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AI Integration and Teacher Performance in Peruvian Higher Education: An Empirical Study of Educational Dimensions

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Abstract– ***The integration of Artificial Intelligence (AI) in education is transforming teaching practices and influencing teacher performance. This study explores the correlation between AI adoption and key aspects of teacher performance, including personalized learning, classroom management, and assessment methodologies. Employing a quantitative research design, the study analysed survey responses from 65 university faculty members. Results indicate a moderate yet significant positive correlation between AI usage and teacher performance, particularly in areas such as space and time management, teaching resources, classroom climate, and evaluation methods. These findings underscore the potential of AI to enhance educational quality while highlighting the need for faculty training in AI tools to maximize their pedagogical impact. The study concludes that AI serves as a valuable pedagogical ally, enhancing teaching effectiveness and improving student engagement.***

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Keywords-- ***Artificial Intelligence in Education, Teacher Performance, Higher Education, Personalized Learning, Educational Technology***

I. Introduction

In recent years, the educational field has undergone significant changes, driven by the constant advancement of technology, especially in relation to artificial intelligence. These innovations have proven to be powerful agents of change with great potential to transform various aspects of education, including the engagement of both students and teachers [1].

China is well-positioned to fully benefit from the integration of artificial intelligence into its educational system, thanks to its large population, diverse socioeconomic environment, and strong commitment to continuous educational improvement [2].

Currently, teachers are the foundation of the educational system, playing a key role in the transmission of knowledge and the development of skills. With the increasing presence of technology in classrooms and virtual learning environments, educators face the challenge of leveraging data-driven insights to personalize instruction, adapt teaching strategies to individual learning needs, and streamline lesson planning[3]. In addition, by enabling the automation of certain tasks, AI-driven solutions provide teachers with more time for one-on-one interactions with students and for fostering innovation in teaching [4].

Teacher effectiveness, student engagement, classroom management, and professional development are key elements within the broad concept of teacher performance. Although the impact of teachers on educational outcomes is widely acknowledged, research on how artificial intelligence influences these various aspects remains quite limited [5].

Research on technological literacy in the context of technology-based teaching practices remains largely unexplored. The effectiveness of artificial intelligence depends on the accuracy and quality of the data it processes[6]. Likewise, it is essential to examine how proficiency in using technology influences the impact of these tools on teacher performance [7].

The issue focuses on the need for university professors to acquire knowledge about artificial intelligence tools, given their impact on teaching and learning. The lack of training in AI usage, particularly in formative assessment, limits educators' ability to provide immediate and personalized feedback, a key factor in meaningful learning. This gap in training prevents the full utilization of AI's transformative potential in higher education, affecting teaching quality. As [8] points out, artificial intelligence is redefining educational

processes, requiring educators to adapt and effectively integrate these innovations into their teaching practices.

This research aims to analyse the relationship between the integration of artificial intelligence in university teaching and its impact on teacher performance. It will examine aspects such as personalized learning and classroom management efficiency using intelligent tutoring systems. Additionally, it will explore both the benefits and challenges, including potential resistance to change due to a lack of familiarity with these technologies. Studying these correlations will provide a deeper understanding of how AI influences teaching, offering key insights to enhance educational practices in higher education.

This study is highly relevant in the current context as it addresses a critical need: the effective integration of AI in higher education to enhance teacher performance. With the increasing digitalization of education and the evolution of learning environments, understanding the impact of AI on teaching is essential for designing strategies that optimize educational quality and the training of future professionals.

Thanks to educational data analysis, educators can now collect and analyse large amounts of data on student behaviour, engagement, and learning patterns. This data can help teachers adjust their teaching strategies to address the specific needs of students, thereby enhancing the effectiveness of instruction [9].

By tailoring teaching to different learning styles, this customization enhances student engagement and outcomes. Educational data analysis can significantly impact teachers' professional development [10]. Educational institutions can identify areas for growth and provide targeted training programs by analysing teachers' performance data. This approach ensures that professional development initiatives align with individual teachers' needs, leading to continuous improvement and more effective classroom practices.

The incorporation of artificial intelligence (AI) in education has emerged as a transformative force reshaping teacher performance and educational methods. This research explores the academic discourse surrounding the impact of AI adoption on teacher effectiveness, teaching methodologies, personalized learning, and professional development [11].

The ability of artificial intelligence (AI) to process large amounts of data and provide valuable insights has enhanced teaching strategies. Due to [12] AI-driven analytics can identify patterns in students' learning behaviours, enabling educators to adjust their methods to improve engagement. AI-based solutions offer real-time feedback, allowing instructors to tailor their teaching to meet the individual needs of each student.

The implementation of AI enables the customization of learning experiences to address the diverse needs of students. [13] highlight that AI-powered platforms can analyse students' learning habits and recommend relevant materials and exercises accordingly.

[14] suggest that this personalization enhances student comprehension and engagement. AI tools are becoming increasingly crucial in assessment methods. The precise analysis of student data aids instructors in identifying learning gaps and areas requiring intervention.

[15] AI-powered assessment tools provide teachers with timely insights into student progress, enabling them to adjust interventions and support accordingly. As a result, student outcomes improve, and the likelihood of academic challenges decreases. The integration of AI offers transformative opportunities for instructors to enhance their performance and significantly impact students' learning experiences.

[16] AI technologies support the overall development of educational systems by enhancing teaching strategies, promoting personalized learning, aiding professional development, and improving assessment practices.

II. METHODOLOGY

The research followed a quantitative approach, as the variables were quantified, measured, ranked, and analyzed using statistical formulas. The goal was to collect and examine numerical data to understand and describe phenomena, connections, and trends within the study's context. Objective measurements and statistical analysis were used to extrapolate results to a larger population [17]. The methods employed included the analytic-synthetic approach, which allowed for the empirical and theoretical breakdown and analysis of key aspects of the topic, and the analytic-descriptive approach, which helped define and characterize variables and indicators [18]. The study was descriptive, focusing on analyzing the relationships between artificial intelligence and teacher performance in the sample studied, non-experimental, as no variables were manipulated, and ex post facto, analyzing processes that had already occurred.

The selected methods were primarily descriptive, aiming to characterize and define the relationship between artificial intelligence and teacher performance in a specific context. The study seeks to identify the existence, magnitude, and intensity of these connections to derive relevant conclusions [18]. Regarding its nature, the research is non-experimental, as no variables will be manipulated, and it follows an ex post facto approach, analysing processes that have already occurred [17].

The study population included all appointed faculty members up to the 2024-I term, while the sample was emergent, defined in the field based on the study's progression. Inclusion criteria required faculty members with more than three years of experience, while exclusion applied to non-appointed faculty, those with less experience, or those on leave. The sample was limited to faculty from the Chosica campus Peru, maintaining proportionality by faculty.

Ultimately, the sample size consisted of 140 faculty members, representing 23.77% of the total population.

The techniques used included surveys, which were used to design the questionnaire, and systematic observation, which allowed for the development of a checklist based on direct and verified observations by the teachers themselves. The instruments were:

1. Artificial Intelligence Questionnaire, designed to collect information on teachers' knowledge, exploration, and theoretical-practical application of AI, structured according to predefined dimensions.
2. Checklist, used to record aspects of teacher performance in relation to AI, applied after a process of awareness and reflection.

III. RESULTS

TABLE I
INSTRUMENT RELIABILITY

Instrument	Cronbach's Alpha	Number of Items
Artificial Intelligence	0.848	20
Teacher Performance	0.875	20

The Cronbach's Alpha values obtained were 0.848 for the artificial intelligence questionnaire and 0.875 for the teacher performance questionnaire, indicating a high level of reliability for both instruments. These coefficients reflect adequate internal consistency, ensuring the accuracy and stability of the measurements, thereby validating their use in assessing the variables analyzed in the study.

TABLE II
LEVELS OF ARTIFICIAL INTELLIGENCE

Category	*Frequency (f)*	Percentage %
Deficient	4	6,2
Fair	36	55,4
Good	25	38,5
Total	65	100,0

The results show that 55.4% of respondents rated the use of artificial intelligence as fair, while 38.5% considered it good, and 6.2% described it as poor. These findings suggest that, although most participants perceive an adequate use of artificial intelligence, there are still areas for improvement in its implementation and effectiveness.

TABLE III
LEVELS OF ARTIFICIAL INTELLIGENCE BY DIMENSIONS

	Machine Learning		Data Mining		Educational Data Analysis		Space and Time Management	
	f	%	*f*	%	*f*	%	*f*	%
Deficient	9	13,8	11	16,9	10	15,4	10	15,4
Fair	31	47,7	37	56,9	34	52,3	30	46,2
Good	25	38,5	17	26,2	21	32,3	25	38,5
Total	65	100,0	65	100,0	65	100,0	65	100,0

The results show that 47.7% of respondents rated the machine learning dimension as fair, while 56.9% perceived the data mining dimension as fair. Regarding educational data analysis, 52.3% of participants considered it fair, and 46.2% rated the space and time management dimension as fair.

TABLE IV
LEVELS OF TEACHER PERFORMANCE

Category	*Frequency (f)*	Percentage %
Deficient	2	3,1
Fair	35	53,8
Good	28	43,1
Total	65	100,0

As shown in the table, 53.8% of respondents rated teacher performance as fair, 43.1% considered it good, and 3.1% evaluated it as poor.

TABLE V
TEACHER PERFORMANCE LEVELS BY DIMENSIONS

Category	Teaching Resources		Classroom Climate		Assessment Resources	
	f	%	*f*	%	*f*	%
Deficient	4	6,2	4	6,2	4	6,2
Fair	34	52,3	33	50,8	33	50,8
Good	27	41,5	28	43,1	28	43,1
Total	65	100,0	65	100,0	65	100,0

As observed, 52.3% of respondents rated the teaching resources dimension of teacher performance as fair, while 50.8% of informants also evaluated the classroom climate and assessment resources dimensions as fair.

TABLE VI
NORMALITY ASSUMPTION

	Kolmogorov Smirnov		
	Statistic	df	Sig.
Artificial Intelligence	,167	65	,000
Teacher Performance	,198	65	,000

The results of the normality assessment show that the significance values for both samples were less than 0.05, indicating that the samples do not follow a normal distribution. Therefore, non-parametric tests should be applied for data analysis.

TABLE VII
CORRELATION BETWEEN ARTIFICIAL INTELLIGENCE AND TEACHER PERFORMANCE

		Teacher Performance
Artificial Intelligence	Spearman's Rho	,598
	Sig. (bilateral)	,000
	N	65

As observed, the obtained correlation, Rho = 0.598, was found to be significant (Sig. < 0.05), providing evidence that the use of artificial intelligence is positively correlated with teacher performance. This finding suggests that as the application of artificial intelligence in pedagogical practices improves, so does teacher performance.

TABLE VIII
CORRELATION BETWEEN ARTIFICIAL INTELLIGENCE AND SPACE AND TIME MANAGEMENT

		Space and Time Management
Artificial Intelligence	Spearman's Rho	,578
	Sig. (bilateral)	,000
	N	65

The results show a moderate correlation of Rho = 0.578, which is significant (Sig. < 0.05), confirming that the use of artificial intelligence in teaching contributes significantly to space and time management.

TABLE VIII
CORRELATION BETWEEN ARTIFICIAL INTELLIGENCE AND TEACHING RESOURCES.

		Teaching Resources
Artificial Intelligence	Spearman's Rho	,542
	Sig. (bilateral)	,000
	N	65

As shown in the table, the correlation of Rho = 0.542, which is moderate and significant (Sig. < 0.05), demonstrates a bivariate relationship, indicating that increased use of artificial intelligence is associated with better teacher performance in utilizing teaching resources.

TABLE IX
CORRELATION BETWEEN ARTIFICIAL INTELLIGENCE AND CLASSROOM CLIMATE.

		Classroom Climate
Artificial Intelligence	Spearman's Rho	,551
	Sig. (bilateral)	,000
	N	65

As stated by the reported data, the correlation of Rho = 0.551 is moderate and significant (Sig. < 0.05), providing sufficient evidence to confirm that artificial intelligence is directly correlated with the classroom climate.

TABLE X
CORRELATION BETWEEN ARTIFICIAL INTELLIGENCE AND EVALUATION RESOURCES

		Evaluation Resources
Artificial Intelligence	Spearman's Rho	,569
	Sig. (bilateral)	,000
	N	65

In keeping with the reported data, the correlation of Rho = 0.569 is moderate and significant (Sig. < 0.05), providing sufficient evidence that artificial intelligence is positively correlated with evaluation resources.

Discussion

The overall results from the hypothesis testing confirm a significant relationship between the use of artificial intelligence and teaching performance. The correlation (Rho = 0.598, Sig. < 0.05) indicates a moderate, positive link between these variables. This finding highlights the importance of successfully integrating AI tools into pedagogy, as they can enhance teaching effectiveness, benefiting both educators and students. This aligns with [19], who emphasized that AI tools, when properly integrated, have a transformative potential to improve teaching practices. However, as noted by [19], effective management and strategic use of these tools are crucial for maximizing their educational impact. In line with this, [20] highlights that incorporating AI into their teaching practices significantly enhances their performance across multiple key areas. AI streamlines administrative tasks, facilitates personalized learning, provides timely feedback to

students, and supports data-driven decision-making for more effective instruction.

Furthermore, [21] reported a positive correlation of Rho = 0.598 was found between artificial intelligence and teacher performance, which aligns with the study who reported a correlation of Rs = 0.620* between the two variables, with a significant and positive relationship. This reinforces the conclusion that increased use of AI in education may contribute to improved teacher performance, as supported by both studies. The effective implementation of technological tools, such as artificial intelligence, emerges as a critical factor in optimizing pedagogical practices, ultimately enhancing academic performance and educational quality.

According to the specific objectives of this study, the findings are presented as follows:

First, in line with the results for objective 1, hypothesis testing confirms a significant correlation (Rho = 0.578, Sig. < 0.05) between artificial intelligence and teachers' time and space management. This underscores AI's value as a pedagogical tool, enhancing educators' ability to manage these aspects effectively. These findings align with [22], who emphasized that AI chatbots optimize time management by automating routine tasks and academic processes, allowing teachers to focus more on effective instruction. By reducing workload and accelerating instructional methods, AI-powered solutions contribute to more dynamic and engaging learning environments, ultimately enriching students' educational experiences. Furthermore, [23] highlighted that effective interaction between robot team members and humans is crucial for various real-world applications. AI enhances communication within multi-robot teams, facilitating the coordination of complex tasks and improving overall efficiency in task execution.

Second, in line with the objective 2 and its hypothesis test, a moderate and significant correlation (Rho = 0.542, Sig. < 0.05) was found between artificial intelligence and teaching resources. This suggests that when teachers implement AI in their lessons, it positively influences the use of teaching resources, enhancing teaching performance. AI's diverse functionalities in educational contexts benefit the teaching process. These results align with [24] study, which highlighted that AI could improve teaching methods by enhancing student motivation, interest, and engagement. Additionally, the flexible applications of AI contribute to a more dynamic learning environment, especially relevant for future educators in initial teacher training. Moreover, [25] intelligent search is becoming an increasingly prominent area of research in education. As artificial intelligence advances, search engines will evolve to better align with users' real needs. Furthermore, the development of this technology will lead to significant improvements in intelligent search, expanding its applicability and solidifying its relevance in the future of information processing.

Third, based on the objective 3, the hypothesis confirmed that artificial intelligence correlates directly with the classroom climate among teachers. This finding is supported by a Rho = 0.551 and Sig. < 0.05, demonstrating that the use of AI tools, resources, and strategies can enhance the classroom environment. These results align with [26] who reported that effective management of generative AI not only requires teachers to understand its functionalities but also to apply it in the classroom for various pedagogical moments, which can contribute to an improved classroom climate. Additionally, [27] emphasized that in a supportive classroom environment, students are more likely to engage effectively, experience greater comfort and relaxation, and feel less distracted or irritated by the equipment.

Ultimately, as stated by objective 4, the hypothesis confirmed a direct correlation between artificial intelligence and evaluative resources among teachers. This was supported by Rho = 0.569 and Sig. < 0.05, suggesting that the implementation of AI as an evaluative resource enhances the evaluation process and, consequently, improves teacher performance. In this regard, Jiménez (2022) stated that simply using technology is not enough; the way it is integrated into the educational process is what truly makes a difference. Teachers must receive proper training to not only familiarize themselves with these tools but also to develop the pedagogical skills needed to use them innovatively. Therefore, [28] suggested that by incorporating AI technologies like chatbots, learning recommendation systems, and data analysis tools, teaching this course is anticipated to enhance student engagement, improve efficiency, and boost overall effectiveness in the learning process.

IV. CONCLUSIONS

The study concluded that there is a moderate and significant correlation between artificial intelligence (AI) and teaching performance, with a Spearman's Rho coefficient of 0.598 and Sig. < 0.05. This suggests that the use of AI can enhance teaching performance by providing tools that improve educational processes.

A moderate and positive correlation between AI and time and space management was found, with a Spearman's Rho of 0.578 and Sig. < 0.05. This indicates that integrating AI as a pedagogical tool can lead to more effective time and space management in the classroom.

The relationship between AI and teaching resources was established, with a Spearman's Rho coefficient of 0.542 and Sig. < 0.05. This suggests that the application of AI in the classroom is associated with improved use of teaching resources.

A positive and significant correlation between AI and the classroom climate was identified, with a Spearman's Rho of 0.551 and Sig. < 0.05. This implies that the use of AI tools can contribute to a more positive and collaborative classroom environment.

A significant correlation between AI and evaluative resources was found, with a Spearman's Rho of 0.569 and Sig. < 0.05. This indicates that AI use is associated with improved quality and effectiveness of evaluative resources.

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