance and effective use of AI in classrooms.
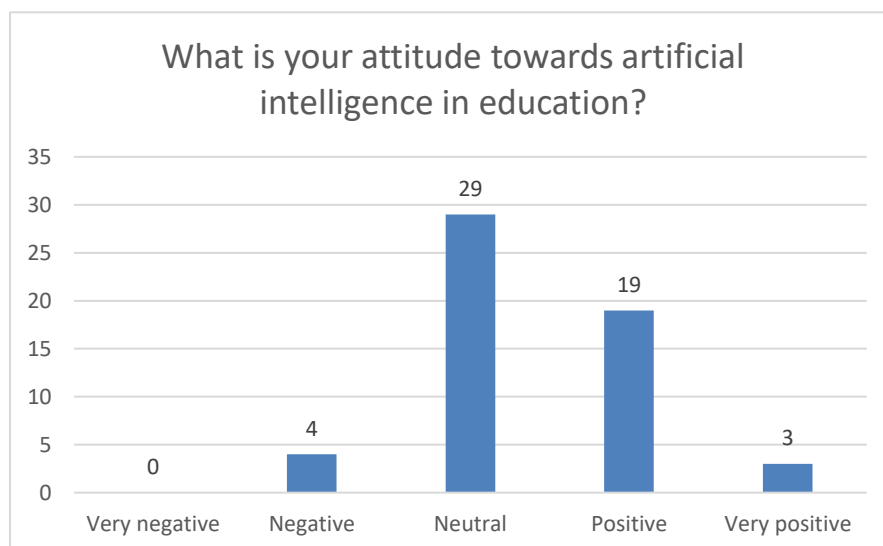
Fig. 6 Attitude towards AI (teachers)

In Figure 7, the surveys assess the respondents' frequency of using AI. The frequency of AI usage among students indicates a higher familiarity and comfort with AI tools. Specifically, 38 students used AI several times a month, 15 several times a week, and 7 daily. Only 9 students had never used or stopped using AI. Among these 9 students, the main reasons for not using AI were "I do not need it" and "Our school does not allow it," indicating that significant barriers to AI adoption include the lack of necessity and institutional restrictions. This frequent usage can be attributed to the integration of AI into various educational tools and platforms, facilitating their studies and assignments. Ofosu-Ampong et al. (2023) found that students often use AI to assist with academic tasks, which contributes to their positive perception of AI.
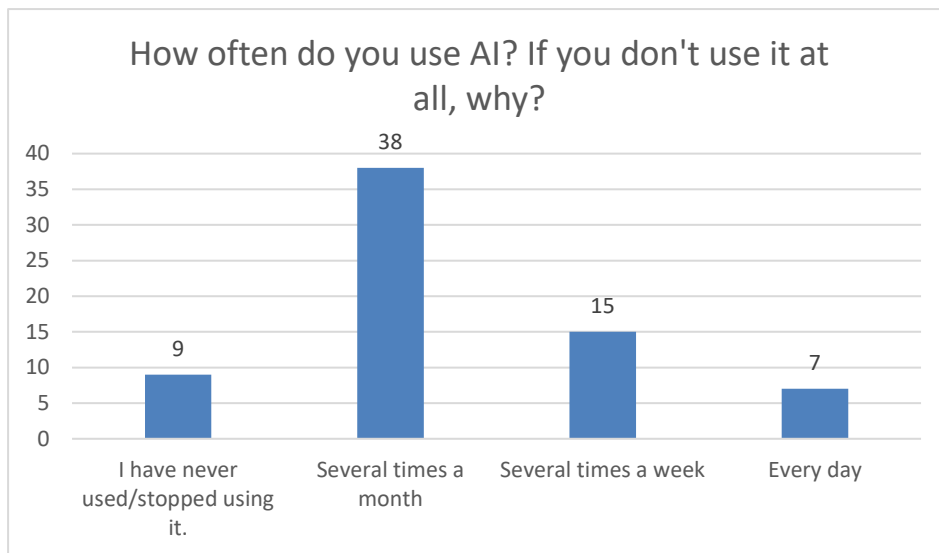
Fig. 7 Frequency of usage (students)

Teachers, however, reported lower usage frequencies, with 23 using AI several times a month, 16 several times a week, and only 1 daily. A significant number, 15, had never used or stopped using AI. This lower usage among teachers suggests a gap in familiarity and confidence in using AI tools as illustrated in Figure 8. The teacher survey shows varied patterns of AI usage among educators; the usage among these respondents is significantly low compared to the learners. Therefore, an inference may be made that younger individuals are more familiar and comfortable with AI technologies. To bridge this gap, schools should ensure that teachers have easy access to AI tools and resources. Regular training sessions tailored to different proficiency levels can help teachers integrate AI into their daily routines. Moreover, creating benefits for teachers who successfully incorporate AI into their teaching practices could motivate more educators to increase their AI usage. Establishing mentorship programs where more experienced teachers support their peers can also be beneficial.
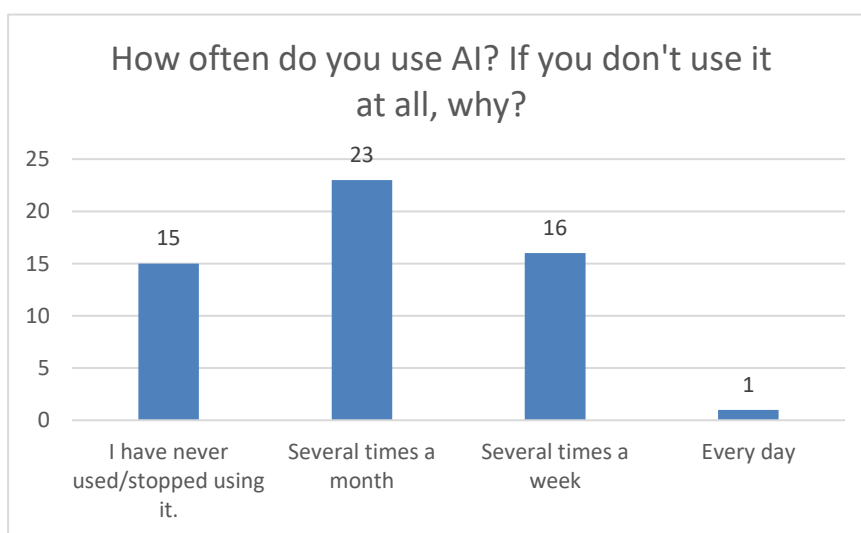
Fig. 8 Frequency of usage (teachers)

The survey results in Figures 9 and 10 show, that the majority of respondents use AI primarily for educational purposes, with 37 students and 21 teachers indicating this as their main use.

Students reported that after educational purposes, their most common uses for AI were content generation and searching for source materials. AI-assisted content generation and source finding significantly simplify students' academic tasks by providing information quickly and efficiently, which is crucial for their learning processes. The ability to generate content and find sources rapidly reduces the time and effort required to search for information manually.

Programming and text translation were less commonly reported uses of AI among students. The low usage for text translation could be because existing web translators are sufficient for simple translations, and AI is not yet advanced enough to handle more complex texts, such as rhyming poems or idiomatic expressions that require contextual understanding. Similarly, the low usage for programming may be due to AI's current limitations in understanding complex inputs and generating functional code reliably.

Teachers also indicated that their primary use of AI was for educational purposes, followed by content generation and searching for source materials. This reflects a similar pattern to students, highlighting AI's role in facilitating teaching and research activities.

Some respondents mentioned using AI for other purposes, such as verifying information, correcting grammar, providing inspiration, and simplifying explanations of complex problems.
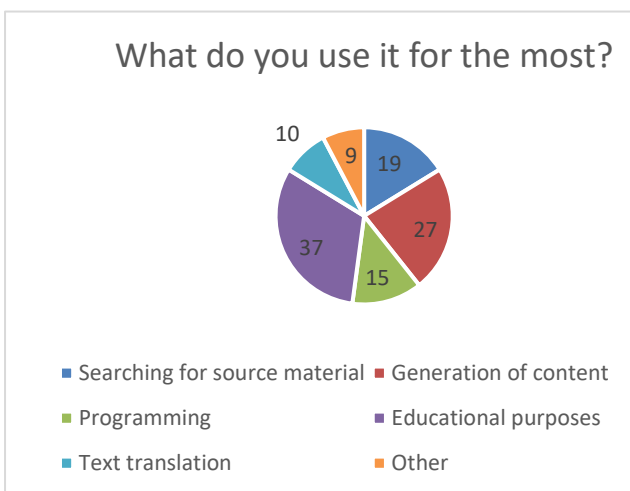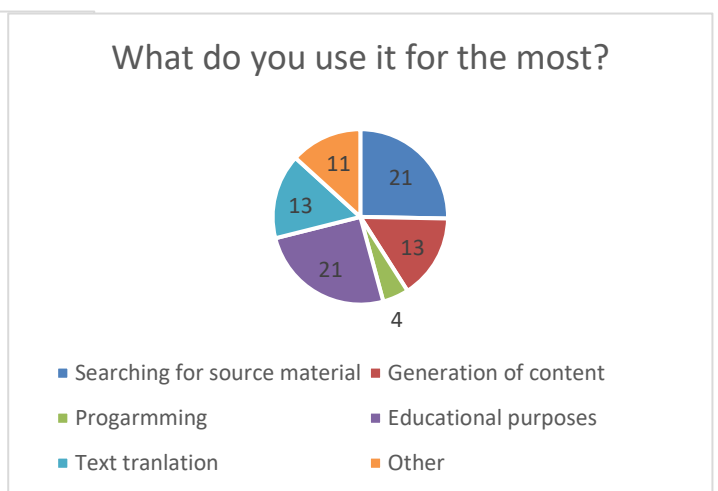

Fig. 9 Usage (students)   Fig. 10 Usage (teachers)

Respondents in the two surveys express varied opinions on whether AI should be incorporated into the education system. Figures 11 and 12 show that the majority of the respondents support the incorporation of AI into the education system with teachers being more hesitant.

Generally, students are more familiar with and exposed to technology. They use AI daily through voice assistants (like Siri and Alexa), recommendation systems (like Netflix and Spotify), and educational tools (like Duolingo and Grammarly). They might see AI as a natural progression in the integration of technology into education, making learning more interactive, personalized, and engaging. Their positive responses could be driven by their comfort and excitement about using AI tools. However, teachers might have a more cautious approach to integrating new technology. Their different reactions show uncertainties about how AI would necessarily change their ways of teaching, the workload in their departments, and their general process of learning. Concerns about the effectiveness and reliability of AI could also be on their minds.
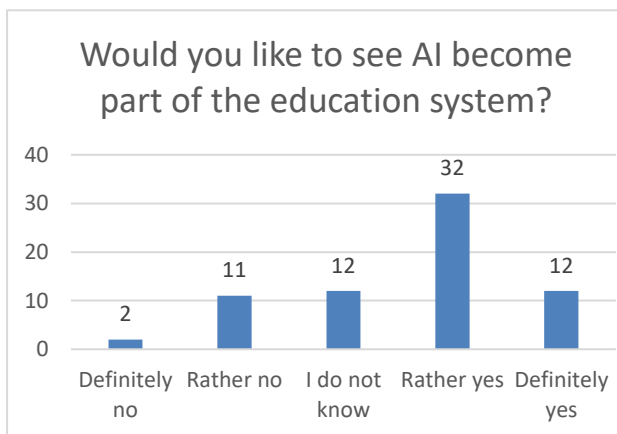

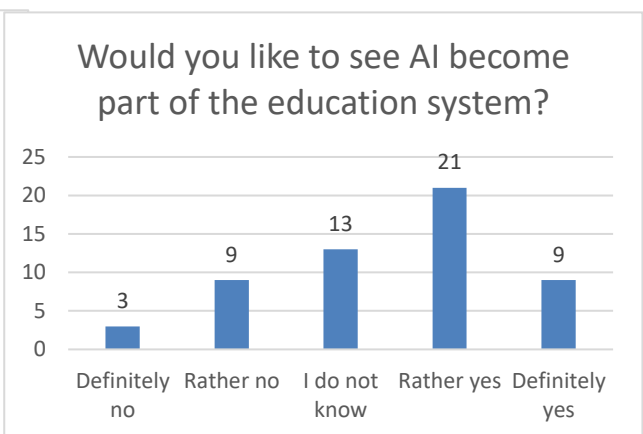*Fig. 11 AI being part of education (students)*   *Fig. 12 AI being part of education (teachers)*

Respondents in the two surveys express different opinions on AI as a credible source. The assessment metrics for this part are rather no, rather yes, I do not know, definitely no, and definitely yes, as illustrated in Figures 13 and 14. Students viewed AI as more credible compared to teachers, with 29 considering it a credible source and 4 strongly believing in its credibility. Only 1 student strongly doubted AI's credibility, while 20 were skeptical.

Nonetheless, teachers showed significant reservations about AI's credibility. While 16 considered AI credible, a similar number of 17 were skeptical, and 16 were unsure. Only 2 teachers strongly believed in AI's credibility, while 4 strongly doubted it. This skepticism is

consistent with findings from Idroes et al. (2023) and Celik et al. (2022), who noted that teachers often question the reliability and ethical use of AI, highlighting the need for more robust evidence and clear guidelines on AI's effectiveness in education.

Teachers' skepticism about AI's credibility highlights a need for reliable, evidence-based information about AI. Educational institutions should provide research studies and reports showcasing AI's effectiveness and reliability in educational contexts. Partnering with AI developers to provide detailed explanations of how AI systems ensure accuracy and handle data ethically could also build trust. Regular updates and continuous professional development on the latest AI advancements and best practices will help keep teachers informed and confident in using AI as a credible resource.
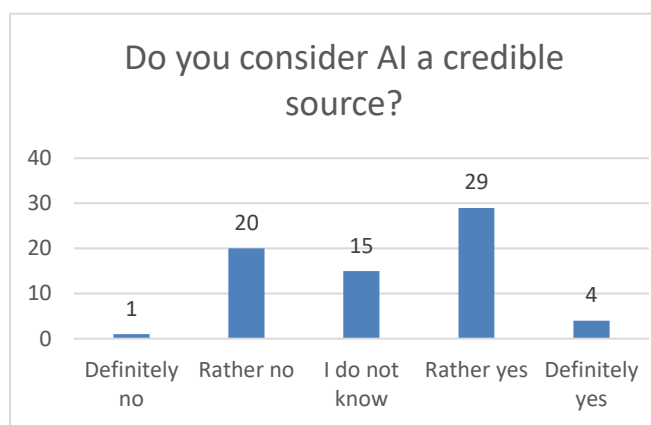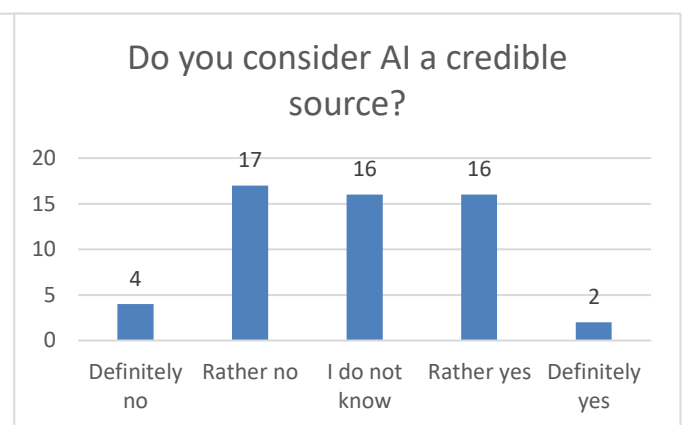

Fig. 13 Credibility of AI (students)

Fig. 14 Credibility of AI (teachers)

According to Figures 15 and 16, both groups largely opposed abolishing thesis writing, recognizing its role in developing critical thinking and original research skills. Among students, 25 rather disagreed, and 10 disagreed with abolishing thesis writing. Teachers exhibited similar opposition, with 23 rather disagreeing and 16 disagreeing.

The main reasons given were the development of critical thinking of students and the inability of AI to mimic human knowledge, creativity, and intuition. Not only does this test students' abilities in reading comprehension, analysis, and inference but it also allows students to take responsibility for their research projects and pursue their intellectual interests. Unlike structured assignments or standardized tests, thesis writing allows students to explore topics that resonate with their passions and curiosity. AI could also become part of the assignment. For example, students could use AI tools to gather data and perform initial analysis but still be required to demonstrate critical thinking and original insight in their final reports. This approach can uphold academic standards while utilizing AI's strengths.
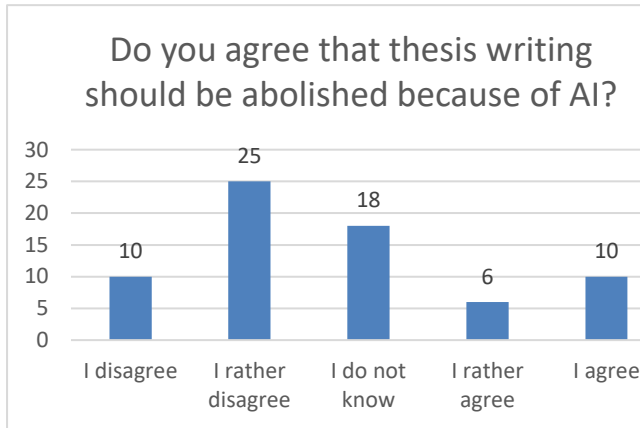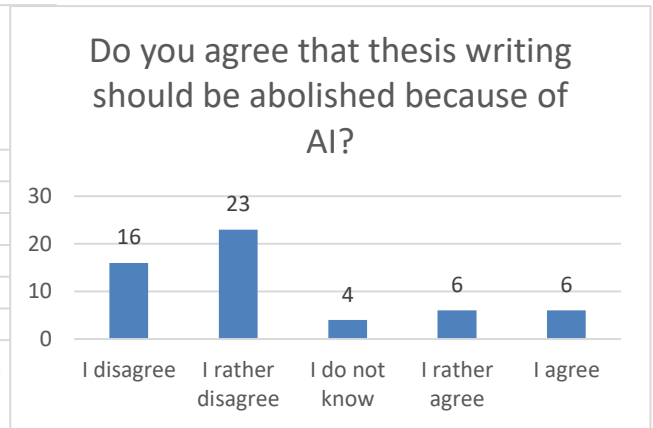
Fig. 15 Abolishment of thesis writing (students)

Fig. 16 Abolishment of thesis writing (teachers)

As illustrated in Figures 17 and 18 both students and teachers supported the incorporation of AI courses, emphasizing the need for structured AI education. Teachers showed strong support, with 28 definitely yes and 28 rather yes responses. Among students, 23 definitely yes and 21 rather yes responses indicate a strong demand for formal AI training to enhance their skills and understanding. This aligns with Chen et al. (2023), who noted that structured AI courses can help students use AI's potential effectively.

The majority of the respondents see the course as important and necessary. Both students and teachers recognize the importance of AI training, indicating a strong alignment of interests. Effective AI training for teachers is likely to result in a more enriched and adaptive learning environment for students. Teachers equipped with AI skills can better address diverse learning needs, provide personalized feedback, and use AI to create more interactive and engaging lessons. Institutions can expect higher levels of engagement and cooperation from both parties, which results in smoother transitions to AI-supported education. The presence of negative responses indicates that some teachers find AI tools troublesome or ineffective, which can harm overall adoption. Conducting detailed assessments to identify specific pain points that make AI tools a burden for some teachers and also offering targeted training sessions to address these pain points and demonstrate effective usage strategies might help solve this issue.
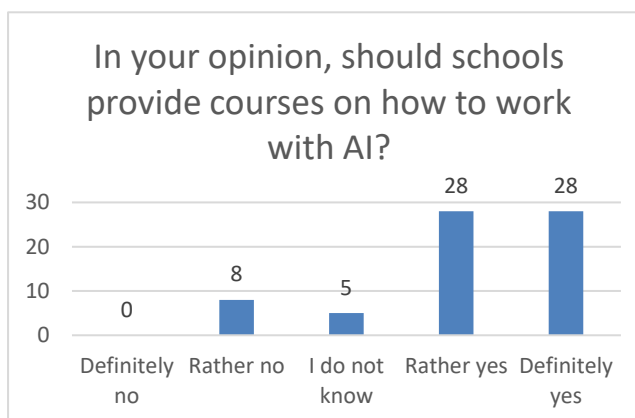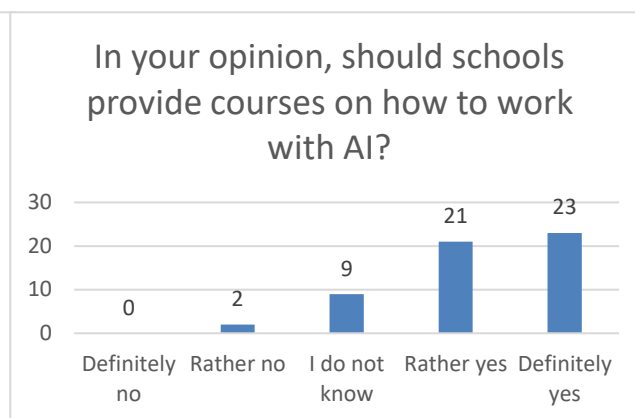
In your opinion, should schools provide courses on how to work with AI?

	Definitely no	Rather no	I do not know	Rather yes	Definitely yes
	0	8	5	28	28

Fig. 17 Staff training (students)

In your opinion, should schools provide courses on how to work with AI?

	Definitely no	Rather no	I do not know	Rather yes	Definitely yes
	0	2	9	21	23

Fig. 18 Staff training (teachers)

As seen in Figure 19, most students did not feel less motivated by AI, with 28 saying no and 17 definitely no. This suggests that AI tools are seen as neutral or positively impacting their motivation. However, 12 students felt that AI made them less motivated rather yes, indicating potential issues with how AI is being used or perceived.

Meanwhile, as depicted in Figure 20, teachers showed mixed feelings about AI's impact on their workload. While 17 were neutral, 9 found AI rather a burden, and 4 considered it definitely a burden. Conversely, 8 found AI rather a relief and 8 definitely a relief. The results illustrate the complex impact AI has on education. Students do not link AI to less motivation to learn while a substantial volume of teachers express a neutral stance on whether AI eases their job or work burden. The majority of students do not feel less motivated by AI, indicating that AI tools are either neutral or positively received in terms of their impact on motivation. This suggests that AI can be effectively integrated into students' learning processes without adversely affecting their motivation levels. On the other hand, a minority of students feel that AI makes them less motivated, which signals potential issues with how AI is being used or perceived by these students. This is a matter of concern when it comes to implementation. Providing clear explanations and demonstrations of how AI tools are intended to aid learning, possibly through lessons or workshops could help these students understand that AI is merely a helpful tool and nothing to be afraid of. Another example is creating a foster environment where students can ask questions and express concerns about AI, ensuring they feel comfortable and supported in using these tools.

A significant portion of teachers are neutral, indicating mixed feelings about whether AI makes their job easier or harder. This suggests that the impact of AI on teaching workflows is not yet clearly defined or felt consistent. A smaller group of teachers find AI makes their job easier, which can serve as positive case studies for promoting AI adoption.
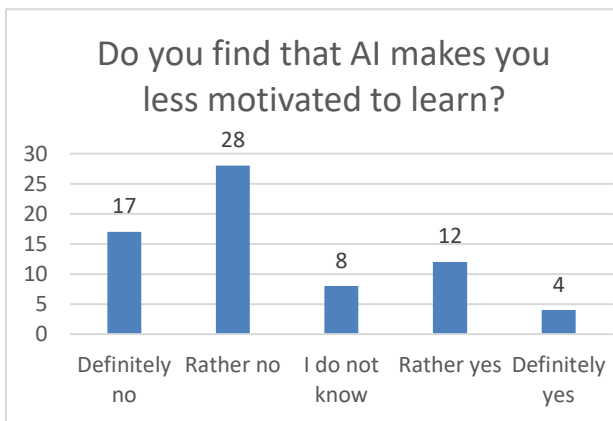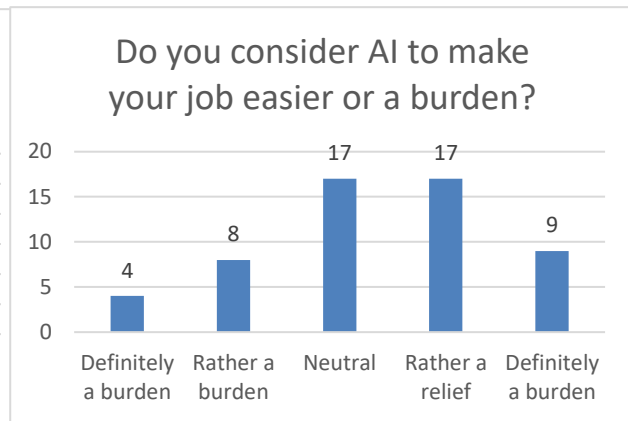
Fig. 19 Motivation and AI (students)

Fig. 20 Motivation and AI (teachers)

Figures 21 and 22 illustrate the results of students' and teachers' experiences of using AI within education. The results suggest that students have a better experience of using AI within education. 32 students, almost half of the sample, indicated their experience was good. On the other hand, approximately a quarter of the respondents, 15, in the teacher survey describe their experience as good. Very few students reported negative, showing overall satisfaction or at least tolerance. Teachers, however, reported more negative experiences, with 13 rating their experience as bad, and 3 as very bad.
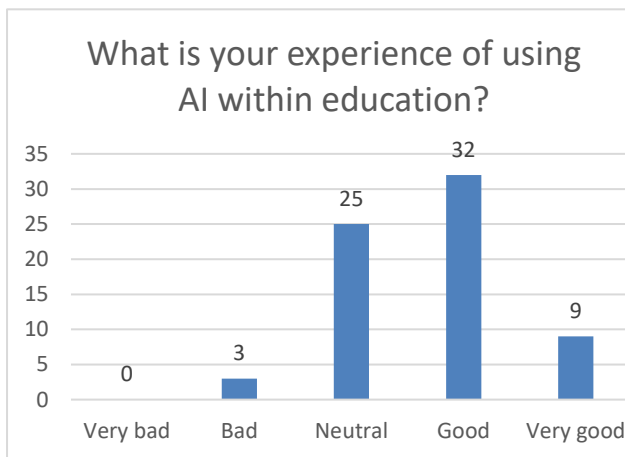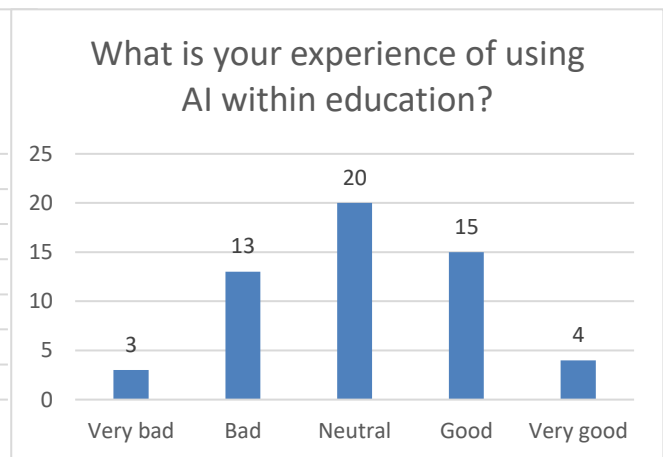

Fig. 21 Experience using AI (students)

Fig. 22 Experience using AI (teachers)

As demonstrated in Figures 23 and 24, both groups largely disagreed that AI makes certain activities unnecessary. Among students, 26 rather no and 19 definitely no responses indicate a recognition of the complementary role of AI in education rather than a replacement for human skills. This suggests that students value the importance of learning and understanding activities that AI can perform, highlighting a balanced perspective on AI's role in education. Similarly to students, teachers exhibited the same views, with 19 definitely no

and 15 rather no responses. This view reflects an understanding that while AI can assist in various tasks, it cannot replace the need for fundamental skills and knowledge.
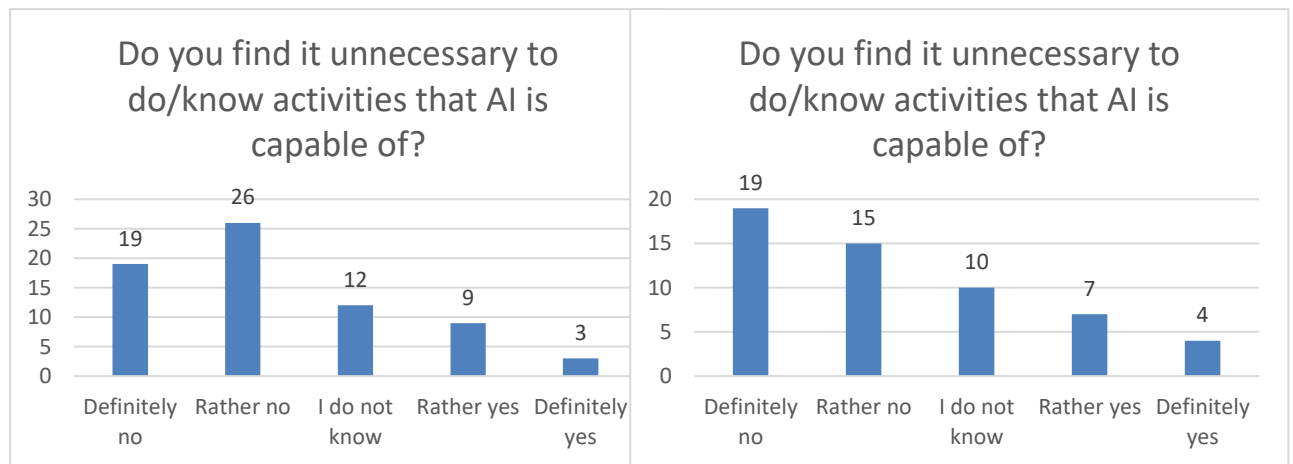

Fig. 23 Necessity of knowing things that AI can do (students) Fig. 24Necessity of knowing things that AI can do (teachers)

6.3 Comparison with Existing Surveys

Examining various studies and surveys about the implementation of AI in education would help develop a better understanding of the concerns and emotions of both teachers and learners.

6.3.1 Teacher's Perspective

Teachers have a mixed attitude towards AI in education across a wide spectrum, which shows their varied experiences and worries. Meanwhile, some teachers see AI as a useful tool to handle their office duties and improve educational outcomes, whereas others voice their concerns or doubt its capabilities (Idroes et al., 2023). Teachers truly worry about ethics and AI use, with plagiarism and authenticity being their primary concerns. In addition, teachers report challenges in incorporating AI into their teaching practices, stating difficulties in understanding how AI works and difficulties in integrating AI tools effectively (Celik et al., 2022). Despite the raised issues, the recognition of AI's potential effects in education emphasizes the need for increased education, training, and ethical guidelines to ensure the responsible implementation of AI in learning.

6.3.2 Student's Perspective

On the contrary, most students are likely to be more positive in their thoughts about AI in education, as they see it as a helpful tool that helps make education more enjoyable. Quite a few students also exploit AI in the educational sector as an assistant to facilitate

academic endeavors, generate content, and source information (Ofosu-Ampong et al., 2023). Though some students raise problems concerning the credibility of computer-generated content, most consider the use of AI in education to be somewhat honest and their experiences with it to be positive. However, students are not mindlessly optimistic, and they recognize the need for education and regulation regarding AI usage that will deal with challenges like plagiarism and originality. According to Chen et al. (2023), students perceive AI as a beneficial aid that will improve their learning processes, as long as they are aware of the obstacles and ethical questions connected with it.

6.4 Cross-Study Comparisons

Various studies and surveys conducted for teachers and students about AI in education report common aspects. People often raise ethical concerns about AI use, particularly about plagiarism and authenticity (Kooli, 2023). Moreover, there is an understanding that artificial intelligence can be useful in automating administrative work and enhancing content management. Meanwhile, there is an undeniable variety of views, with varying attitudes in addition to different experiences between distinct groups. However, everyone agrees on the importance of promoting education, and regulation to guarantee the full integration of AI into education (Le Borgne, 2024).

7. Conclusion

The integration of Artificial Intelligence in education is revolutionizing traditional teaching and learning methods by offering personalized, efficient, and adaptive educational experiences. AI's capabilities in analyzing vast amounts of data allow for tailored educational content that addresses individual student needs, thus creating a more inclusive and effective learning environment.

The theoretical foundations of AI highlight its evolution from theoretical concepts to practical applications, particularly in machine learning, natural language processing (NLP), and computer vision. These advancements have enabled AI to significantly influence various aspects of daily life, including education. Intelligent Tutoring Systems, Learning Analytics, and AI-enhanced virtual reality experiences exemplify AI's potential in education, leading to higher engagement levels and improved academic outcomes.

Despite its potential, AI in education faces several challenges. Ethical considerations and privacy protection are paramount as AI systems rely on vast amounts of student data. Ensuring data security and avoiding algorithmic biases are critical to maintaining fairness and trust in AI applications. Additionally, the acceptance of AI by educators and students is essential. While students generally have a positive attitude towards AI, teachers may require additional support and training to integrate AI effectively into their teaching practices. Financial and technical constraints, along with the potential misuse of AI, also pose significant challenges that need to be addressed.

AI offers numerous benefits, including personalized education, improved assessment and analysis of student performance, and streamlined school administration. AI's ability to provide customized learning experiences enhances student engagement and academic achievement. Automated grading systems and AI-powered analytics offer a more consistent and fair evaluation process, enabling educators to make data-driven decisions to improve teaching strategies. Furthermore, AI streamlines administrative tasks, optimizing resource allocation and reducing logistical challenges.

Survey results reveal a generational gap in the acceptance and usage of AI in education. Students are generally more positive and frequent users of AI compared to teachers, who may have mixed feelings about its impact on their workflow. This highlights

the need for continuous development and training for educators to bridge this gap and maximize the benefits of AI in educational settings.

The credibility of AI-generated content and the ethical considerations of data collection are crucial for its successful implementation. Ensuring transparency, accountability, and adherence to ethical standards in data usage and AI algorithms is essential for gaining trust and acceptance among educators and students.

The future development of AI in education promises to create more interactive, personalized, and accessible learning platforms. However, addressing the digital divide, algorithmic biases, and ethical dilemmas is critical to ensuring that AI technologies serve all learners equitably. Ethical frameworks and guidelines must be established to promote responsible AI usage in education, fostering an inclusive and effective learning environment.

In conclusion, AI has the potential to transform education by enhancing learning experiences, improving teaching methodologies, and streamlining administrative tasks. By addressing the challenges and leveraging the benefits, educators and policymakers can utilize the power of AI to create a more inclusive, accessible, and effective educational landscape for all learners.

List of references

- Banerjee, A., Lamrani, I., Hossain, S., Paudyal, P., & Gupta, S. K. S. (2020). AI Enabled Tutor for Accessible Training. In I. I. Bittencourt, M. Cukurova, K. Muldner, R. Luckin, & E. Millán (Eds.), *Artificial Intelligence in Education* (Vol. 12163, 29-42). Springer International Publishing.

From https://link.springer.com/book/10.1007/978-3-030-52237-7

- Boobier, T. (2020). Machine Learning AI and Apps. *AI and the Future of Banking* (pp. 93-113). John Wiley & Sons.

From https://dokumen.pub/ai-and-the-future-of-banking-9781119596134-1119596130.html

- Borenstein, J., & Howard, A. (2021). Emerging challenges in AI and the need for AI ethics education. *AI and Ethics*, Vol. 1, 61-65.

From https://link.springer.com/article/10.1007/s43681-020-00002-7

- Bulathwela, S., Pérez-Ortiz, M., Holloway, C., Cukurova, M., & Shawe-Taylor, J. (2024). Artificial Intelligence Alone Will Not Democratize Education: On Educational Inequality, Techno-Solutionism, and Inclusive Tools. *Sustainability*, Vol. 16, No. 2, p.781.

From https://www.mdpi.com/2071-1050/16/2/781

- Cao, Y., Li, S., Liu, Y., Yan, Z., Dai, Y., Yu, P. S., & Sun, L. (2023). A comprehensive survey of AI-generated content (AIGC): A history of generative AI from gan to chatbot. *Journal of the Association for Computing Machinery,* Vol. 37, No. 4

From https://arxiv.org/pdf/2303.04226.pdf

- Celik, I., Muhterem Dindar, Hanni Muukkonen, & Sanna Järvelä. (2022). The Promises and Challenges of Artificial Intelligence for Teachers: A Systematic Review of Research. *TechTrends*, Vol. 66, No. 4, 616–630. Springer International Publishing

From https://rdcu.be/dC5yc

- Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *Ieee Access*, Vol. *8*, 75264-75278.

From https://ieeexplore.ieee.org/document/9069875/metrics#metrics

- Chen, Y., Jensen, S., Albert, L. J., Gupta, S., & Lee, T. (2023). Artificial intelligence (AI) student assistants in the classroom: designing chatbots to support student success. *Information Systems Frontiers*, Vol. 25, No. 1, 161–182. Springer International Publishing

From https://rdcu.be/dC6IB

• Chiu, T. K., Meng, H., Chai, C. S., King, I., Wong, S., & Yam, Y. (2021). Creation and evaluation of a pretertiary artificial intelligence (AI) curriculum. *IEEE Transactions on Education*, Vol. 65, No. 1, 30-39.

From https://arxiv.org/ftp/arxiv/papers/2101/2101.07570.pdf

• Cioffi, R., Travaglioni, M., Piscitelli, G., Petrillo, A., & De Felice, F. (2020). Artificial intelligence and machine learning applications in smart production: progress, trends, and directions. *Sustainability*, Vol. 12, No. 2, p. 492.

From https://www.mdpi.com/2071-1050/12/2/492

• Del Bonifro, Gabbrielli, Lisanti a Zingaro (2020). Student dropout prediction. In I. I. Bittencourt, M. Cukurova, K. Muldner, R. Luckin, & E. Millán (Eds.), *Artificial Intelligence in Education* Vol. 12163, 129-140. Springer International Publishing.

From https://link.springer.com/book/10.1007/978-3-030-52237-7

• Dhara, S., Chatterjee, S., Chaudhuri, R., Goswami, A., & Ghosh, S. K. (2022). Artificial Intelligence in Assessment of Students' Performance. In *Artificial Intelligence in Higher Education* (pp. 153–167). CRC Press.

From

https://www.researchgate.net/publication/361861919_Artificial_Intelligence_in_Assessment_of_Students%27_Performance

• Effenberger, T., & Pelánek, R. (2020). Impact of Methodological Choices on the Evaluation of Student Models. In I. I. Bittencourt, M. Cukurova, K. Muldner, R. Luckin, & E. Millán (Eds.), *Artificial Intelligence in Education* (Vol. 12163,153-164). Springer International Publishing.

From https://link.springer.com/book/10.1007/978-3-030-52237-7

• Fan, Z., Yan, Z., & Wen, S. (2023). Deep learning and artificial intelligence in sustainability: a review of SDGs, renewable energy, and environmental health. *Sustainability*, Vol. 15, No. 18, 13493.

From https://www.mdpi.com/2071-1050/15/18/13493

• Flasiński, M. (2016). History of Artificial Intelligence. In *Introduction to Artificial Intelligence* (pp. 3-13). Springer, Cham

From https://rdcu.be/dIesV

• George, A. S., & George, A. H. (2023). A review of ChatGPT AI's impact on several business sectors. *Partners Universal International Innovation Journal*, Vol. 1, No. 1, 9–23.

From

https://www.researchgate.net/publication/368662952_A_Review_of_ChatGPT_AI%27s_Impact_on_Several_Business_Sectors

• Gill, S. S., Xu, M., Patros, P., Wu, H., Kaur, R., Kaur, K.,... & Buyya, R. (2024). Transformative effects of ChatGPT on modern education: the Emerging Era of AI Chatbots. *Internet of Things and Cyber-Physical Systems*, Vol. 4, 19–23.

From https://www.sciencedirect.com/science/article/pii/S2667345223000354

• Halili, S. H. (2019). Technological advancements in education 4.0. *The Online Journal of Distance Education and e-Learning*, Vol. *7*, No.1, 63-69.

From https://tojdel.net/journals/tojdel/articles/v07i01/v07i01-08.pdf

• Holmes, W., Bialik, M., & Fadel, C. (2023). Artificial intelligence in education. In: *Data ethics: building trust: how digital technologies can serve humanity*. (pp. 621–653). Globethics Publications.

From https://repository.globethics.net/handle/20.500.12424/4273108

• Idroes, G. M., Noviandy, T. R., Maulana, A., Irvanizam, I., Jalil, Z., Lensoni, L.,... & Idroes, R. (2023). Student perspectives on the role of artificial intelligence in education: A survey-based analysis. *Journal of Educational Management and Learning*, Vol. 1, No. 1, 8–15.

From https://heca-analitika.com/jeml/article/view/58/30

• Johnson, K. B., Wei, W. Q., Weeraratne, D., Frisse, M. E., Misulis, K., Rhee, K.,... & Snowdon, J. L. (2021). Precision medicine, AI, and the future of personalized health care. *Clinical and translational science,* Vol. 14, No. 1, 86–93.

From https://ascpt.onlinelibrary.wiley.com/doi/epdf/10.1111/cts.12884

• Kooli, C. (2023). Chatbots in education and research: A critical examination of ethical implications and solutions. *Sustainability*, Vol. 15, No. 7, 5614.

From https://www.mdpi.com/2071-1050/15/7/5614

• Krishna, G. (2023). Multilingual NLP. *International journal of advanced engineering and nanotechnology (IJAENT), 10*(6).

From https://www.researchgate.net/publication/371964082_Multilingual_NLP

• Lameras, P., & Arnab, S. (2021). Power to the teachers: an exploratory review on artificial Intelligence in education. *Information*, Vol. 13, No. 1, 14.

From https://www.mdpi.com/2078-2489/13/1/14

• Le Borgne, Y. A., Bellas, F., Cassidy, D., Vourikari, R., Kralj, L., Obae, C.,... & Weber, M. (2024). AI report. *Royal College of Surgeons in Ireland*,

From https://repository.rcsi.com/articles/report/AI_report/25021193

• Luckin, R., & Holmes, W. (2019). Intelligence Unleashed: An argument for AI in education.

From

https://www.researchgate.net/publication/299561597_Intelligence_Unleashed_An_argument_for_AI_in_Education

• Maghsudi, S., Lan, A., Xu, J., & van Der Schaar, M. (2021). Personalized education in the artificial intelligence era: what to expect next. *IEEE Signal Processing Magazine*, Vol. 38, No. 3, 37–50.

From https://arxiv.org/pdf/2101.10074.pdf

• Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). Understanding AI and education: Emerging practices and benefit-risk assessment. *AI and education: guidance for policymakers* (pp 13-23). UNESCO Publishing.

From https://unesdoc.unesco.org/ark:/48223/pf0000376709

• Nazaretsky, T., Bar, C., Walter, M., & Alexandron, G. (2022, March). Empowering teachers with AI: co-designing a learning analytics tool for personalized instruction in the science classroom. In *LAK22: 12th International Learning Analytics and Knowledge Conference* (pp. 1–12),.

From

https://www.researchgate.net/publication/359382223_Empowering_Teachers_with_AI_Co-Designing_a_Learning_Analytics_Tool_for_Personalized_Instruction_in_the_Science_Classroom

• Ofosu-Ampong, K., Acheampong, B., & Kevor, M.-O. (2023, July 31). Acceptance of Artificial Intelligence (ChatGPT) in Education: Trust, Innovativeness, and Psychological Needs of Students. Social Science Research Network. *Journal of Information and Knowledge Management*, Vol. 13, No. 4

From

https://www.researchgate.net/publication/372787378_Acceptance_of_Artificial_Intelligence_ChatGPT_in_Education_Trust_Innovativeness_and_Psychological_Need_of_Students

• Owoc, M. L., Sawicka, A., & Weichbroth, P. (2019). Artificial intelligence technologies in education: benefits, challenges, and strategies of implementation. In *IFIP International Workshop on Artificial Intelligence for Knowledge Management* (pp. 37-58). Cham: Springer International Publishing.

From https://link.springer.com/chapter/10.1007/978-3-030-85001-2_4

• Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development, Vol. 7. United Nations Educational, Scientific and Cultural Organization

From https://gcedclearinghouse.org/sites/default/files/resources/190175eng.pdf

• Pelau, C., Dabija, D. C., & Ene, I. (2021). What makes an AI device human-like? The role of interaction quality, empathy, and perceived psychological anthropomorphic characteristics in the acceptance of artificial intelligence in the service industry. *Computers in Human Behavior*, Vol. 122, 1055–1068.

From https://www.sciencedirect.com/science/article/pii/S0747563221001783

• Popenici, S. (2023). *Artificial intelligence and learning futures: critical narratives of technology and imagination in higher education.* Routledge, Taylor & Francis Group.

From https://www.taylorfrancis.com/books/mono/10.4324/9781003266563/artificial-intelligence-learning-futures-stefan-popenici

• Qin, H., & Wang, G. (2022, January). Benefits, challenges, and solutions of Artificial Intelligence applied in education. In *2022 11th International Conference on Educational and Information Technology (ICEIT)* (pp. 62-66). IEEE.

From https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9690739

• Roll, I., & Wylie, R. (2016). Evolution and revolution in artificial Intelligence in education. *International Journal of Artificial Intelligence in Education, 26*, 582-599.

From https://link.springer.com/article/10.1007/s40593-016-0110-3

• Tahiru, F. (2021). AI in education: A systematic literature review. *Journal of Cases on Information Technology (JCIT)*, Vol. *23*, No.1, 1-20.

From https://www.igi-global.com/gateway/article/full-text-html/266434

• Vincent-Lancrin, S., & Van der Vlies, R. (2020). Trustworthy artificial intelligence (AI) in education: Promises and challenges. *OECD Education Working Papers.* No. 218, OECD Publishing.

From https://www.oecd-ilibrary.org/docserver/a6c90fa9-en.pdf?expires=1715718372&id=id&accname=guest&checksum=FBC818ADC8A37A5CDEBD14359AB94356

• Wang, T., Lund, B. D., Marengo, A., Pagano, A., Mannuru, N. R., Teel, Z. A., & Pange, J. (2023). Exploring the potential impact of artificial intelligence (AI) on international students in higher education: Generative AI, chatbots, analytics, and international student success. *Applied Sciences*, Vol. 13, No. 11, 6716.

From https://www.mdpi.com/2076-3417/13/11/6716

- Wei, L. & Hindman, G. (2011). Does the digital divide matter more? Comparing the effects of new media and old media use on the education-based knowledge gap. *Mass communication and society.* Vol. 14, No. 2, 216-235

From https://www.studocu.com/row/document/sveuciliste-u-zagrebu/epistemologija-informacijske-znanosti/6-wei-l-does-the-digital-divide-matter-more/15609774

Figures

Appendix - Questionnaires

AI ve školství (učitelé)

Dobrý den,

jsem studentem VŠ a jako součást mé bakalářské práce jsem vytvořil tento dotazník na téma AI ve školství. Je určen pro učitele základních, středních a vysokých škol.

Jeho vyplnění Vám zabere 5 minut, proto bych byl vděčný za Vaši pomoc. Děkuji.

1 How old are you?

○ < 26   ○ 27 - 35   ○ 36 - 45   ○ 45 - 55   ○ 55 <

2 What school do you work at?

○ Elementary school   ○ Gymnasium   ○ Secondary Vocational School   ○ University   ○ Higher Vocational School
○ Other [   ]

3 What is your attitude towards artificial intelligence in education?

○ Very positive   ○ Positive   ○ Neutral   ○ Negative   ○ Very Negative

4 How often do you use AI? If you don't use it at all, why?

○ Every day   ○ Several times a week   ○ Several times a month
○ I have never used/stopped using AI [   ]

5 What do you use it for the most?

☐ Searching for source material   ☐ Generation of content   ☐ Programming   ☐ Educational purposes   ☐ Text translation
☐ Other [   ]

6 Would you like to see AI become part of the education system?

○ Definitely yes   ○ Rather yes   ○ I do not know   ○ Rather no   ○ Definitely no

7 Do you consider AI a credible source?

○ Definitely yes   ○ Rather yes   ○ I do not know   ○ Rather no   ○ Definitely no

8 Do you agree that thesis writing should be abolished because of AI?

○ I agree   ○ I rather agree   ○ I do not know   ○ I rather disagree   ○ I disagree

9 In your opinion, should schools provide courses on how to work with AI?

○ Definitely yes   ○ Rather yes   ○ I do not know   ○ Rather no   ○ Definitely no

10 Do you consider AI to make your job easier (writing documents) or a burden (checking students' work,...)?

○ Definitely a relief   ○ Rather a relief   ○ Neutral   ○ Rather a burden   ○ Definitely a burden

11 What is your experience of using AI within education?

○ Very good   ○ Good   ○ Neutral   ○ Bad   ○ Very bad

12 Do you find it unnecessary to do/know activities that AI is capable of?

○ Definitely yes   ○ Rather yes   ○ I do not know   ○ Rather no   ○ Definitely no

13 Is there anything you would like to add to the questionnaire?

AI ve školství (studenti)

Dobrý den,

jsem studentem VŠ a jako součást mé bakalářské práce jsem vytvořil tento dotazník na téma AI ve školství. Je určen pro studenty středních a vysokých škol.

Jeho vyplnění Vám zabere 5 minut, proto bych byl vděčný za Vaši pomoc. Děkuji.

1 How old are you?

◯ < 15   ◯ 16 - 19   ◯ 20 - 23   ◯ 23 <

2 What school are you studying?

◯ Gymnasium   ◯ Vocational secondary school   ◯ University   ◯ Higher vocational school
◯ Other [   ]

3 What is your attitude towards artificial intelligence in education?

◯ Very positive   ◯ Positive   ◯ Neutral   ◯ Negative   ◯ Very Negative

4 How often do you use AI? If you don't use it at all, why?

◯ Every day   ◯ Several times a week   ◯ Several times a month
◯ I have never used/stopped using AI [   ]

5 What do you use it for the most?

☐ Searching for source material   ☐ Generation of content   ☐ Programming   ☐ Educational purposes   ☐ Text translation
☐ Other [   ]

6 Would you like to see AI become part of the education system?

◯ Definitely yes   ◯ Rather yes   ◯ I do not know   ◯ Rather no   ◯ Definitely no

7 Do you consider AI a credible source?

◯ Definitely yes ◯ Rather yes ◯ I do not know ◯ Rather no ◯ Definitely no

8 Do you agree that thesis writing should be abolished because of AI?

◯ I agree ◯ I rather agree ◯ I do not know ◯ I rather disagree ◯ I disagree

9 In your opinion, should schools provide courses on how to work with AI?

◯ Definitely yes ◯ Rather yes ◯ I do not know ◯ Rather no ◯ Definitely no

10 Do you find that AI makes you less motivated to learn?

◯ Definitely yes ◯ Rather yes ◯ I do not know ◯ Rather no ◯ Definitely no

11 What is your experience of using AI within education?

◯ Very good ◯ Good ◯ Neutral ◯ Bad ◯ Very bad

12 Do you find it unnecessary to do/know activities that AI is capable of?

◯ Definitely yes ◯ Rather yes ◯ I do not know ◯ Rather no ◯ Definitely no

13 Is there anything you would like to add to the questionnaire?