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Attitudes of University Professors towards the Use of Artificial Intelligence in Teaching and Learning

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ABSTRACT: In a world increasingly driven by artificial intelligence, higher education is at a critical point where it must demonstrate its relevance and adaptability. Universities not only they must transform ideas into actions but also reaffirm their value as public goods through community alliances that benefit everyone. In this process, understanding and addressing attitudes towards AI is crucial to integrate this technology ethically and effectively in education. To the by doing so, institutions not only prepare their students for an uncertain future, but also reinforce their role as communities of values, where technology, although powerful, continues being a tool at the service of integral human development.

Objective.- Under this research article it is intended analyze the attitudes of teachers towards AI in general and particularly towards its use in teaching-learning processes, as well as identifying the factors associated with the teachers' attitudes toward AI. In this sense, the results of the study will help develop teacher professionalization guidelines that address concerns and encourage the adoption of AI.

Method.- An empirical investigation of an explanatory and transversal nature was carried out. Concerning population, a through convenience sampling, a representative sample of 632 teachers was obtained with a confidence level of 0.99% of the total population of teachers at a university in the western Mexico. The dependent variables under study were the attitude of the teachers towards AI in general and teachers' attitudes to the use of AI in teaching processes learning and the independent variables were sex, age group, type of teacher, teaching experience in the institution, area of professional training knowledge, level of teacher training and AI training.

Instruments.- To identify teachers' attitudes, the AI scale was used, on the one hand. Attitude Scale (AIAS-4) developed and validated by Grassini, F. (2023) that evaluates general attitude towards artificial intelligence, focusing on public perceptions of AI technology. The scale is composed of four items designed to assess beliefs about the influence of AI in people's lives, in their careers and in humanity in general. The scale items are they focus on the perceived usefulness and potential impact of technology on society and humanity.

The AIAS-4 showed high internal consistency. It presented a Cronbach's alpha of 0.902 and an omega McDonald's score of 0.904, indicating a very high level of reliability. The AIAS-4 was correlated with the attitude factors of the Media and Technology Usage and Attitudes Scale (MTUAS) and the correlations were moderate and statistically significant with the positive factors and negative results of the MTUAS, which supports the convergent validity of the scale. For this research a pilot test was carried out and a Cronbach's alpha of 0.71 was obtained.

On the other hand, an *ad hoc* scale was developed to evaluate teachers' attitudes towards the use of generative artificial intelligence (AI) in teaching-learning processes. This scale considered five dimensions: perception of usefulness, ease of use, risk, implication social and intention of use. The scale was made up of 25 items and a Cronbach's alpha of 0.87 was obtained for the entire Scale and 0.77 for the usefulness dimension, 0.73 for ease of use, 0.85 for risk, 0.79 for social implications and 0.78 for intention to use.

Conclusions.- These are conclusions obtained:

(1) Teachers have a good attitude towards AI in general, believing that it will improve life, work, that they will use it in the future and that it is positive for humanity. However, there is a great dispersion among the opinions of the teachers so there is no consensus among them.

(2) Teachers have a good attitude towards the use of AI in teaching (4/5) they consider it useful, easy to use, with positive social implications and have intentions to use it. However, teachers have uncertainty and pockets of pessimism about the risk involved AI in teaching. In this regard, they are worried if it will replace them at work, yes will depersonalize learning experiences, it will amplify inequality gaps, if it is safe and reliable and can be used to manipulate and control.

(3) Create spaces where teachers can discuss their experiences, concerns and expectations about AI and document success experiences. These forums should encourage exchange of ideas and resolution of common problems, promoting an environment collaborative.

(4) Implement AI progressively, starting with tools that teachers considered more useful and easier to use. Provide constant and personalized technical assistance to facilitate adoption and solve problems in real time.

(5) Establish periodic evaluation mechanisms to monitor the impact of AI on the teaching and learning. Collect and analyze feedback data from teachers and students to continually adjust and improve learning strategies implementation.

(6) Communicate an institutional statement on the use of AI and the guidelines that guide its use. Directly address concerns about security, reliability, privacy and ethics in the use of AI. This includes ensuring that AI will not replace teachers but will serve as a complementary tool.

(7) Implement pilot projects in different academic areas to evaluate the effectiveness of the

AI in specific contexts. Document and share learning outcomes and lessons learned to guide future implementations.

(8) Centralize governance and institutional infrastructure for AI adoption upfront to promote the coordination of efforts. Of course, with openness to serve initiatives from different areas. While the academy defines the criteria to select relevant AI tools for professional training educational programs that are offered.

KEYWORDS: Artificial Intelligence; Teaching-learning, Teacher Attitudes.

I.- INTRODUCTION

Higher education has long grappled with its role in the world: How should universities translate ideas into action? In today's contentious environment, it has become a critical mission for universities to demonstrate their value to students through those who serve. The University as a Public Good explores various ways in which higher education can find purpose and benefit in enduring community partnerships, that is, in agreements that people in the community make for a common purpose and for the benefit of all. In this framework of searching for common goods, the attitudes of teachers towards Generative Artificial Intelligence (AI) in general and towards the teaching-learning processes are analyzed based on the role it plays.

Imagine a university classroom where students not only interact with a professor, but also debate, question, and learn from an artificial intelligence that knows all the information available. In this futuristic scenario, will AI become the perfect study companion or the most feared rival for teachers? This is the crossroads that higher education faces today. Are we ready for a classroom where the “greatest mind” has no pulse, is a machine, is AI?

The term generative artificial intelligence (AI) refers to a technology that allows computer programs and technologies to emulate human intelligence. AI is rapidly transforming various aspects of modern society, such as security, transportation, finance, and education, among others. As AI technologies are integrated into everyday life, it is essential to understand public attitudes and perceptions towards AI to guide its development, adoption and regulation (Grassini S. 2023, Araujo et al., 2020)

In the current context of postmodernist culture, marked by an ethical emotivism where emotions and affects guide behavior, power, money and emotion have become central references. Exploring technology and artificial intelligence (AI) as an ecosystem allows us to understand the role that ethical reasoning and virtuous practice have when considering the nature and purpose of the human being. The ecosystem is structured in four interrelated levels: macro, meso, micro and onto system. At the macro level, these include global and societal forces that influence the development and implementation of AI, such as government policies, the global economy, technological trends, and cultural perceptions. This level establishes the general context within which organizations and individuals operate, dictating the regulations, values and trends that guide the use of technology around the world.

At the meso level, there are organizations and institutions, such as universities, companies, and non-governmental organizations, which mediate between the macro and micro levels. These entities apply global guidelines to the local context, influencing the adoption and adaptation of AI in specific sectors. The micro level addresses the direct interaction of individuals and communities with AI, exploring how people and small communities adapt and respond to emerging technologies in their daily

lives. Finally, the onto system encompasses the deepest and most subjective dimension of the relationship between people and AI, focusing on how technology impacts people's personal identity, ethics, emotional well-being, and values. This model offers a comprehensive vision that captures the complex interaction between technology and society, from global policies to the personal experience of individuals (See Figure 1)

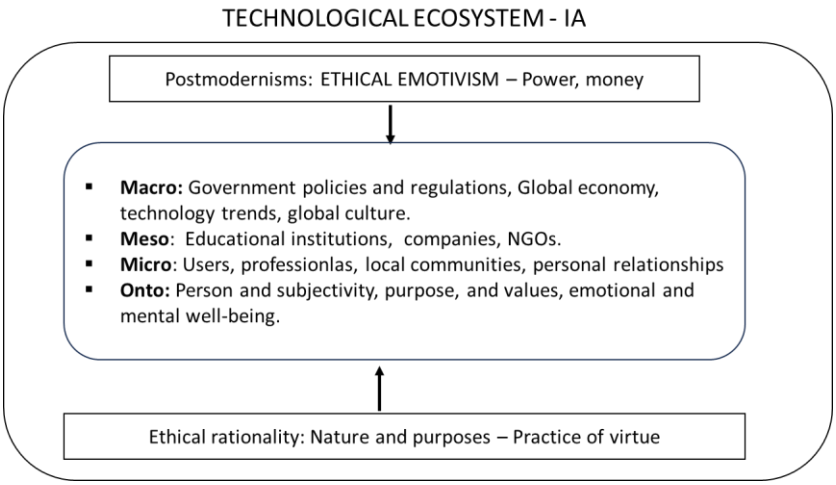

Figure 1.
Source: Own elaboration

There is an ongoing debate about AI, identifying numerous perspectives held by various stakeholders. It is of utmost importance for education to understand the interaction between person-computer and in general the acceptability and adoption of emerging technologies to develop and implement valid and effective actions for the incorporation of AI in teaching-learning processes.

Within the framework of university vocational training and its contribution to productivity and innovation as goals of the economic development of the region (ECLAC 2024). For Ernst, E., Merola, R., and Samaan, D. (2019), from a moderately optimistic perspective on AI, they consider that the wave of technological change driven by AI generates fear of job loss and increased inequality.

However, AI offers great opportunities to improve productivity, even in developing countries, by reducing capital costs and increasing productivity, especially in low-skilled workers. To share the benefits of AI and avoid further inequalities, policies are needed that regulate the digital economy, protect data privacy and encourage benefit sharing through taxes on digital capital and reduction of working time, as well as formulation of policies that consider their characteristics. For developing countries, this technological change poses significant challenges, as they face both the automation and relocation of existing tasks and therefore lose the advantage of lower labor costs that supported their development model in the past. recent. In this same direction, Tschang, F. T., and Almirall, E. (2021) consider that AI raises concerns about unemployment, although its defenders claim that it also creates jobs. Both positions are valid, but it is necessary to understand how AI can influence this aspect. Economic studies show that automation favors non-routine skills and affects medium-skill jobs. AI increases this automation, modulating routine work and leaving non-routine and highly skilled tasks. Combining AI with other technologies creates economies of scale and can reduce the need for highly skilled labor. A critical dialogue is required between society and business, and an update in teaching in higher education institutions. Organizations often do not consider that Information and Communications Technologies (ICT) may not be suitable for cultural contexts other than those in which it was created, which can generate a culture clash in its acceptance by users. Culture significantly influences the disposition towards the use of ICT in an organization or country. Some experts point out that ICT designers do not always consider cultural differences and their implications, which can lead to misuse or failure of these technologies (Yong-Varela, L. A. 2004).

Recent studies explore university professors' attitudes toward AI in higher education. The findings indicate a mix of opportunities and challenges. While generative AI is considered potentially beneficial for rethinking pedagogical practices and improving teaching (Andreoli et al., 2024; Bernilla Rodríguez, 2024), concerns remain about academic integrity, plagiarism, and technological dependency (Ramírez Martinell and Casillas Alvarado, 2024). Teachers recognize the advantages of generative AI in generating texts and organizing activities, but express doubts about its precision and veracity (Bernilla Rodríguez, 2024). There is a consensus on the need for continuous teacher training and collective reflection to address these challenges (Andreoli et al., 2024; Bernilla Rodríguez, 2024). Generative and conversational AI tools are most frequently used for class preparation and integration (Sánchez Vera, 2023). Despite the limited understanding and integration of AI in educational processes, it is generally

perceived as a tool that can improve teaching and learning when used judiciously (Ramírez Martinell and Casillas Alvarado, 2024; Sánchez Vera, 2023).

In this area, the study of attitudes towards AI can provide valuable information on the factors that influence people's acceptance or resistance to its use. Understanding these factors helps to take educational actions that address people's concerns while raising awareness of its potential and positive impact by fostering a deeper understanding of people's feelings and expectations to ensure that AI develops and implement responsibly and ethically in education. To maximize the benefits of AI while mitigating its potential risks, leading to a more harmonious integration of AI into our academic lives.

Grassini (2023) developed the AIAS scale based on an exhaustive review of theoretical models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), as well as empirical studies on artificial intelligence. This innovative scale seeks to measure attitudes towards generative AI, placing special emphasis on how people perceive its usefulness and impact on society. AIAS allows you to explore both the expected benefits and potential risks associated with AI, in addition to evaluating people's willingness to use these technologies in their daily lives.

Following the principles of the TAM Model proposed by Davis, F.D. (1989) and Davis, F.D.; Bagozzi, R.P. and Warsaw P.R. (1989) and the UTAUT formulated by Venkatesh V., Morris G.M., Davis G.B., Devis F.D. (2003) in this research, an instrument was developed that captures teachers' attitudes towards AI in teaching using as dimensions: Perceptions of usefulness that AI has for teachers, this is the extent to which a person believes that Using a specific technology will improve your performance at work. The perception of ease of use refers to the extent to which a person believes that using a technology will be effortless. Risk perception refers to the concerns and fears teachers may have about using AI. The social implications point to the broader effects that the adoption of AI can have on the educational community and society in general and finally the intentions of use, that is, the willingness of a person to use this technology in the future. See figure 2.

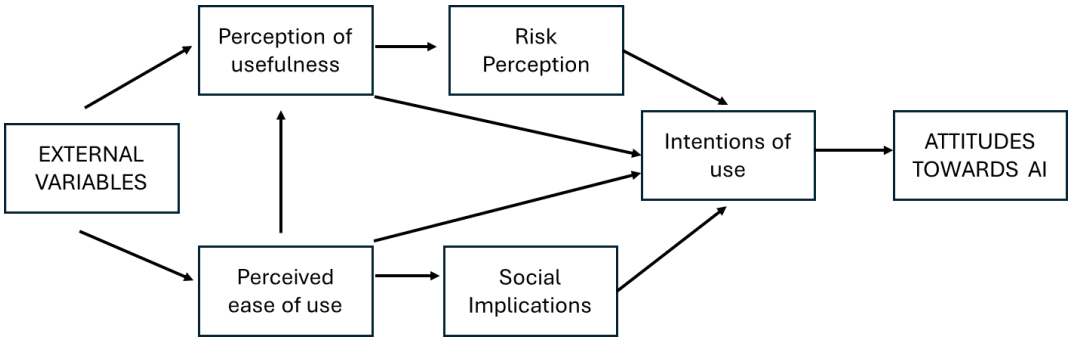

Figure 2: Dimensions of attitudes towards IAG

Source: Adapted from the Technology Acceptance Model (TAM), Davis (1989), Davis, et al. (1989) and Davis (1993)

Studies on people's behavior in accepting technology emphasize the need to expand the Unified Theory of Acceptance and Use of Technology (UTAUT) to encompass a multifactorial analysis of the use of these systems to better understand how they are integrated into the daily practice of professionals. (Gonzalez-Arza E. 2012 and Venkatesh, V.; Thong, J. Y. L. & Xin X. 2016)

Education, as an intentional activity, requires that participants in the teaching-learning processes evaluate the means and results based on the goals of education. For MacItyre (2016) this implies the need to consider that intentional actions are those that we carry out based on our beliefs about them. This implies that we believe that certain aspects of these stocks make them attractive or valuable. Therefore, reflecting on our own desires means stopping at the right moment, before acting, to evaluate how valid our reasons are for acting to satisfy that desire. Being reflective in our relationships with others implies knowing how to evaluate their desires, considering both the real or perceived goods that constitute the objects of their desire, and the level of reflection that they themselves have regarding those desires.

To understand attitudes towards artificial intelligence, it is essential to consider several factors that influence its perception and acceptance. People value both the benefits, such as efficiency and automation of tedious tasks, and the risks, such as job loss and data privacy. Trust in AI is strengthened by transparency in its operation and data handling, while a lack of clarity can generate distrust. Furthermore, ethical considerations, such as fairness and justice, are increasingly relevant, and people tend to have more positive attitudes when these are appropriately addressed. Familiarity and prior experience with AI also play a crucial role; Those who have had positive interactions tend to be more accepting, in contrast to those who have had negative experiences. Finally, clear and assertive communication about the benefits, risks and limitations of AI can foster a more informed and balanced perception of this technology.

In summary, to understand attitudes towards artificial intelligence, it is important to consider perceived benefits and risks, trust in the technology, ethical considerations, previous experience, communication and education about AI. These aspects help to interpret and assess teachers' attitudes towards artificial intelligence effectively.

In this perspective, this research aims to: analyze teachers' attitudes towards AI in general and particularly towards its use in teaching-learning processes, as well as identify the factors associated with teachers' attitudes towards AI. In this sense, the results of the study will help develop teacher professionalization guidelines that address concerns and encourage the adoption of AI.

When integrating AI into education, it is essential to ask ourselves how this technology can enhance the comprehensive development of people. In vocational training, this means cultivating the unique human skills of each profession and helping students achieve both career success and personal fulfillment of purpose. Education should focus on improving human nature and making the most of the potential of everyone, always guided by solid moral principles and goods that give meaning to their lives.

When using AI in education, it is important not to lose sight of the fact that personal development requires constant practice and collaboration. By working together, we can help each other achieve our goals and cultivate the virtues we value. Success, in this sense, is an internal achievement that is experienced on a personal level.

In this educational revolution driven by AI, it is important to recognize that the community precedes the learner, assigning them responsibilities and rules from the beginning. However, this does not only mean respecting and perpetuating what is inherited. Tradition is a continuous debate oriented towards the good, and what sustains a tradition are the virtues, among which the understanding of said tradition now stands out. This understanding is essential to being able to choose not to accept the limitations of the community. In this sense, the university is defined as a community based on shared values, where technology is only a tool.

In a world increasingly driven by artificial intelligence, higher education is at a critical point where it must demonstrate its relevance and adaptability. Universities must not only transform ideas into actions but also reaffirm their value as public goods through community alliances that benefit everyone. In this process, understanding and addressing attitudes towards AI is crucial to integrate this technology ethically and effectively in education. By doing so, institutions not only prepare their students for an uncertain future, but also reinforce their role as communities of values, where technology, although powerful, remains a tool at the service of integral human development.

II. METHODOLOGY USED

Type of study: An empirical investigation of an explanatory and transversal nature was carried out.

Population: Through convenience sampling, a representative sample of 632 professors was obtained with a confidence level of 0.99% of the total population of professors at a university in western Mexico.

Variables: The dependent variables under study were the attitude of teachers towards AI in general and the attitudes of teachers to the use of AI in teaching-learning processes and the independent variables were sex, age group, type of teacher, teaching experience in the institution, area of professional training knowledge, Level of teaching training and AI Training.

Instruments: To identify teachers' attitudes, on the one hand, the AI Attitude Scale (AIAS-4) developed and validated by Grassini, F. (2023) was used, which evaluates the general attitude towards artificial intelligence, focusing on the public perceptions about AI technology. The scale is made up of four items designed to assess beliefs about the influence of AI on people's lives, careers, and humanity in general. The scale items focus on the perceived usefulness and potential impact of technology on society and humanity. The AIAS-4 showed high internal consistency. It presented a Cronbach's alpha of 0.902 and a McDonald's omega of 0.904, indicating a very high level of reliability. The AIAS-4 was correlated with the attitude factors of the Media and Technology Usage and Attitudes Scale (MTUAS) and the correlations were moderate and statistically significant with the positive and negative factors of the MTUAS, supporting the convergent validity of the scale. For this research, a pilot test was carried out and a Cronbach's alpha of 0.71 was obtained. On the other hand, an ad hoc scale was developed to evaluate teachers' attitudes towards the use of generative artificial intelligence (AI) in teaching-learning processes. This scale considers five dimensions: Perception of usefulness, ease of use, risk, social implications and intention to use. The scale was made up of 25 items and a Cronbach's alpha of 0.87 was obtained for the entire Scale and 0.77 for the usefulness dimension, 0.73 for ease of use, 0.85 for risk, 0.79 for social implications and 0.78 for intention of use.

For the descriptive analysis of the data, measures of central tendency (means and standard deviations) were obtained and to identify the associated factors, multifactorial and simple analysis of variance were carried out, as well as multifactorial regression analysis to understand the relationships between the perception of usefulness (PU), perceived ease of use (PFU), social implications and intention to use affect attitude towards use (AU).

III.- RESULTS

A) From descriptive analysis:

Regarding teachers' attitudes towards AI in general: Figure 3 shows that teachers express a favorable attitude towards artificial intelligence, giving it an average rating of 8 out of 10. Their interest in using this technology in the future stands out, with an average rating of 9 out of 10.

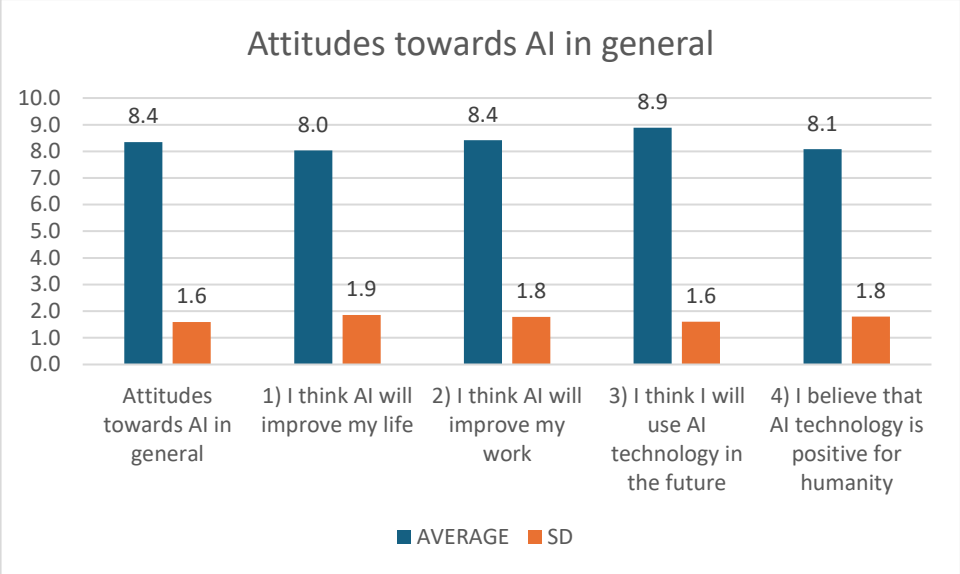

Figure 3

Source: Own elaboration.

In Figure 4 it can be seen that the teachers consulted show a general acceptance towards the incorporation of AI in their pedagogical practices, except in relation to the possible risks that this technology could represent for the teaching-learning process, where certain uncertainty.

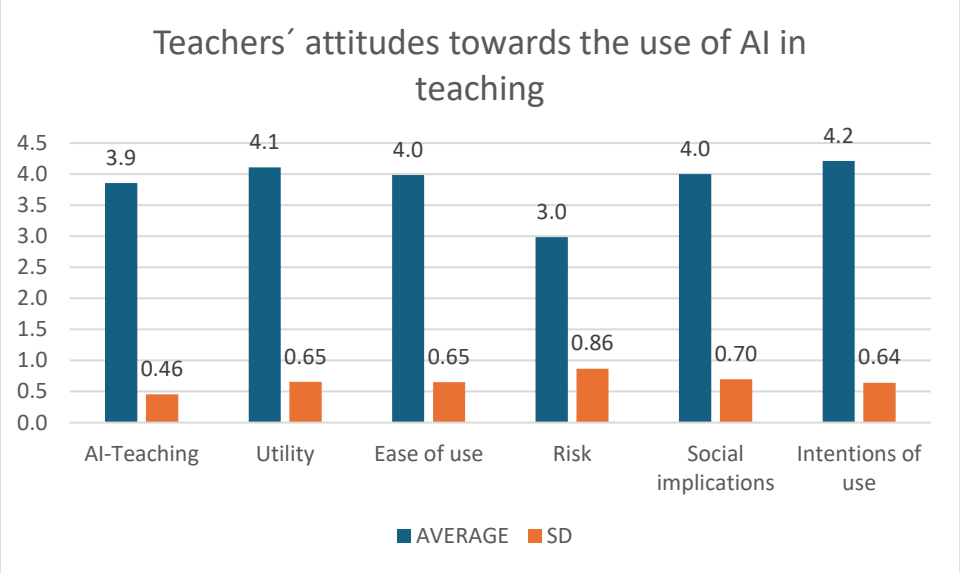

Figure 4

Source: Own elaboration.

Table 1 shows the results for each of the questions on the scale. It is pertinent to highlight that in the risk dimension the attitudes are one of indecision and within the group of teachers there is no consensus in their answers about whether AI loses. will replace at work, it will depersonalize learning experiences, and it will widen inequality gaps, among other aspects.

Table 1

Teachers' attitudes towards the use of AI in teaching	AVERAGE	SD
Utility	**4.1**	**0.65**
1. AI would help me be more effective in teaching.	4.1	0.83
6. AI would allow me to offer a more personalized learning experience	3.9	0.96
11. AI would help me optimize time in administrative and grading tasks.	4.2	0.79
16. AI would allow me to access new resources and tools for teaching.	4.3	0.69
21. AI would help me improve the quality of my evaluations.	4.1	0.87
Ease of use	**4.0**	**0.65**
2. I feel comfortable using technology in general.	4.3	0.77
7. I think I can learn to use AI easily.	4.3	0.76
12. AI is easy to use and integrate into my classes.	3.9	0.87
17. The user interface of AI systems is friendly and easy to use.	3.9	0.91
22. I have access to sufficient technical support to use AI in teaching.	3.5	1.07
Risk	**3.0**	**0.86**
3. I am worried that AI could replace my job as a teacher.	2.3	1.16
8. I am concerned that AI could depersonalize the learning experience	3.2	1.25
13. I am concerned that AI could amplify inequality gaps	3.2	1.13
18. I am concerned that AI is not safe or reliable for use in teaching.	3.3	1.16
23. I am concerned that AI could be used to manipulate or control	3.0	1.26
Social implications	**4.0**	**0.70**
4. I believe that AI has the potential to improve the quality of education.	4.1	0.83
9. I believe AI can make education more accessible to everyone.	3.9	0.96
14. I believe AI can help prepare students for future work.	4.0	0.92
19. I believe that AI is a valuable tool for research and development,	4.2	0.79
24. I believe AI can be used to promote inclusion and equity.	3.8	0.96
Intentions of use	**4.2**	**0.64**
5. I intend to use AI in my teaching in the near future.	4.2	0.75
10. I would recommend the use of AI to other teachers.	4.2	0.85
15. I am looking for opportunities to learn more about AI.	4.1	0.83
20. I am willing to invest time and effort in learning how to use AI.	4.3	0.71
25. I believe that AI can have a positive impact on education.	4.2	0.80

Source: Own elaboration.

b) On the factors associated with teachers' attitudes towards AI: The evaluation of teachers' attitudes towards AI was oriented in two directions, first on the expectations and impact of AI on people's lives in general, that is, they do consider that AI will improve their lives, their work, that they will use it in the future and that it is positive for humanity; and then about the incorporation of AI in teaching.

To determine the factors associated with teachers' attitudes towards AI; First, a multifactorial ANOVA was calculated to determine if the variables: Sex, School year, Type of teacher, Teaching experience, Area of knowledge, Level of teacher training

and Training in AI have a statistically significant relationship with attitudes towards AI and then proceed to calculate a simple ANOVA to identify the differences between the subgroups within the factor variables.

For teachers' attitudes toward AI in general, Table 2 of the multivariate ANOVA breaks down the variability of the values for each of the variables. Since Type III sum of squares have been selected (default), the contribution of each value is measured by eliminating the effects of the other factors. P-values evaluate the statistical significance of each of these factors. When a P-value is less than 0.05, this indicates that the factor has a statistically significant effect, with a confidence level of 95.0%. In this case, the variable Teaching experience with a P-value of 0.0167 and the variable AI training with a P-value of 0.0000 are significantly related to teachers' attitudes towards AI.

Table 2

Multivariate Analysis of Variance for TEACHERS' ATTITUDES TOWARDS AI in General - Type III Sum of Squares

Source	*Sum of Squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
MAIN EFFECTS					
A: Sex	0.378073	1	0.378073	0.16	0.6935
B: Age group	3.44532	3	1.14844	0.47	0.7021
C: Teacher type	7.96287	2	3.98144	1.64	0.1957
D: Teaching experience	25.0912	3	8.36372	3.44	**0.0167**
E: A- of Knowledge	7.19585	3	2.39862	0.99	0.3992
F: Teacher training level	4.05163	2	2.02582	0.83	0.4356
G: AI Training	46.0818	1	46.0818	18.93	**0.0000**
WASTE	1499.68	616	2.43455		
TOTAL (Corrected)	1606.53	631			

All F-ratios are based on the mean square of the residual error

Source: Own elaboration.

To identify the differences within the variables, that is, the subgroups that make them up, the results of the simple ANOVA and the Multiple Range test are presented below for the two variables that were identified as factors associated with the teachers' attitudes. towards AI.

Table 3 shows that the P-Value of the simple ANOVA confirms that the Teaching Experience variable has a significant relationship with teachers' attitudes towards AI. When comparing the subgroups of the variable in the Multiple Range Tests, it is identified that there are significant differences between teachers with up to 5 years of experience and those with 16 or more years of teaching experience.

Table 3

Simple ANOVA for ATTITUDES TOWARD AI in General by TEACHING EXPERIENCE

Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	31.224	3	10.408	**4.15**	**0.0063**
Intra groups	1575.31	628	2.50845		
Total (Corrected)	1606.53	631			

Multiple Range Tests for ATTITUDES TOWARD AI in General by TEACHING EXPERIENCE

Method: 95.0 percent LSD			
TEACHING EXPERIENCE	*Cases*	*Average*	*Homogeneous groups*
16- + years	173	8.02746	X
11-15 years	48	8.22917	XX
6-10 years	105	8.35714	XX
0-5 years	306	8.55229	X

Contrast	*Sig.*	*Difference*	*+/- Limits*

0-5 years - 11-15 years		0.323121	0.481917
0-5 years - 16- + years	*	**0.524831**	0.295281
0-5 years - 6-10 years		0.195145	0.351089
11-15 yearsa - 16- + years		0.20171	0.506412
11-15 years - 6-10 years		-0.127976	0.540857
16- + years - 6-10 years		-0.329686	0.384022

* indicates a significant difference.

Source: Own elaboration.

In Table 4, the results confirm that the AI Training variable with a P-Value of 0.0000 has a significant relationship with teachers' attitudes towards AI in General and that there are significant differences between those who have received AI Training and those who have not.

Table 4

Simple ANOVA for ATTITUDES TOWARD AI by AI TRAINING

Source	*Sum of squares*	*df*	*Meean Square*	*F-Ratio*	*P-Value*
Between groups	46.1188	1	46.1188	**18.62**	**0.0000**
Intra groups	1560.41	630	2.47684		
Total (Corrected.)	1606.53	631			

Multiple Range Tests for ATTITUDES TOWARD AI by AI TRAINING

Method: 95.0 percent LSD

AI TRAINING	*Cases*	*Average*	*Homogeneous groups*
No	274	8.04288	X
Yes	358	8.58799	X

Contraste	*Sig.*	*Difference*	*+/- Limits*
No – Yes	*	-0.545106	0.247594

* Indicates a significant difference.

Source: Own elaboration.

Regarding the factors associated with teachers' attitudes towards the use of AI in teaching-learning processes, Table 5 presents the results of the multifactor ANOVA and identifies that the variables Teaching Experience with a P Value of 0.0070 and AI Training with a P-Value of 0.0003 have a statistically significant relationship with teachers' attitudes.

Table 5

Multifactor Variance Analysis for TEACHERS' ATTITUDES TOWARDS AI IN TEACHING - Type III Sum of Squares

Source	*Sum of Squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
MAIN EFFECTS					
A: Sex	0.00427957	1	0.00427957	0.02	0.8842
B: Age group	0.436255	3	0.145418	0.72	0.5395
C: Teacher type	0.253893	2	0.126947	0.63	0.5331
D: Teaching experience	2.46767	3	0.822556	4.08	**0.0070**
E: A- of Knowledge	0.701568	3	0.233856	1.16	0.3243
F: Teacher training level	0.980423	2	0.490212	2.43	0.0888
G: AI Training	2.58539	1	2.58539	12.82	**0.0003**
WASTE	124.193	616	0.201611		
TOTAL (Corrected)	132.819	631			

All F-ratios are based on the mean square of the residual error

Source: Own elaboration.

Table 6 presents the results of the simple ANOVA and the Multiple Range Tests for the Teaching Experience variable. The P Value of 0.0037 confirms that this variable is a factor associated with teachers' attitudes. On the other hand, in the lower part of the table, significant differences are identified between teachers between 0 and 5 years of teaching experience and those who have between 6-10 years and 16 or more years.

Table 6

ANOVA for ATTITUDES TOWARD AI IN TEACHING by TEACHING EXPERIENCE

Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	2.81374	3	0.937913	**4.53**	**0.0037**
Intra groups	130.005	628	0.207014		
Total (Corrected.)	132.819	631			

Multiple Range Tests for ATTITUDES TOWARD AI-TEACHING by TEACHING EXPERIENCE

Method: 95.0 percentLSD			
TEACHING EXPERIENCE	*Cases*	*Average*	*Homogeneuos Groups*
11-15 years	48	3.71458	X
16- + years	173	3.79595	X
6-10 years	105	3.84762	XX
0-5 years	306	3.91928	X
Contrast	*Sig.*	*Difference*	*+/- Limits*
0-5 years - 11-15 years	*	**0.204698**	0.138443
0-5 years - 16- + years	*	**0.123327**	0.0848268
0-5 years - 6-10 years		0.071662	0.100859
11-15 years - 16- + years		-0.0813704	0.145479
11-15 years - 6-10 years		-0.133036	0.155375
16- + years - 6-10 years		-0.0516653	0.11032
* Indicates a significant difference			

Source: Own elaboration.

Table 7 presents the results of the simple ANOVA for teachers' attitudes towards the use of AI in teaching and confirms with a P-Value of 0.0001 that the AI Training variable has a significant statistical relationship with attitudes. of the teachers. At the bottom, the difference between teachers with AI Training and those without it becomes evident.

Table 7

Simple ANOVA for TEACHERS' ATTITUDES TOWARDS AI IN TEACHING by AI TRAINING

Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	3.03701	1	3.03701	**14.74**	**0.0001**
Intra groups	129.782	630	0.206003		
Total (Corrected)	132.819	631			

Multiple Range Tests for ACT-IA-TEACHING by AI TRAINING

Method: 95.0 percent LSD			
TRAINING AI	*Cases*	*Average*	*Homogeneuos groups*
No	274	3.77883	X
Yes	358	3.91872	X
Contrast	*Sig.*	*Difference*	*+/- Límites*
No – Yes	*	**-0.139883**	0.0714048
* Indicates a significant difference			

Source: Own elaboration.

Considering the scores that teachers assigned to AI in the different dimensions that evaluate their attitudes towards its use in teaching. The lowest mean was for the Risk dimension, which is why the multifactorial ANOVA was calculated for this dimension to identify the factors associated with this attitude. In Table 8 The variables Age Group with a P-Value of 0.0023, Teaching Experience with a P-Value of 0.0278 and AI Training with a P-Value of 0.0004 have a significant statistical relationship with teachers' attitudes towards the Risk that AI represents for teaching.

Table 8

Multifactor Variance Analysis for the RISK dimension - Type III Sum of Squares

Source	*Sum of Squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
MAIN EFFECTS PRINCIPALES					
A: Sex	1.40394	1	1.40394	1.97	0.1606
B: Age Group	10.4384	3	3.47948	4.88	**0.0023**
C: Teacher Type	0.52774	2	0.26387	0.37	0.6909
D: Teaching experience	6.54294	3	2.18098	3.06	**0.0278**
E: A- of Knowledge	5.43241	3	1.8108	2.54	0.0556
F: Teacher training level	3.28742	2	1.64371	2.31	0.1006
G: AI Training	9.02546	1	9.02546	12.66	**0.0004**
WASTE	439.253	616	0.713073		
TOTAL (Corrected)	471.934	631			

All F-ratios are based on the mean square of the residual error.

Source: Own elaboration.

Table 9 identifies that there is a statistically significant difference between the mean of the Risk dimension and the segments of the Age Group variable, with a 5% level of significance. At the bottom of the table, significant differences are identified between teachers in the 25-35 age group and the 36-45 age group, between the 25-35 group and the 56- or older group, and finally between the age group between 36-45 with the 46-55.

Table 9

Simple ANOVA for the RISK dimension by AGE Group

Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	7.52988	3	2.50996	**3.39**	**0.0177**
Intra groups	464.404	628	0.739496		
Total (Correted.)	471.934	631			

Multiple Range Testing for RISK dimension by AGE Group

Method: 95.0 percent LSD

AGE GROUP	*Cases*	*Average*	*Homogeneuos groups*
36-45 years	166	2.85663	X
56- + years	129	2.88992	XX
46-55 years	150	3.07867	XX
25-35 years	187	3.09626	X

Contrast	*Sig.*	*Diference*	*+/- Limits*
25-35 years - 36-45 years	*	**0.23963**	0.179734
25-35 years - 46-55 years		0.01759	0.184742
25-35 years - 56- + years	*	**0.206334**	0.192906
36-45 years - 46-55 years	*	**-0.22204**	0.189872
36-45 years - 56- + years		-0.033296	0.197824
46-55 years - 56- + years		0.188744	0.202385

* indicates a significant difference

Source: Own elaboration.

Table 10 identifies that the P-value of 0.0884 of the F-ratio is greater than 0.05, so there is no statistically significant difference between the Risk dimension and the Teaching Experience variable. At the bottom of the table, 2 homogeneous groups have been identified according to the alignment of the X's in columns; On the other hand, differences are identified between teachers with teaching experience of 0-5 years and those of 6-10 years.

Table 10

Simple ANOVA for the dimension RISK by TEACHING EXPERIENCE

Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	4.87933	3	1.62644	**2.19**	**0.0884**
Intra groups	467.054	628	0.743717		
Total (Corrected.)	471.934	631			

Multiple Range Tests for RISK Dimension by Teaching Experience

Method: 95.0 percentLSD			
TEACHING EXPERIENCE	*Cases*	*Average*	*Homogeneous Groups*
11-15 years	48	2.89167	XX
0-5 years	306	2.92222	X
16- + years	173	3.02775	XX
Years	105	3.15238	X

Contrast	*Sig.*	*Difference*	*+/- Limits*
0-5 years- 11-15 years		0.0305556	0.262406
0-5 years - 16- + years		-0.105523	0.160782
0-5 years- 6-10 years	*	**-0.230159**	0.191169
11-15 years - 16- + years		-0.136079	0.275743
11-15 years - 6-10 years		-0.260714	0.294499
16- + years - 6-10 years		-0.124635	0.209102

* Indicates a significant difference

Source: Own elaboration.

The results of the simple ANOVA for the AI Training variable in relation to the Risk dimension are presented in table 11, which identifies that the P-Value of 0.0091 is less than 0.05, which confirms a statistically significant difference between the variables. When contrasting the two groups of this variable, it is identified that there are statistically significant differences between teachers with AI Training and those without with a 95% confidence level.

Table 11

Simple ANOVA for the dimension RISK by AI TRAINING

Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	5.03506	1	5.03506	**6.79**	**0.0091**
Intra groups	466.899	630	0.741109		
Total (Corrected.)	471.934	631			

Multiple Range Tests for dimension RISK by AI TRAINING

Method: 95.0 percent LSD			
AI TRAINNING	*Cases*	*Average*	*Homogeneous groups*
Yes	358	2.90894	X
No	274	3.08905	X

Contrast	*Sig.*	*Difference*	*+/- Limits*
No – Yes	*	**0.180113**	0.135435

* Indicates a significant difference

Source: Own elaboration.

c) In relation to the dimensions: Utility, Ease of Use, Risk Perception, Social Implications and Intention of Use that make up the construct Teachers' attitudes towards the use of AI in teaching. Table 12 presents the results of the multivariate analysis, that is, the correlations between the dimensions and the construct of teachers' attitudes towards the use of AI in teaching. The table shows the Pearson product moment correlations between each pair of dimensions. The range of these correlation coefficients is from -1 to +1, and they measure the strength of the linear relationship between the dimensions. Also shown, in parentheses, are the number of data pairs used to calculate each coefficient. The third number in each block of the table is a P-value that tests the statistical significance of the estimated correlations.

The following pairs of dimensions have P-values below 0.05: Utility and Ease of Use, Utility and Risk, Utility and Social Impact, Utility and Intention to Use, Utility and Attitudes towards AI in Teaching, Ease of Use and Risk, Ease of use and Social impact, Ease of use and Intention to use, Ease of use and Attitudes towards AI in teaching, Risk and social impact, Risk and Intention to use, Risk and Attitude towards AI in teaching, Social impact and Intention to use, Social impact and Attitudes towards AI in teaching to conclude Intention to use and Attitudes towards AI in teaching.

Table 12

CORRELATIONS OF DIMENSIONS AND ATTITUDES TOWARDS AI IN TEACHING

	UTILITY	EASY OF USE	RISK	SOCIAL IMPLICATIONS	INTENTIONS OF USE	ATTITUDES TOWARS AI IN TEACHING
UTILITY		0.6388	-0.2273	0.8135	0.8537	0.8697
		(632)	(632)	(632)	(632)	(632)
		0.0000	0.0000	0.0000	0.0000	0.0000
EASY OF USE	0.6388		-0.1982	0.5650	0.6675	0.7505
	(632)		(632)	(632)	(632)	(632)
	0.0000		0.0000	0.0000	0.0000	0.0000
RISK	-0.2273	-0.1982		-0.2586	-0.2635	0.1065
	(632)	(632)		(632)	(632)	(632)
	0.0000	0.0000		0.0000	0.0000	0.0072
SOCIMP-IMP	0.8135	0.5650	-0.2586		0.8077	0.8280
	(632)	(632)	(632)		(632)	(632)
	0.0000	0.0000	0.0000		0.0000	0.0000
INT-USE	0.8537	0.6675	-0.2635	0.8077		0.8591
	(632)	(632)	(632)	(632)		(632)
	0.0000	0.0000	0.0000	0.0000		0.0000
ATTITUDES TOWAR IA IN TEACHING	0.8697	0.7505	0.1065	0.8280	0.8591	
	(632)	(632)	(632)	(632)	(632)	
	0.0000	0.0000	0.0072	0.0000	0.0000	

Note: The data that appears corresponds to: Correlation, (Sample Size) and P-Value

Source: Own elaboration.

Table 13 shows the results of the Multiple Regression that summarizes the relationships between the 5 dimensions that make up the construct as predictors of the total scores on teachers' Attitudes towards the use of AI in teaching. The equation of the adjusted model was ACT-IA-TEACHING = -0.009282 + 0.20417*UTILITY + 0.199866*FAC-USE + 0.201879*RISK + 0.204302*IMP-SOC + 0.192868*INT-USE. Since the P-value in the ANOVA table is less than 0.05, there is a statistically significant relationship between the dimensions with a 95.0% confidence level.

The R-Square statistic indicates that the adjusted model explains 99.6433% of the variability in teachers' attitudes towards the use of AI in teaching. The adjusted R-Square statistic, which is most appropriate for comparing models with different numbers of independent variables, is 99.6405%. The standard error of the estimate shows that the standard deviation of the residuals is 0.0275102. The mean absolute error (MAE) of 0.0231554 is the average value of the residuals. The Durbin-Watson (DW) statistic examines the residuals to determine if there is any significant correlation based on the order in which they occur in the data.

Since the P-value is greater than 0.05, there is no indication of serial autocorrelation in the residuals at the 95.0% confidence level. To determine if the model can be simplified, note that the highest Pvalue of the independent variables is 0.0000, which corresponds to UTILITY. Since the P-value is less than 0.05, that term is statistically significant with a confidence level of 95.0%. Consequently, it is not necessary to eliminate any variable from the model.

Table 13

Multiple Regression Estimates

Parameter	*Estimate*	*Standar Error*	*Statistical T*	*P-Value*
CONSTAN	-0.009282	0.00982121	-0.945097	0.3446
P-UTILIDAD	0.20417	0.00356403	57.2863	**0.0000**
P-FAC-USO	0.199866	0.00229471	87.0988	0.0000
P-RIESGO	0.201879	0.0013183	153.136	0.0000
P-IMP-SOC	0.204302	0.00291988	69.9694	0.0000
P-INT-USO	0.192868	0.00369899	52.1406	0.0000

Análisis de Varianza

Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Model	132.345	5	26.469	34974.53	**0.0000**
Residue	0.473762	626	0.000756808		
Total (Corr.)	132.819	631			

R-squared = 99.6433 percent. R-squared (adjusted for d.f.) = 99.6405 percent. Std Standard error = 0.0275102. Mean absolute error = 0.0231554. Durbin-Watson statistic = 2.0055 (P=0.4724). Autocorrelation of residuals at lag 1 = -0.00370763

Source: Own elaboration.

The results of the simple ANOVA, presented in table 14, confirm the relationships proposed in the model to explain teachers' attitudes towards AI. The differences in the means of the dimensions evaluated (Usefulness, Ease of use, etc.) are statistically significant ($p < 0.05$), which indicates that the model fits the data.

Table 14

Simple ANOVA by variable dimension of teachers' attitudes towards the use of AI in teaching

UTILITY by Perceptions of EASE OF USE					
Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	122.163	18	6.78684	**28.04**	**0.0000**
Intra groups	148.354	613	0.242013		
Total (Corr.)	270.517	631			
SOCIAL IMPLICATIONS due to Perceptions of EASE OF USE					
Source	*Sum of squares*	*df*	*Mean Square Medio*	*F-Ratio*	*P-Value*
Between groups	112.413	18	6.24515	**19.63**	**0.0000**
Intra groups	195.026	613	0.318151		
Total (Corr.)	307.439	631			
RISK due to Perceptions of UTILITY					
Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	42.7567	17	2.5151	**3.60**	**0.0000**

Intra groups	429.177	614	0.698985		
Total (Corr.)	471.934	631			
INTENTION TO USE by Perceptions of EASE OF USE					
Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	129.304	18	7.18355	**33.57**	**0.0000**
Intra groups	131.19	613	0.214012		
Total (Corr.)	260.493	631			
INTENTION TO USE by Perceptions of UTILITY					
Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	192.137	17	11.3021	**101.52**	**0.0000**
Intra groups	68.3568	614	0.11133		
Total (Corr.)	260.493	631			
INTENTION TO USE by Perceptions of SOCIAL-IMPLICATIONS					
Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	177.108	19	9.32145	**68.41**	**0.0000**
Intra groupo	83.3858	612	0.136251		
Total (Corr.)	260.493	631			
INTENTION TO USE due to RISK Perceptions					
Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	45.5157	20	2.27578	**6.47**	**0.0000**
Intra groups	214.978	611	0.351846		
Total (Corr.)	260.493	631			
ATTITUDES TOWARD AI IN TEACHING by Perceptions of INTENTIONS TO USE					
Source	*Sum of squares*	*df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	100.173	19	5.27226	**98.84**	**0.0000**
Intra groups	32.6458	612	0.0533428		
Total (Corr.)	132.819	631			

Source: Own elaboration.

IV.- CONCLUSIONS

Based on the results of the study, the following is concluded:

(1) Teachers have a good attitude towards AI in general, considering that it will improve life, work, that they will use it in the future and that it is positive for humanity. However, there is a great dispersion among the opinions of the teachers so there is no consensus among them.

(2) Teachers have a good attitude towards the use of AI in teaching (4/5) they consider it useful, easy to use, with positive social implications and they have intentions to use it. However, teachers have uncertainty and pockets of pessimism about the risk that AI implies in teaching. In this regard, they are concerned about whether it will replace them at work, whether it will depersonalize learning experiences, whether it will amplify inequality gaps, whether it is safe and reliable and whether it can be used to manipulate and control.

(3) The variables associated with teachers' attitudes towards AI in general are the variables Teaching experience and Training in AI, so the alternative hypothesis (H1) is approved for these variables and the null hypothesis (Ho) is approved for the variables Sex, Age Group, Type of teacher, Area of knowledge and level of teacher training with 95% reliability. In this regard, it is pertinent to mention that age is not a significant variable in teachers' attitudes towards AI and the specific training they receive.

(4) The factors associated with teachers' attitudes towards the use of AI in teaching are Teaching Experience and Training in AI, so H1 is approved for these variables and Ho is approved for the variables Sex, Age Group, Type of teacher, Area of knowledge and Level of teacher training with 95% reliability. In this regard, it is pertinent to mention that the Age is not a significant variable in teachers' attitudes toward using AI in teaching and whether they receive AI training.

(5) Age Group, Teaching Experience and AI Training are factors associated with teachers' risk attitudes towards the use of AI in teaching, so H1 is approved for these variables and Ho is approved for the variables Sex, Type of teacher, Area of knowledge and Level of teacher training with 95% reliability. In this regard, it is pertinent to mention that teachers with greater teaching experience express greater concern about the risk involved in the use of AI in teaching.

(6) There is a high correlation between the dimensions Utility, Ease of use, Social impact and intention to use with the Attitudes of teachers towards the use of AI in teaching and the statistics indicate that the model that explains the construct does not require the exclusion of any of the dimensions, including Risk.

(7) The proposed model satisfactorily explains teachers' attitudes toward AI, as supported by the ANOVA results. In summary, it is concluded that, although teachers in general have a positive attitude towards artificial intelligence (AI) and its use in teaching, there is a notable dispersion of opinions among them, without reaching a clear consensus. Teachers value the usefulness and ease of use of AI and are willing to incorporate it into their educational practices, recognizing its social benefits. However, they raise significant concerns about potential risks, such as the depersonalization of learning, increasing inequalities, and the safety and reliability of AI. Attitudes toward AI are influenced by teaching experience and specific training in AI, but not by demographic variables such as gender or age group. Teachers with more teaching experience show more concern about the risks associated with the use of AI. Finally, usefulness, ease of use, social impact and intention to use are highly correlated with teachers' attitudes towards AI in teaching, suggesting that these dimensions are crucial in the acceptance and adoption of the technology. This confirms that the proposed model satisfactorily explains teachers' attitudes towards the use of AI in teaching.

V.- SUGGESTIONS FOR INTERVENTION

(1) Consider the attitudes of teachers and the factors associated with them, as well as the previous training of teachers, for the adoption of AI in teaching-learning processes.

(2) Develop a continuing training program that includes specific workshops and courses on the use of AI in education. This program must address both the technical skills inherent to the careers offered by the University, as well as the pedagogical applications of AI, highlighting best practices and success stories. Based on three axes: Thinking with AI, teaching with AI and Learning with AI. See proposed training program (Annex 3), diagnostic examination (Annex 4), examples of instructions for interacting with AI (Annex 5) and teaching activities for each axis (Annex 6).

(3) Create spaces where teachers can discuss their experiences, concerns and expectations about AI and document successful experiences. These forums should encourage the exchange of ideas and the resolution of common problems, promoting a collaborative environment.

(4) Implement AI progressively, starting with tools that teachers consider most useful and easy to use. Provide constant and personalized technical assistance to facilitate adoption and resolve problems in real time.

(5) Establish periodic evaluation mechanisms to monitor the impact of AI on teaching and learning. Collect and analyze feedback data from teachers and students to continually adjust and improve implementation strategies.

(6) Communicate an institutional statement on the use of AI and the guidelines that guide its use. Directly address concerns about security, reliability, privacy, and ethics in the use of AI. This includes ensuring that AI will not replace teachers but rather serve as a complementary tool.

(7) Establish an Academic Integrity program for the responsible use of AI

(8) Implement pilot projects in different academic areas to evaluate the effectiveness of AI in specific contexts. Document and share learning outcomes and lessons learned to guide future implementations.

(9) Centralize the governance and institutional infrastructure for the adoption of AI at the beginning to promote the coordination of efforts. Of course, with openness to attend to initiatives from different areas. At the same time, the academy defines the criteria to select the relevant AI tools for the professional training of the educational programs offered.

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Annex 1

AI Attitude Scale (AIAS-4)

Participant data:

1. Sex: Male ( ) Female ( )
2. Age: _____
3. Type of teacher: Base ( ) Partial ( ) Partial Internal ( )
4. Teaching experience at the university in years: _____
5. Educational level in which you teach: Basic education ( ) Baccalaureate ( ) Associate professional ( ) Bachelor's degree ( ) Postgraduate ( )

6. Professional training area: Humanities and social sciences ( ) engineering ( ) Chemical Sciences ( ) Health Sciences ( ) Design and architecture ( )

7. Have you taken any training course or workshop in Artificial Intelligence (AI):

Yes ( ). Not ( )

8. Department: _____

Instructions:

Below, you will find phrases about the attitude towards Artificial Intelligence (AI), determine for each one the degree to which you agree with it. For this purpose, use the scale of 1 to 10, where one is totally disagreed and 10 is totally agree.

1. I think AI will improve my life 1 2 3 4 5 6 7 8 9 10
2. I think AI will improve my work 1 2 3 4 5 6 7 8 9 10
3. I think I will use AI technology in the future 1 2 3 4 5 6 7 8 9 10
4. I believe that AI technology is positive for humanity 1 2 3 4 5 6 7 8 9 10
5. Describe with one word or phrase what you think about artificial intelligence:

Annex 2

Scale of Attitudes of University Professors towards AI in the Teaching-Learning Process (EAIAp)

Part 2 Instructions:

Below is a series of phrases about Artificial Intelligence and its relationship with the ***teaching process-learning.*** Read carefully and determine for each of these its position within the scale of 1 to 5, in where 1 means totally disagree and 5 totally agree.

1. 1.- AI would help me be more effective in the teaching.	Total disagreement (1)	Disagreement (2)	Neither agree nor disagree (3)	Agreement (4)	Total agreement (5)
2. 6.- I feel comfortable using technology in general.					
3. 11.- I am worried that AI could replace my work as a teacher.					
4. 16.- I believe that AI has the potential to improve quality of education.					
5. 21.- I intend to use AI in my teaching soon.					
6. 2.- AI would allow me to offer an experience of more personalized learning for my students.					
7. 7.- I think I can learn to use AI easily.					
8. 12.- I am concerned that AI could depersonalize learning experience for students.					
9. 17.- I believe that AI can make education more accessible to everyone.					
10. 22.- I would recommend the use of AI to other teachers.					
11. 3.- AI would help me optimize time on tasks administrative and qualification.					
12. 8.- AI is easy to use and integrate into my classes.					

13. 13.- I am concerned that AI could amplify the inequality gaps among students.					
14. 18.- I believe that AI can help prepare students for future work.					
15. 23.- I am looking for opportunities to learn more about AI and how to use it in teaching.					
16. 4.- AI would allow me to access new resources and teaching tools.					
17. 9.- The user interface of AI systems is friendly and simple.					
18. 14.- I am worried that AI is not safe or reliable for use in teaching.					
19. 19.- I believe that AI is a valuable tool for research and educational development.					
20. 24.- I am willing to invest time and effort in Learn to use AI.					
21. 5.- AI would help me improve the quality of my evaluations.					
22. 10.- I have access to sufficient technical support to use AI in teaching.					
23. 15.-I am concerned that AI could be used to manipulate or control students.					
24. 20.- I believe that AI can be used to promote inclusion and equity in education.					
25. 25.- I believe that AI can have a positive impact on education.					

Annex 3

AI Training Program for the University

Thematic axes of the program: Thinking with AI, teaching with AI and Learning with AI

1. Introduction:

• Objective: Provide teachers with the necessary skills to integrate AI into their teaching practices, promoting critical and ethical thinking about its use, optimizing teaching and promoting more effective and personalized learning.

• Program duration: 6 months

• Format: Mixed (in-person and online)

• Participants: Teachers from all areas of knowledge

Axis 1: Thinking with AI

Topic 1: Fundamentals of Artificial Intelligence

• Objective: Provide a basic understanding of what AI is, how it works, and its current applications.

• Content:

1) History and evolution of AI

2) Key concepts: Machine Learning, Deep Learning, Neural Networks

3) Practical applications of AI in various fields

Topic 2: Ethics and AI

• Objective: Develop a critical and ethical perspective on the use of AI in education and society.

• Content:

1) Ethical principles and academic integrity in the development and use of AI

2) Privacy, security and biases in algorithms
3) Social and economic impact of AI

Topic 3: Critical Thinking with AI

• Objective: Foster critical thinking skills to evaluate the capabilities and limitations of AI.
• Content:
1) Critical analysis of AI use cases
2) Risk and benefit assessment
3) Making informed decisions about AI adoption

Axis 2: Teaching with AI

Topic 1: AI Tools for Teaching

• Objective: Familiarize teachers with AI tools and platforms that can be integrated into teaching.
• Content:
1) Introduction to tools such as virtual assistants, intelligent tutoring systems and learning analytics
2) Practical workshops on the use of specific tools

Topic 2: Design of Learning Experiences with AI

• Objective: Train teachers to design learning activities that incorporate AI effectively.
• Content:
1) Principles of AI-assisted instructional design
2) Creation of interactive and personalized content
3) Automated evaluation and feedback

Topic 3: Evaluation of the Impact of AI in Teaching

• Objective: Provide methods to evaluate the impact of AI on teaching and learning processes.
• Content:
1) Quantitative and qualitative evaluation methods
2) Data analysis and reporting
3) Continuous improvement based on evidence

Axis 3: Learning with AI

Topic 1: Personalization of Learning

• Objective: Explore how AI can personalize learning to meet individual student needs.
• Content:
1) Content recommendation algorithms
2) Adaptive learning platforms
3) Learning Personalization Case Studies

Topic 2: Promoting Student Autonomy

• Objective: Use AI to promote autonomy and self-regulation of learning in students.
• Content:
1) Self-assessment and instant feedback tools
2) Development of metacognitive skills
3) Strategies to motivate students

Topic 3: Collaboration and Social Learning with AI

• Objective: Facilitate collaboration and social learning through AI technologies. • Content:
1) Collaborative platforms powered by AI
2) Analysis of social learning networks
3) Group dynamics and collaborative projects

Evaluation and Certification

• Continuous Evaluation: Through questionnaires, practical projects and self-evaluations in each module.
• Final Project: Participants will develop an AI implementation project in their specific educational context.
• Certification: Upon completion of the program, participants will receive a certificate in "Integration of AI in Higher Education."

Support and Monitoring

• Personalized Consulting: Mentoring sessions to support the implementation of individual projects.
• Community of Practice: Creation of a network of teachers who share experiences and resources on the use of AI.

• Continuous Update: Access to additional resources and workshops to stay up to date with innovations in AI.

This comprehensive training program seeks not only to technically train teachers, but also to foster a culture of innovation and critical reflection on the use of AI in education.

Source: Based on Bowen & Watson (2024) and in interaction with ChatGPT.

Annex 4

Diagnostic Exam for the AI Training Program

Objective: Assess participants' prior knowledge and attitudes toward artificial intelligence (AI) and its application in teaching.

Instructions: Answer the following questions as honestly as possible. This diagnosis will help us customize the training program according to your current needs and knowledge.

Part 1: General Knowledge about AI

1. What do you understand by artificial intelligence (AI)?

a. The ability of machines to perform tasks that normally require human intelligence.
b. A type of computer software.
c. A set of emerging technologies.
d. I'm not sure.

2. Select the AI applications you know (you can choose more than one):

a. Virtual assistants (like Siri or Alexa)
b. autonomous vehicles
c. medical diagnosis
d. Content recommendations (like on Netflix or Amazon)
e. I don't know of any specific application.

3. What is machine learning?

a. A type of AI that allows machines to learn from data and improve with experience.
b. A method of programming computers.
c. A process to teach humans to use AI.
d. I'm not sure.

4. What are neural networks?

a. Systems that imitate the functioning of the human brain to process information.
b. Computer connections on a network.
c. A traditional teaching method.
d. I'm not sure.

Part 2: Attitudes and Experiences with AI

5. How do you feel about incorporating AI into your daily and professional life?

a. Very positive
b. Something positive
c. Neutral
d. Something negative
e. Very negative

6. Have you used any AI tools in your teaching practice?

a. Yes, frequently
b. Yes, occasionally
c. No, but I would like to
d. No, and I'm not interested

7. What are your main concerns regarding the use of AI in education? (you can choose more than one)

a. Let it replace the teachers
b. That depersonalizes the learning experience
c. That increases inequalities
d. That is not safe or reliable
e. Used to manipulate or control

f. I have no specific concerns

Part 3: Technical Knowledge and Training

8. Do you have previous experience in programming or data analysis?

a. Yes, I have a lot of experience

b. Yes, I have some experience

c. No, but I am willing to learn

d. No, and I am not interested in learning

9. Have you participated in any course or workshop on AI or related technologies?

a. Yes, several

b. Yes, one or two

c. No, but I am interested in participating

d. No, and I'm not interested in participating.

10. How often do you read or educate yourself about the latest trends in AI and educational technology?

a. Very frequently

b. Occasionally

c. Rarely

d. Never

Part 4: Opinions and Expectations

11. On a scale of 1 to 5, how would you rate your level of confidence in integrating AI into your teaching? (1: Not at all confident, 5: Very confident)

1

2

3

4

5

12. What do you hope to learn or achieve by participating in this AI training program?

a. Know the theoretical bases of AI

b. Learn to use AI tools in teaching

c. Design personalized learning experiences with AI

d. Evaluate the impact of AI on my teaching

e. Other (specify): _____

13. Are you willing to participate in pilot projects to implement AI in your teaching practice? a. Yes, definitely

b. Yes, with some conditions

c. I'm not sure

d. No

Thank you for completing this diagnosis. Your answers will help us design a training program that meets your needs and expectations.

_____

Source: Based on Bowen & Watson (2024) and in interaction with ChatGPT

Annex 5

Examples of Directions for Interacting with AI

Axis 1: Thinking with AI:

It refers to the process of integrating artificial intelligence (AI) into decision making, problem solving, and critical reflection. It is a way of thinking that considers how AI can provide value in the interpretation and analysis of data, the automation of complex processes, and the generation of innovative solutions in different contexts, including education, business and science.

This approach is not limited to using AI tools but also involves understanding the principles and limitations of AI, evaluating its ethical and social impacts, and developing a mindset that combines critical human thinking with advanced technological capabilities. "Thinking with AI" involves collaborating with technology to improve the decision-making process, using AI as an ally in reflection and strategic planning.

1. Indication: "Analyze data from student satisfaction surveys and generate a report with the main suggested areas of improvement."

▪ Purpose: Use AI to identify patterns and trends in large data sets and develop critical analysis skills.

2. Prompt: "Explore how different AI algorithms make decisions and compare their results on a specific data set."

▪ Purpose: Understand the inner workings of AI and evaluate the effectiveness of different machine learning approaches.

3. Indication: "Generates a summary of the latest advances in artificial intelligence and its impact on higher education."

▪ Purpose: Stay updated on innovations in AI and reflect on its ethical and practical application in education.

Axis 2: Teaching with AI

It refers to the use of artificial intelligence tools and technologies to improve and personalize the teaching process. This includes integrating AI systems into the classroom to tailor educational content to individual students' needs, automating repetitive tasks such as assessment and feedback, and providing personalized tutoring based on each student's progress and skills.

Teaching with AI also involves using these technologies to create more interactive and dynamic learning experiences, facilitating student understanding and engagement. Additionally, teachers can use AI to analyze educational data to improve instructional planning by enabling a more informed and evidence-based approach.

This concept also encompasses the development of new pedagogical strategies that incorporate AI effectively, to enrich teaching and improve learning outcomes.

1. Prompt: "Create an interactive lesson using an AI platform that personalizes content based on the student's skill level."

▪ Purpose: Implement AI tools to adapt the teaching process to the individual needs of students.

2. Prompt: "Design a quiz using AI to assess students' understanding of a specific topic and provide immediate feedback."

▪ Purpose: Use AI to evaluate learning in real time and provide personalized feedback.

3. Prompt: "Use an AI virtual assistant to answer frequently asked questions from students outside of class time."

▪ Purpose: Improve accessibility to information and academic support, allowing students to obtain immediate answers to their questions.

Axis 3: Learning with AI

It refers to the process of using artificial intelligence as a tool to improve and personalize the learning experience of students. This involves taking advantage of AI technologies to adapt the contents, methods and teaching rhythms to the needs, preferences and levels of each student, facilitating more effective and individual-centered learning.

Through AI learning, students can receive personalized recommendations for educational resources, participate in interactive activities that adjust to their progress, and get immediate feedback that helps them identify areas for improvement and strengthen their skills. Additionally, AI can help students develop autonomy, promoting self-assessment and self-regulation of learning.

This approach also allows students to explore new forms of collaborative learning, where AI facilitates peer interaction and teamwork, enhancing social learning and the development of soft skills. Learning with AI is, therefore, a way to enhance learning through technology, making it more accessible, efficient and personalized.

1. Prompt: "Use an AI tool to identify your strengths and weaknesses in an area of study and generate a personalized study plan."

▪ Purpose: Promote self-directed learning and help students focus on areas that need more attention

2. Prompt: "Engage in an AI-powered interactive simulation that replicates a real-world scenario related to your field of study."

▪ Purpose: Apply theoretical knowledge in practical contexts and develop problem-solving skills.

3. Prompt: "Ask an AI platform for recommendations of educational resources (articles, videos, exercises) to delve deeper into a specific topic."

▪ Purpose: Facilitate access to relevant and updated educational materials, personalized according to the student's learning needs.

Source: Based on Bowen & Watson (2024) and in interaction with ChatGPT.

Annex 6

Example of Activities for Each Axis

Activity 1: Thinking with AI

Title: Critical Analysis of Educational Data

Description: Participants will use an AI-powered data analysis tool to examine a large database of student assessments. They will need to identify trends, patterns and key areas of improvement in teaching and learning.

Goals:

▪ Develop data analysis and critical thinking skills.

▪ Understand how AI can identify patterns in complex data.

Instructions:

(1) Access the data analysis tool provided.

(2) Import the student evaluation database.

(3) Generate a report with the main trends and areas for improvement.

(4) Discuss your findings with your colleagues and propose possible interventions.

Activity 2: Teaching with AI

Title: Personalized Lesson Design with AI

Description: Participants will design a lesson using an AI-based adaptive learning platform. The lesson should dynamically adjust to the needs and skill levels of the students.

Goals:

• Become familiar with AI tools for personalizing learning.

• Develop skills in adaptive instructional design.

Instructions:

(1) Select a topic for your course.

(2) Use the adaptive learning platform to create an interactive lesson.

(3) Make sure the lesson includes activities that fit each student's skill level.

(4) Test the lesson with a group of students and collect feedback.

Activity 3: Learning with AI

Title: Personalized Study Plan with AI

Description: Participants will use an AI tool to assess their knowledge in a specific area and generate a personalized study plan that addresses their weaknesses and enhances their strengths.

Goals:

• Promote self-assessment and self-directed learning.

• Use AI to create personalized study plans.

Instructions:

(1) Access the self-assessment tool provided.

(2) Conduct a diagnostic evaluation in the selected study area.

(3) Review the personalized study plan generated by AI.

(4) Follow the study plan for the next month and record your progress.

(5) At the end of the month, evaluate your knowledge again and adjust the plan as necessary.

Source: Based on Bowen & Watson (2024) and in interaction with ChatGPT