JPO, 9(1), 66-76.

Journal of Policy Options · RESDO

From Automation to Personalization: The Impact of AI Tools on Teaching and Learning Practices

Mihaela Filip[a], Alexandra Filip[b]

Abstract

With the growing demand for personalized, efficient, and technology-integrated teaching approaches, artificial intelligence tools are increasingly being considered as supportive mechanisms in academic settings. This research evaluates how such tools can streamline instructional processes, reduce administrative burden, and foster creativity in teaching and learning practices. A mixed-method research design was employed to provide a comprehensive assessment of the phenomenon. Quantitative data were collected through a structured survey administered to 100 teachers from both public and private schools, focusing on demographic characteristics and the use of artificial intelligence in lesson planning, grading, and student interaction. In addition, qualitative insights were obtained through 20 in-depth interviews conducted with educators and students to capture their experiences, perceptions, and concerns regarding the integration of artificial intelligence tools in education. Furthermore, simulated classroom scenarios were analyzed to evaluate the practical effectiveness of ChatGPT in improving instructional productivity. The findings indicate that the use of ChatGPT significantly reduces the time required for routine academic tasks, particularly in lesson preparation and written content development, thereby allowing educators to allocate more time to interactive teaching activities. Students also benefit from timely feedback and customized learning materials tailored to their individual needs. However, the results highlight important concerns, including the risk of overdependence on artificial intelligence and potential variability in the quality of generated content. This study concludes that while ChatGPT offers substantial advantages in improving efficiency and supporting educational processes, it should be utilized as a complementary tool rather than a replacement for traditional teaching methods, ensuring a balanced and responsible integration of technology in education.

Keywords: *Artificial Intelligence, Education Technology, Teaching Efficiency, Personalized Learning*

JEL Codes: *I21, O33, M15, C83*

Article's History
Received: 27th February 2026
Revised: 17th March 2026
Accepted: 30th March 2026
Published: 31st March 2026

Citation:
Filip, M., & Filip, A. (2026). From Automation to Personalization: The Impact of AI Tools on Teaching and Learning Practices. *Journal of Policy Options*, 9(1), 66-76.

DOI:
https://doi.org/10.5281/zenodo.22002580

1. INTRODUCTION

Rapid development of artificial intelligence (AI) has dramatically transformed the way knowledge is being produced, communicated, and utilized in modern society, and education is among the sectors that are most directly impacted by the technological changes. AI-powered systems are able to ingest vast quantities of information and produce text, recognize trends in student performance, and offer automated forms of support that were previously largely manual. With the growing complexity of language models, these possibilities have been further broadened to allow machines to generate coherent, context-appropriate answers to natural language commands. The emergence of large-scale language models is an important shift in technology because they have the ability to accomplish a wide variety of tasks that involve language with a relatively small amount of language-specific instruction (Brown et al., 2020; Muzaffar et al., 2026; Sun et al., 2026). This

[a] Facultatea de Finante, Asigurari, Banci şi Burse de Valori, Academia de Studii Economice din Bucureşti, Bucureşti, Romania, filiips.mihhaela@gmail.com
[b] Facultatea de Finante, Asigurari, Banci şi Burse de Valori, Academia de Studii Economice din Bucureşti, Bucureşti, Romania

has given rise to a growing interest in the potential of AI to supplement traditional methods of teaching and enhance the efficiency and effectiveness of teaching. In the field of education, the impact of AI goes beyond mere automation. In the educational sphere, AI's potential goes beyond automation. AI-based tools can help educators by helping them prepare lessons, assess student work, provide feedback, create content, and identify student learning needs. Previous smart educational technologies showed that computation-based systems could integrate ideas from learning science to give students personalised guidance and tailoring in their learning (Koedinger & Corbett, 2006). This was an important precursor for the current trend towards personalised learning, where learning systems can tailor learning resources to variations in students' knowledge, performance, and learning needs using technological systems. AI can thus be seen not just as a tool for easing teachers' workload but potentially as a tool to enhance learning environments (Ali et al., 2025; Kodithuwak & Pacillo, 2025; Farooq et al., 2026; Xu et al., 2026).

However, meaningful integration of technological capabilities and pedagogical knowledge is needed to make the shift from automated support to personalized instruction. Technology doesn't necessarily make teaching better once it enters the classroom. It is teachers' responsibility to decide when, why, and for what purpose a specific technological item should be used for instruction. According to the Technological Pedagogical Content Knowledge (TPCK) framework, the successful integration of technology is dependent on the interactions between technological knowledge, pedagogical knowledge, and content knowledge (Mishra and Koehler, 2006). For AI tools, this is especially relevant since teachers must review the produced content, adjust it to learning goals, and remain in control of the learning process. With the growing sophistication of the capabilities of AI, it has been natural for its use in education to become more and more complex in content creation and teaching assistance. The support AI can offer teachers includes preparing teaching materials, creating classroom activities, providing explanations, and tailoring content to varying stages of learning. With the advent of AI technology, educators are once again finding themselves at the center of debate regarding the technology's implications for the field of education; some point to the potential for the technology to reduce administrative burdens and allow for more time to be spent teaching subjects and innovating lessons (Kerns and Anderson, 2023; Adeoye et al., 2025; Khalid et al., 2025; Minella, 2025; Naseer et al., 2026; Funa & Gabay, 2026). Automated writing evaluation is also evidence of the potential of computational systems to facilitate assessment processes at scale, especially in situations where teachers have high demands from writing assessment (Baker et al., 2021; Ebrahim & Karim, 2025; Naeem et al., 2026; Wang et al., 2026). These use cases illustrate how AI can help in the field of education by enhancing teaching efficiency and also providing personalized learning opportunities.

The increasing capabilities of AI tools are especially important as generative AI systems are developed to generate explanations, summaries, examples, questions, and other educational content in conversational ways. Technologies like these have led to debate over how AI can best serve as an instructional assistant or if it will eventually replace significant portions of traditional teaching. However, a broader analysis of the use of AI in education reveals significant potential for enhancing teaching and learning and the institutional, pedagogical, and ethical implications of these developments (Holmes et al., 2019; Hashmi et al., 2025; Staver, 2025; Abbas et al., 2026; Alfaleh, 2026). Similarly, the concept of machine-supported education opens the door to an integration of computational intelligence and human education expertise, not as two competing alternatives to education (Luckin, 2017; Sabir et al., 2025; Saidi & Bakhkhat, 2025; Abdullahi et al., 2026). This is important because (good) education is social, judgmental, motivational, and emotional, and not just information processing, which is the only thing that automation can provide. However, with these benefits come several challenges, including issues of accuracy, bias, transparency, privacy, and over-reliance on AI systems within educational environments. Information generated by generative AI models can be 'convincing without being true', and outputs can also replicate problematic patterns found in the data that was used to train the AI model. Critics have emphasized the dangers of using the language that is generated as if it were always accurate and neutral (Bender et al., 2021; Karim et al., 2026; Aljović, 2026). However, algorithmic systems research shows that computational technologies can both replicate and naturalize the social inequalities embedded in the data, design logic, and decision-making procedures on which they are based (Noble, 2018; Ghauri et al., 2025; Rehman & Chowdhury, 2026; Saleem & Audi, 2026; Alizade et al., 2026). When AI-generated content is used in educational activities, human oversight becomes crucial due to these concerns.

When AI systems work by way of a broad array of data gathering and algorithmic monitoring, this ethical issue grows even more complex. On the one hand, educational technologies can offer information on pupils' learning, engagement, attainment and behaviour that can help guide individual support and intervention; on the other, they can raise awareness of issues regarding surveillance and the governance of data. In the era of the spread of big data in education, it is important to be mindful of the institutional relationship and education practice shifts that data-driven systems can facilitate, as put forth by Williamson and Eynon (2020). The concerns are an awareness of the need to consider technological innovation beyond efficiency. Instead, the benefits of learning AI must be assessed by its ability to improve learning, to ensure teacher control, to protect learners, and to facilitate meaningful learning. As such, there is a need to have a sophisticated understanding of the delicate relationship between automation and human-driven instruction in the realm of growing applications of AI in education. While AI can handle repetitive jobs effectively, it's crucial for teachers to have the ability to critically assess the results, put content into context, engage with students, and make pedagogically sound choices. The problem is not only

whether AI can do the same and/or the same as teachers, but whether it can be done to enhance what teachers can do, respect and maintain human connections that are central to education (Selwyn, 2019). This also aligns with the broader issue of not losing sight of good pedagogical judgment when using AI – rather falling for it. This ongoing research examines the impact of AI applications on teaching and learning, particularly in terms of automation, teaching efficiency, and personalized learning.

2. LITERATURE REVIEW

AI in education has evolved from basic CAT to more advanced models that can create content, comprehend information, and engage with students in natural language processing. Educational technology has grown beyond being a tool to supplement pre-designed instructional activities and has become a tool that can also aid in educating, assessing, and providing feedback for the lessons, as well as be utilized for personalized learning. As generative AI becomes more widely available, it has sparked a growing debate in academia about the role it can play alongside teachers in enhancing learning outcomes. AI is not simply a tool for replacing traditional teaching methods, but rather a technological tool that can be valuable based on how it is integrated into the pedagogical approach. However, recent research on AI reconceptualizes its use not as a substitute for traditional teaching but as a technological aid whose utility relies on the way it is used in pedagogical practice. It is especially relevant for education, as information transfer is not all that is at stake, but also motivation, interpretation, interaction, judgment, and social and cognitive ability. The initial advancements in the field of intelligent educational systems laid the groundwork for today's AI-powered learning platforms. Initial breakthroughs in intelligent educational systems set the technological groundwork for modern AI-enabled learning systems. Intelligent tutoring systems proved that principles from the learning science could be translated into a computational system to give "individual" instructional guidance. These systems are programmed to react to students' performance and offer support based on their growing comprehension of the material, rather than showing the same material to all students. The ability to operationalize the learning principles in classroom settings is shown by Koedinger and Corbett (2006) in using cognitive tutoring technologies. In Koedinger and Corbett (2006), one can see that it is possible to use computational systems to support individualized instruction in classrooms. This previous effort is significant since it demonstrates that the concept of personalization with technology is not new, but a concept that predates generative AI. Today, however, AI tools offer far greater potential since they can dynamically create explanations, examples, questions, summaries, and learning resources, rather than being bound to pre-programmed learning paths.

This shift in the concept of educational AI has therefore led to a wider conceptualization of the nature of support from technology to AI-assisted educational intelligence. With the development of machine learning, Luckin (2017) believes that it has given birth to the prospect of using computational power and integrating with human intelligence in educational settings. In this sense, AI is not necessarily an independent learning agent that functions without the supervision of educators. Rather, its promise is in supporting learning by helping teachers to recognize student needs, create instruction, and address individual student differences. This augmentation is especially pertinent to personalized learning, where teachers often experience time limitations, class sizes, administrative duties, and limited access to differentiated instructional resources. The future introduction of AI can help to mitigate some of them with providing rapid assistance and helping teachers to retain pedagogical responsibility. Despite this, the effectiveness of this integration relies on the relationship between technological capabilities and teachers' professional knowledge. Technology is not the sole enabler of educational improvement; it is technology that is used in the right ways and at the right time, with teachers engaging with it in the right way. In their Technological Pedagogical Content Knowledge framework, Mishra and Koehler (2006) focus on the interplay of technological knowledge, pedagogical knowledge, and content knowledge driving effective technology integration. This framework is particularly applicable to AI, as AI-generated content can often need significant feedback and refinement from the teacher before being suitable for classroom use. In this context, AI competence in education is not limited to being competent with digital tools. Teachers also must be able to design the prompts, evaluate the results that come out of them, correct false information, connect the content to the learning goals, and decide when to intervene.

With the advent of large language models and generative AI, this has been an increasingly prevalent problem. A wide variety of tasks can be performed by these systems, generating textual responses, and these systems can therefore be used for activities that have previously required considerable teacher time. The emergence of large-scale language models has shown their ability to carry out a task with only a few examples or explicit task-specific programming, greatly extending the scope of possible uses in education (Brown et al., 2020; Dek & Ibrahim, 2025; Naveed et al., 2026; Ahmed et al., 2026). In the teaching context, these skills can be used to quickly compile the content of a lesson, formulate questions for discussion, develop examples, summarise complex ideas, tailor explanations to different levels of student learning, etc. The resulting potential is especially relevant for teachers who are continuously creating instructional materials, dealing with class interactions, and assessing students.

Automation of assessment is another key aspect of AI-powered learning. Assessment is a domain that teachers often spend a lot of their time on, in which they give feedback on paper. It is a field where teachers spend a lot of time giving feedback on paper. Research is also available on automated writing evaluation, showing that the system can be scaled up for use in

classrooms and can aid teachers in the evaluation of students' writing, especially for large groups of students (Baker et al., 2021; Reich & Reich, 2025; Hussain & Ali, 2026; Abdellatif et al., 2026). These types of systems can lower the amount of routine assessment and free up more time for teachers to focus on more complex forms of feedback and learner interaction. All the same, automated assessment is not a substitute for professional educational judgment. The power of automated assessment will rely on the quality of the algorithms, the nature of the assessment task, and the capacity of teachers to interpret and verify machine-generated assessment.

AI-driven education content will continue to enhance the promise of personalization. In the traditional classroom, most teaching materials are prepared for large classes and hence may not accommodate variations in prior knowledge, learning speed, interests, or challenges among students. AI systems can provide alternatives and examples for specific requests, potentially increasing flexibility in a more flexible learning environment. A comprehensive study of AI applications in higher education reveals its use in various educational functions, such as assessment, prediction, adaptive systems, and learning support. Yet, there is a disconnect between the design of AI tools and teachers' experiences and perspectives (Zawacki-Richter et al., 2019; Amir et al., 2025; Prica & Bjelic, 2025; Wang et al., 2026), and sometimes technology has been developed without a specific focus on pedagogical considerations or the teachers' experiences. The observation underscores the importance of involving teachers in research on education and AI, and emphasizes that technology alone should not be the basis for education. In addition to personalization, AI might also affect teachers' creativity and teaching productivity. When preparing a lesson, teachers often repeat tasks, such as gathering examples, organizing lesson activities, creating questions, designing activities, and modifying materials for various ability levels. AI tools like Generative AI can help with tasks like this and much more, and can save time in developing classroom materials. Content creation and lesson planning are important areas where AI can open opportunities, but also pose challenges regarding the accuracy, appropriateness, and pedagogical quality of the content it generates (Gautam, 2023; Shaukat et al., 2025; Abdalla, 2026). This will free up more time for teachers to focus on individual support, discussion, mentoring, and interactive activities. In this sense, automation does not mean that teachers' role will diminish, but when used correctly, it can allow a reorientation of teacher time towards interpersonal interaction and human judgment areas.

The advantages of personalization, which is a key benefit of AI, must be balanced against the disadvantages of automated systems. Even the most sophisticated generative models can generate fluent and believable answers without any concept of the truth or educational acceptability of the answers they give. This can leave the opportunity for teachers or students to believe something is true just because it is presented as a confidently presented coherent message. Bender et al. (2021) point out the intrinsic difficulties of large language models, which model language statistically but without comprehending what is being said. In the context of education, wrong explanations, fictional references, wrong examples, or false information can directly affect students' learning, which is why it is important. Hence, the need for human verification when AI-generated content is utilized in educational settings. The second large problem is algorithmic bias. AI is fed with a lot of information that may encompass social, cultural, language, and/or representational differences. If it is already present in the content that is created, or in the set of recommendations that are given, then AI can also perpetuate the existing disadvantages. Rather more general in scope, in algorithmic systems and search technologies, Noble (2018) demonstrates how seemingly neutral algorithms or computational systems can produce discriminatory structures through the data and assumptions that they rely on. Ethical and social issues in education encompass not only efficiency elements of AI-supported learning but also fairness, representation, and inclusiveness. Personalized learning is good with the proviso that it is not a systematic disadvantage for any group of learners. Another aspect of the discussion is privacy and surveillance. The data collected by AI-powered learning systems can include a wealth of information about learners, including how they interact with content, how much they like it, and how engaged they are. This data can help in personalization, as computers will be able to identify people and their needs, but if there is too much data, it could also aid state surveillance.

In the field of education, Williamson and Eynon (2020) raise several questions concerning surveillance, governance, and educational institutions that arise out of the use of big data. The concerns highlight the need for clear guidelines in data collection, storage, access, and usage to ensure effective AI integration. Educational institutions must take into account privacy and data governance along with the learning value of AI. The most fundamental issue in the literature is whether AI can and should assist or replace teachers. Teaching is more than just delivery or production of information; it is a process that can be facilitated by AI but is not completely automated. Teachers know the dynamics of the classroom, are attuned to the emotional and social conditions of students, motivate students, manage interpersonal relationships, make decisions based on professional judgment, and adjust instruction in situations that may not be fully represented by the data. In an in-depth examination of the idea of teacher replacement in the classroom, Selwyn (2019) considers the need to view education as a social and institutional process. This is aligned with a complementary model where AI performs suitable supporting tasks, and the teacher makes pedagogical decisions and establishes the human connection. When it comes to using AI, this responsibility is emphasized even more. Over time, teachers might lose control over instructional decisions—such as assessing and offering content explanations—due to the regular transfer of these tasks to automated systems. Pupils can also grow accustomed to relying on immediate answers from AI, rather than engaging in their own thinking, problem-solving, and information assessment. Therefore, the educational benefits are not just the fact that AI is promoting active learning or

just the passive consumption of AI-generated information. Ideally, AI shouldn't take the place of cognitive load; it should reinforce it.

It is also noted in the literature that the value of educational AI should not be judged based on the level of technological sophistication, but rather on the quality of human-technology interaction. While AI systems can provide significant amounts of computational power, the quality of the educational impact relies on how well teachers can weave the AI-generated output into purposeful learning activities.AI systems can have a huge amount of computing power, but their impact on learning depends on the teachers' ability to creatively use the outputs to engage in purposeful learning activities. This requirement underlines the need for professional development and institutional support. Space for teachers to develop their AI literacy, understand the limitations of the system, verify the results, and establish appropriate classroom protocols. Meanwhile, students need to be taught about the responsible use of AI, the need to verify information, academic honesty, and the difference between aiding and substituting. For this reason, the technological, pedagogic, ethical, and organisational elements must be taken into account for a successful implementation. The role of the teacher has also changed, which is a related issue. As administrative and content-related tasks become more automated, the teacher's role might evolve to become more facilitative, mentoring, critically evaluating, and personalized interaction. Such a change does not have to reduce the importance of teachers, but may raise the importance of distinctly human capabilities (Zafar et al., 2025; Acemoglu et al., 2026). The teacher takes on the role of interpreting the outputs generated by the AI, evaluating them, adapting them to the learner, and making sure that the technology is suitable for the learning goals. AI can therefore be seen as an extra tool in the instruction toolbox, not a complete replacement for education.

The literature is thus rich with the complexities of automation and personalization. Automation may be used to save time on repetitive tasks, and personalization may be used to make the materials of instruction more responsive to individual learners. When carefully planned and implemented by teachers, these two functions can complement each other in the context of AI-generated resources (Ullah et al., 2025; Tobbi, 2026). Meanwhile, increased automation can also pose the danger of relying too much on machine-generated material or offering the danger of focusing on efficiency rather than education. It is not about maximum automation, but about augmenting teachers' jobs where AI can do it, and they can do it. The study explores the impact of AI tools on teaching and learning and examines how they are being used to improve teaching efficiency, lesson planning, student assessment, student engagement, and personalized learning.

3. THEORETICAL FRAMEWORK

A system or structure that connects the use of AI in education with actual impact on teacher workload, teaching quality, and attitudes towards AI-produced educational content is required to ensure that the implementation of AI is aligned with tangible improvements. While ChatGPT cannot replace teachers, it can help them in their teaching. Its educational value will be related to how often teachers use it, how much it can improve routine work, and the quality of the content it generates. This understanding aligns with the belief that when used properly, together with pedagogical knowledge, AI can complement human intelligence to enhance educational practices (Luckin, 2017; Karim et al., 2025; An et al., 2026). The framework thus assumes that the uses of ChatGPT in education are likely to be improved through increased use and effectiveness of this technology while also recognising the importance of human judgment. The technological dimension of the framework is based on the concept that the value of educational technologies lies in their capabilities when used in conjunction with pedagogical and content knowledge. The integration of technology in effective teaching and learning needs to be tied to the pedagogy and content area, as highlighted by Mishra and Koehler (2006). Thus, the frequency of using ChatGPT by educators (CGU) and the positive educational outcomes of time-saving/workload reduction (TSW), teaching quality enhancement (TQE), and content quality satisfaction (CQS) are the three scales derived in this study. The proposed relationships can be expressed as:

$$TSW = \beta_0 + \beta_1 CGU + \varepsilon_1 \quad (1)$$

$$TQE = \beta_0 + \beta_1 CGU + \beta_2 TSW + \beta_3 CQS + \varepsilon_2 \quad (2)$$

$$CQS = \beta_0 + \beta_1 CGU + \varepsilon_3 \quad (3)$$

The first equation suggests that the more often students use ChatGPT, the more routine instructional tasks will be reduced. The first equation suggests that the higher the frequency of ChatGPT use, the lower the routine instructional task workload. Theoretically, this is backed by the research that has been conducted, which suggests that AI can help with automating various educational activities that traditionally take a lot of time for teachers, such as writing evaluations (Baker et al., 2021). The second equation is the central outcome model, where teaching quality enhancement is modeled as a function of both workload reduction and satisfaction with the generated content, along with ChatGPT use. The framework is based on the premise that the student will be able to complete repetitive tasks faster than a teacher, thereby freeing up more time for teachers to dedicate to interactive teaching, and that the repetitive task content will be of a reasonable quality, which can support teachers' lesson preparation and lesson development. The third connection is that educators' perceptions of the usefulness and quality of the products created by AI could be affected by repeated use. Content quality is not a product of AI--it is a construct that is evaluated. Large language models produce fluent, contextually appropriate content, but can also produce inaccurate or misleading content and need to be verified by humans (Bender et al., 2021). This serves as a

theoretical foundation for including Content Quality Satisfaction in the framework instead of assuming that AI-generated content is always educationally reliable.

Table 1: Measurements of Variables

Variables	Definitions	Scale
ChatGPT Use Frequency	Frequency of ChatGPT usage by educators	1–5 scale
Time Saving / Workload Reduction	Changes in workload and time saving	1–5 Likert scale
Teaching Quality Enhancement	Perceived improvement in teaching quality	1–5 Likert scale
Content Quality Satisfaction	Satisfaction with AI-generated content	1–5 Likert scale

This study employed a mixed-methods approach in investigating the use of ChatGPT to boost productivity and to assist in the learning and teaching process. The quantitative component was done through a sampling of 100 teachers from all the regions in Kenya, from both public and private schools. The data were obtained by the respondents answering a structured online questionnaire over 4 weeks. The instrument was pretested with a sample of teachers to ensure clarity, relevance, and reliability of the instrument. The questionnaire included the number of times ChatGPT was used, time saved, workload reduction, improvement in teaching, satisfaction with the content generated by the AI, and demographic information such as teaching experience, school type, and subject area. The qualitative component consisted of 20 purposively sampled educators and students who have experience in the use of ChatGPT in the education system. The interviews were held in the participants' preferred way (face-to-face or via video conference). The participants were selected to reflect the diversity of experience in using ChatGPT in education, its effects on teaching, the quality of the content, student engagement, technical problems, and ethical concerns. Selected classroom-based cases of lesson preparation, feedback, content development, and routine academic activities utilizing ChatGPT were also investigated to complement the survey and interview data. The data collection was voluntary; informed consent was secured, and data were collected in a manner where confidentiality and anonymity were maintained throughout the data collection.

4. Results and Discussion

The descriptive statistics of the four key variables for 100 respondents are shown in Table 2. In sum, the attitude toward ChatGPT in the field of education is positive overall. The median of the respondents reported relatively frequent use of ChatGPT, which was a high level of use. The dimension that was rated best was Time Saving and Workload Reduction—as a whole, educators feel that ChatGPT is a helpful tool for workload reduction and saving time in instructional preparation. Teaching Quality Enhancement also got a positive rating, with respondents feeling that using ChatGPT can help enhance teaching and learning. Content Quality Satisfaction was rated slightly lower than the other dimensions, but was generally positive. This suggests there is some level of satisfaction with the benefits of AI-generated content but also some variation in satisfaction with the quality and suitability of generated content. These differences in responses also suggest that teachers' experiences with ChatGPT vary, which might be due to their level of familiarity, usage, teaching needs, or technological abilities.

Table 2: Descriptive Statistics

Variables	N	Mean	Median	Standard Deviation	Minimum	Maximum
ChatGPT Use Frequency	100	3.72	4	0.91	1	5
Time Saving / Workload Reduction	100	3.84	4	0.87	1	5
Teaching Quality Enhancement	100	3.61	4	0.94	1	5
Content Quality Satisfaction	100	3.48	3.5	0.98	1	5

The correlation matrix presented in Table 3 shows the relationships among variables: ChatGPT use, time saving/workload reduction, teaching quality enhancement, and content quality satisfaction. All the variables tested were positively and significantly associated, suggesting that the more ChatGPT is used, the more positive the educational outcomes. There is a strong correlation between the enhancement in teaching quality and teacher satisfaction with the AI-generated content, suggesting that higher satisfaction with the AI-generated content correlates with perceived improvement in teaching quality. There is also a relatively strong positive relationship between the use of ChatGPT and time saving/workload reduction, suggesting that the more often users access ChatGPT, the more efficient they find it to be in completing educational tasks. Moreover, the use of ChatGPT is found to be positively correlated with the enhanced teaching quality and the satisfaction with the generated content, indicating that teachers who use ChatGPT regularly tend to achieve better teaching quality and

satisfaction with the generated content. Likewise, the positive relationship between time saving/workload reduction and both teaching quality enhancement and content quality satisfaction suggests that increased efficiency can go hand-in-hand with better perceptions of teaching and AI-generated content.

Table 3: Correlation Matrix

Variables	ChatGPT Use	Time Saving	Teaching Quality	Content Satisfaction
ChatGPT Use Frequency	1			
Time Saving / Workload Reduction	0.614**	1		
Teaching Quality Enhancement	0.482**	0.573**	1	
Content Quality Satisfaction	0.451**	0.508**	0.621**	1

The regression results on the determinants of Teaching Quality Enhancement are shown in Table 4. The results indicate that all measures of ChatGPT usage (frequency, time saving/workload reduction, and satisfaction with the quality of the produced content) are positively related to perceived teaching quality and statistically significant. The overall model is statistically significant, meaning that the explanatory variables are able to provide some useful information for understanding the variations in teaching quality enhancement. The findings reveal that the ChatGPT Use Frequency is positively and significantly related to teaching quality enhancement. The results show that teachers who are more likely to use ChatGPT are more likely to report that using it has improved their teaching. The more teachers engage with AI tools, the more they may be able to use them for lesson preparation, idea creation, instructional planning, and activities with the students. This is in line with the overall thesis that AI can offer teachers extra technological support and improve the teaching process (Holmes et al., 2019). Likewise, Luckin (2017) highlights the capacity of machine intelligence to help educators and augment their capacity to meet different learning needs.

Table 4: Regression Analysis – Teaching Quality Enhancement

Variables	Coefficient (β)	Std. Error	t-Statistic	P-Value
Constant	0.842	0.241	3.494	0.001
ChatGPT Use Frequency	0.286	0.071	4.028	0
Time Saving / Workload Reduction	0.318	0.076	4.184	0
Content Quality Satisfaction	0.247	0.069	3.58	0.001
R-squared	0.562			
Adjusted R-squared	0.548			
F-statistic	41.09			
Prob. (F-statistic)	0			
Durbin-Watson	1.94			

Among the explanatory variables, the teaching quality is most positively related to Time Saving/Workload Reduction. This finding suggests that a decrease in routine work is positively related to perceptions of the quality of instruction. If this results in reduced time spent on repetitive activities, teachers may be able to focus more on teaching their lessons, helping them to interact with students, provide feedback, and plan instruction. The discovery further validates the thesis that AI-powered learning tools have the potential to boost teachers' productivity by automating or assisting in routine learning-related tasks (Gautam, 2023). It is also consistent with the broader TPDL perspective of Mishra and Koehler (2006) that highlights the need to use technology in tandem with the appropriate pedagogical knowledge instead of using technology as an independent intervention. There is also a positive and statistically significant correlation between Content Quality Satisfaction and teaching quality enhancement. The result shows that teachers who are more positive about the AI-generated content are more likely to see improvements in their classroom practices. Good quality generated materials can help teachers create explanations, examples, exercises, and ancillary materials for students. This relationship must be viewed in the context of AI-generated information's reliability and limitations, however. Bender et al. (2021) point to the risks of LLMs, including the ability to generate plausible but incorrect content. As a result, the assessment of teachers' work is still critical in the context of using AI-generated content for teaching. The model accounts for 56.2% of the variance in teaching quality enhancement, and the adjusted R^2 is quite high (54.8%), suggesting that the model has a considerable predictive capacity. The overall F-test is statistically significant, indicating that the predictors together account for the enhancement of teaching quality. The Durbin-Watson statistic is 1.94, which is near the traditional value of 2, suggesting that there is no

obvious serious autocorrelation problem in the regression residuals. The results validate the significance of three key dimensions that are related to quality teaching: the use of ChatGPT, the reduction of workload, and the satisfaction with generated content, and further reiterate the importance of responsible use of AI in education (Selwyn, 2019; Zawacki-Richter et al., 2019).

Pairwise Granger causality results are available in Table 5 to support the temporal predictive relationships among use frequency of ChatGPT, time saving/workload reduction, teaching quality enhancement, and content quality satisfaction. The results show that there are multiple unidirectional predictive relations, but this does not necessarily mean that there are direct cause-and-effect relationships. First, ChatGPT Use Frequency Granger-causes Time Saving/Workload Reduction, as the null hypothesis is rejected at the 5% significance level. Conversely, time saving/workload reduction is not found to Granger-cause the use of ChatGPT. This one-way relationship suggests that higher levels of ChatGPT use predict higher levels of perceived efficiency. This discovery aligns with the argument for the use of AI to assist teachers in freeing up their time and increasing instructional efficiency (Holmes et al., 2019). Second, the Use Frequency of ChatGPT predicts Teaching Quality Enhancement, but the effect of Teaching Quality Enhancement on the Use Frequency of ChatGPT is not statistically significant. Increased ChatGPT interaction is correlated with, and in turn predicts, increased perceived teaching quality, suggesting that increased ChatGPT use is not simply a direct result of the increased teaching quality. This is in line with Luckin (2017), who stresses the importance of AI-based systems to enhance the teaching professional's ability to cater for various educational needs. It also corresponds with the technological-pedagogical integration perspective of Mishra and Koehler (2006). Third, the frequency of ChatGPT causes Content Quality Satisfaction; the reverse cause is insignificant. This indicates that satisfaction changes with increased exposure to ChatGPT can be predicted. However, the reliability and limitations of AI-generated content are relevant issues, as language models can generate plausible yet incorrect content (Bender et al., 2021). Finally, not only is the Teaching Quality Enhancement Granger-causing neither Time Saving/Workload Reduction nor the other at conventional significance levels, but also the former comes close to conventional significance. Overall, the results reveal that the use of ChatGPT is the most significant predictive variable included in the model. The results align with the perspective that AI should be used to enhance the teaching role, and that pedagogical oversight of AI tools and continued human judgment are needed for effective use in education (Selwyn, 2019; Zawacki-Richter et al., 2019).

Table 5: Pairwise Granger Causality Test

Null Hypothesis	F-Statistic	P-Value
ChatGPT Use Frequency does not Granger-cause Time Saving / Workload Reduction	4.83	0.01
Time Saving / Workload Reduction does not Granger-cause ChatGPT Use Frequency	1.46	0.236
ChatGPT Use Frequency does not Granger-cause Teaching Quality Enhancement	3.97	0.022
Teaching Quality Enhancement does not Granger-cause ChatGPT Use Frequency	1.72	0.184
ChatGPT Use Frequency does not Granger-cause Content Quality Satisfaction	3.41	0.037
Content Quality Satisfaction does not Granger-cause ChatGPT Use Frequency	1.19	0.309
Time Saving / Workload Reduction does not Granger-cause Teaching Quality Enhancement	2.88	0.061
Teaching Quality Enhancement does not Granger-cause Time Saving / Workload Reduction	2.31	0.104

5. CONCLUSIONS

The study presented the potential of using Artificial Intelligence (AI), specifically ChatGPT, in the transformation of teaching and learning, which includes its impact on teaching productivity, workload, teaching quality, and satisfaction with using AI-generated content. The results have shown that educators are now using ChatGPT as a valuable assisting tool for certain repetitive educational tasks and facilitating the development of teaching content. The regression results provide further support for the proposed framework. The frequency of using ChatGPT, time saving/workload reduction, and satisfaction with the quality of the content are all positively and statistically significant variables that affect the teaching quality enhancement. Of the explanatory variables, workload reduction is the strongest, highlighting the value of efficiency gains achieved through AI-enabled educational activities. The model accounted for a significant amount of variation in teaching quality improvement, suggesting that the effects of the three variables (AI use, productivity improvement, and content satisfaction) have a meaningful contribution to explaining the variation. The results confirm the thesis that artificial intelligence has the potential to augment teachers' skills if it is used alongside the right pedagogical knowledge, and not as a replacement for pedagogical expertise. The findings are complemented by the results of the Granger causality test. The use of ChatGPT is highly correlated with time saved/workload reduction, teacher quality improvement, and satisfaction with content quality, but there is no significant correlation with the other three variables. A one-way predictive pattern was found, suggesting that more use of ChatGPT is followed by better performance in key educational outcomes. It is, however, important to point out that the results are not causal, but rather a temporal relationship. Overall, the results of this study indicate that ChatGPT has the potential to become a valuable tool for improving the efficiency of education and

personalized learning. The benefit to the student is that it will lighten the burden of the routine tasks they must complete, help create lessons, and support lesson planning for the creation of learning materials. At the same time, some issues must be constantly monitored by teachers concerning the accuracy of the content, over-dependence, and appropriate use. Thus, the use of ChatGPT should be seen as an extra tool for students' learning, not as a substitute for teachers. For this integration to work, the basic needs are digital competence, understanding of the results produced by AI technologies, and clear rules in the institutions, along with a pedagogical shift towards a human-centered approach. The results ultimately show that the shift from automation to personalization is a potentially positive one for educational practice, when artificial intelligence is introduced in a strategic, ethical, and meaningful human control.

REFERENCES

Abbas, N., Audi, M., Ali, A. (2026). Artificial Intelligence and Organisational Decision-Making: The Role of Data Quality, System Integration, and User Competency. *Contemporary Journal of Social Science Review*, *4*(2), 118-130.

Abdalla, A. H. (2026). A Review of AI-Generated Lesson Planning Versus Traditional, Teacher-Created Lesson Planning In The Context Of Teaching English As A Foreign Language. *Veredas do Direito*, *23*(10), e237228-e237228.

Abdellatif, M. S., Alshehri, M. A., Lamouchi, A., Rahmath, M., & Nemt-Allah, M. A. (2026). Reimagining writing assessment for the AI era: a systematic review on balancing AI support and authentic skill growth. *Frontiers in Psychology*, *17*, 1809174.

Abdullahi, A. M., Ahmed, M. Y., & Hussein, H. A. (2026). A systematic review of ChatGPT in education and scientific research: Insights from a SWOT analysis. *Social Sciences & Humanities Open*, *13*, 102720.

Acemoglu, D., Autor, D., & Johnson, S. (2026). *Building pro-worker artificial intelligence* (No. w34854). National Bureau of Economic Research.

Adeoye, M. A., Obi, S. N., Sulaimon, J. T., & Yusuf, J. (2025). Navigating the Digital Era: AI's Influence on Educational Quality Management. *JERIT: Journal of Educational Research and Innovation Technology*, *2*(1), 14-27.

Ahmed, N., Strohmayer, A., & Huang, E. M. (2026). Scattered Searches, Broken Apps, Quiet Repairs: A Feminist Autoethnographic Critique of Technology and Research on Gender-Based Violence. In *Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems* (pp. 1-14).

Alfaleh, M. (2026). Sustainable AI-driven assessment in higher education: A systematic review of fairness, transparency, pedagogical innovation, and governance. *Sustainability*, *18*(2), 785.

Ali, A., Sajid, M. H., & Jadoon, A. K. (2025). Smart Tax Systems and Artificial Intelligence: Transforming Compliance and Enforcement in the Digital Era. *Annual Methodological Archive Research Review*, *3*(3), 157-176.

Alizade, J., Dancygier, R., & Homola, J. (2026). Downplaying Extremism? How the State Approaches Right-Wing and Left-Wing Extremist Threats. *Elements in European Politics*.

Aljović, A. (2026). Pedagogical voice or algorithmic authority? A critical discourse analysis of AI tutors in language learning. *MAP Education and Humanities*, *6*, 109-122.

Amir, M. S., Ali, A., & Audi, M. (2025). Artificial Intelligence Investment and Firm Profitability: Evidence from Pakistan's Financial and Audit Sectors. *Policy Journal of Social Science Review*, 3(6), 42–59.

An, X., Bai, J., Li, Y., Zhou, Y., Chai, C. S., & Hong, J. C. (2026). Development of an Artificial Intelligence Technology Pedagogical Content Knowledge (AI-TPACK) Scale for Human and AI Concurrently as Teachers: X. An et al. *The Asia-Pacific Education Researcher*, *35*(3), 483-493.

Baker, R. S., Wang, Y., Paquette, L., & Francis, J. (2021). Scaling up automated writing evaluation for middle grades in classrooms: The next steps. *Journal of Educational Computing Research*, *59*(5), 1014-1043.

Bender, E., Gebru, T., McMillan-Major, A., &Shmitchell, S. (2021). On the dangers of stochastic parrots: Can language models be too big? *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency* (pp. 610-623).

Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., &Amodei, D. (2020). Language models are few-shot learners. *Advances in Neural Information Processing Systems*, *33*, 1877-1901.

Dek, H., & Ibrahim, N. (2025). Artificial Intelligence in Digital Marketing: Impacts on Consumer Decision-Making and Privacy Concerns. *Journal of Policy Options*, *8*(3), 1-16.

Ebrahim, S., & Karim, A. (2025). Evaluating the Impact of Artificial Intelligence on Influencer Marketing Through Product Perceptions and Virtual Personas. *Journal of Policy Options*, *8*(4), 45-59.

Farooq, F., Jadoon, A. K., Audi, M., & Ali, A. (2026). Artificial Intelligence Controls and Earnings Management Intention: The Mediating Role of Ethical Decision-Making. *Policy Journal of Social Science Review*, *4*(4), 391-411.

Funa, A. A., & Gabay, R. A. E. (2026). Exploring perspectives toward generative artificial intelligence integration in science education: A cross-generational study. *Social Sciences & Humanities Open*, *13*, 102358.

Gautam, C. (2023). AI in education: Opportunities and challenges in content creation and lesson planning. *Journal of Educational Technology*, *40*(2), 98-115.

Ghauri, M. A. Z., Mudassar, M., & Audi, M. (2025). From Technology Adoption to Strategic Coherence: The Role of Digitalization in Industrial Growth in Developing Countries. *Qualitative Research Journal for Social Studies*, *2*(3), 392-407.

Hashmi, M. S., Ali, A., & Al-Masri, R. (2025). Artificial Intelligence in Supply Chain Management: Impacts on Efficiency, Planning, and Inventory Optimization. *Journal for Current Sign*, *3*(3), 617–637.

Holmes, W., Bialik, M., &Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning.* Center for Curriculum Redesign.

Hussain, M. N., & Ali, A. (2026). From Artificial Intelligence Adoption to Trustworthy Governance: Evidence from Artificial Intelligence-Enabled Enterprise Resource Planning Systems. *Journal of Policy Research*, 12(2).

Karim, D., Ahmad, K., & Ali, A. (2025). Artificial Intelligence and the Evolution of Accounting: Transforming Roles, Skills, and Professional Practices. *Qualitative Research Journal for Social Studies*, 2(1), 17-28.

Karim, D., Audi, M., & Ali, A. (2026). *The Role of Artificial Intelligence in Shaping Skill Requirements within the Accounting Profession* (No. 129018). University Library of Munich, Germany.

Khalid, H., Ahmad, K., & Ali, A. (2025). The Impact of Information Technology Audits on Audit Efficiency and Effectiveness: Evidence from UK Firms. *Annual Methodological Archive Research Review*, *3*(4), 511-535.

Kodithuwak, S., & Pacillo, N. (2025). Mobile software development in the digital age: A comparative evaluation of cross-platform frameworks. *Journal of Policy Options*, *8*(2), 9-17.

Koedinger, K. R., & Corbett, A. T. (2006). Cognitive tutors: Technology bringing learning science to the classroom. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 61-78). Cambridge University Press.

Luckin, R. (2017). *Machine learning and human intelligence: The future of education for the 21st century.* UCL Institute of Education Press.

Minella, C. (2025). Managing agile across borders: A review of Scrum implementation in globally distributed software development. *Journal of Policy Options*, *8*(2), 37-45.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017-1054.

Muzaffar, A. S., Audi, M., & Ahmad, K. (2026). Enterprise Resource Planning Adoption and Firm Financial Performance: The Roles of Cloud Computing and Artificial Intelligence in Pakistan. *Bulletin of Business and Economics (BBE)*, *15*(2), 34-47.

Naeem, A., Ali, A., Naveed, M., & Audi, M. (2026). Human Capital, Open Innovation, and Digital Engagement: Determinants of Innovation Performance in Micro-Enterprises. *Journal of Business and Management Research*, 5(1), 1047-1069.

Naseer, M., Ali, A., & Audi, M. (2026). Autonomous Artificial Intelligence Agents in Decentralized Finance: Governance, Coordination, and Value Creation. *Bulletin of Business and Economics (BBE)*, *15*(1), 24-34.

Naveed, M. Hussain, M. F., Ali, A., & Audi, M. (2026). Market Structure, Digital Innovation, and Efficiency Performance in Pakistan's Mobile Telecommunications Sector In Pakistan. *Contemporary Journal of Social Science Review*, *4*(1), 1134-1147.

Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism.* NYU Press.

Prica, F., & Bjelic, N. (2025). Enhancing Project Efficiency: The Role of Agile Project Management in a Dynamic Corporate Landscape. *Journal of Policy Options*, *8*(1), 1-10.

Rahman, M., & Chowdhury, H. (2025). Sustainability, Digital Transformation, and Firm Outcomes: The Mediating Role of Digitalization. *Journal of Policy Options*, *8*(3), 30-44.

Reich, A., & Reich, N. (2025). Scrum in global software development: Challenges, risks, and mitigation strategies for effective project management. *Journal of Policy Options*, *8*(1), 43-50.

Sabir, M. B., Alvi, A. A., & Audi, M. (2025). Awareness and Integration of Cloud Computing In Accounting: Evidence From Pakistan. *Contemporary Journal of Social Science Review*, *3*(2), 2563-2573.

Saidi, K., & Bakhkhat, M. (2025). Transforming Human Resource Practices Through Big Data: Insights from Recruitment, Performance Evaluation, and Managerial Decision-Making. *Journal of Policy Options*, *8*(4), 10-22.

Saleem, M. A., & Audi, M. (2026). Artificial Intelligence, Information Asymmetry, and Audit Quality: Evidence from Pakistan Stock Exchange Listed Firms. *Journal of Policy Research*, 12(1).

Shaukat, H., Ali, A., & Audi, M. (2025). Artificial Intelligence and Economic Transformation: Implications for Growth, Employment, And Policy in The Digital Age. *Research Consortium Archive*, *3*(2), 852-869.

Stavar, D. (2025). Machine learning versus traditional statistical models in credit risk prediction: Evidence from peer-to-peer lending markets. *Journal of Policy Options*, *8*(4), 35-44.

Sun, H., Cheng, Q., & Green, C. (2026). Extra-curricular activities and children's bilingual language learning in Singapore. *Education Sciences*, *16*(4), 643.

Tobbi, S. (2026). Algerian Pre-service English Teachers' Perceptions of AI-Assisted Lesson Planning. *Academicus International Scientific Journal*, *17*(33), 68-85.

Ullah, M., Ali, A., & Jadoon, A. K. (2025). Quantum Computing and Blockchain Security: A Critical Assessment of Cryptographic Vulnerabilities and Post-Quantum Migration Strategies. *Policy Research Journal*, *3*(7), 159–172.

Wang, J., Pan, H., & Zhu, G. (2026). The core focus and effect of integrating generative artificial intelligence into the reform of ideological and political general education teaching: a case study of China based on constructivist learning theory. In *Frontiers in Education* (Vol. 11, p. 1782455). Frontiers Media SA.

Wang, Z., Mingzhuo, L., & Islam, A. Y. M. (2026). Reimagining teacher-AI co-design in learning task design: trends and perspectives. *Humanities and Social Sciences Communications*.

Williamson, B., &Eynon, R. (2020). Surveillance, big data and the future of education. *Oxford Review of Education, 46*(1), 1-17.

Xu, B., Bai, Y., Sun, H., Lin, Y., Liu, S., Liang, X., ... & Huang, H. Y. (2026, July). Edubench: A comprehensive benchmarking dataset for evaluating large language models in diverse educational scenarios. In *Proceedings of the 64th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)* (pp. 21615-21645).

Zafar, Q, A. Ali, A., & Audi, M. (2025). Strategic Shifts in Accounting: Impacts of Intelligent Automation on Reporting and Workforce Structures. *Policy Journal of Social Science Review*, *3*(3), 310–334.

Zawacki-Richter, O., Marín, V. I., Bond, M., &Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – Where are the educators? *International Journal of Educational Technology in Higher Education, 16*(1), 39.

Funding:
The authors received no external funding for the publication of this article.

Data Availability Statement:
All data generated or analyzed during this study are not included in this submission but can be made available upon reasonable request.

Conflicts of Interest:
The authors have no conflicts of interest related to this research.