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ANALYSIS OF THE DIDACTIC USE OF ARTIFICIAL INTELLIGENCE AMONG TEACHING STAFF IN PRIMARY SCHOOL DISTRICT 61 IN AGUASCALIENTES

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Abstract: The present study analyzes the didactic use of artificial intelligence (AI) by the teaching staff of School Zone 61 of elementary education in Aguascalientes. Through a mixed methodological approach, data were collected through Likert scale surveys, semi-structured interviews , direct observation in the classroom and documentary review. The results show that most teachers have limited knowledge about AI and its pedagogical application, using it -when it occurs- in a superficial way or in administrative tasks. Lack of training, poor technological infrastructure and a marginal urban context that hinders equitable access to digital resources are identified as limiting factors. Despite this, there is a growing interest among teachers to be trained in the educational use of AI, which represents an opportunity for the design of training programs and institutional policies that promote its meaningful integration. The analysis of the interviews and observations also reveals an ambivalent perception regarding the risks and benefits of AI, pointing to fears related to the dehumanization of teaching or the substitution of the teaching role. The conclusions point to the need for intervention strategies that include contextualized teacher training, provision of minimum infrastructure in schools and development of curricular guidelines that incorporate emerging technologies such as AI in an ethical and didactic way. This work contributes to make visible the digital divides in vulnerable school environments and to reflect on the role of artificial intelligence in educational transformation.

Keywords: Artificial intelligence, information and communication technologies, didactic methodologies, teachers' digital competence, school digital divide.

INTRODUCTION

The development of digital technologies has significantly transformed teaching and learning processes, generating new opportunities and challenges for teachers. In this scenario, artificial intelligence (AI) is positioned as an emerging tool with great potential to enrich educational practice, from the personalization of learning to the automation of administrative tasks. However, its effective implementation in the classroom requires not only technological infrastructure, but also teacher training, pedagogical vision and favorable contextual conditions. Several studies highlight that, although AI is already present in many aspects of daily life, its incorporation in educational systems is still incipient, especially in vulnerable school contexts or those with limited resources. Digital divides, resistance to change and the lack of clear policies are factors that limit its use in education.

In Mexico, the use of artificial intelligence in basic education is still limited and not very systematized. Despite advances in digital policies and connectivity, there are still structural challenges related to teacher training, access to devices and the adaptation of pedagogical models to incorporate emerging technologies in an ethical and meaningful way.

In the state of Aguascalientes, the educational landscape shows relatively favorable conditions in terms of technological infrastructure and access to digital resources. According to data from the Institute of Education of Aguascalientes (IEA, 2023), more than 85% of elementary schools have some type of basic technological resource, and practically all of them have internet service. However, the use of artificial intelligence as a teaching tool has not yet been systematically addressed. This is due, in part, to the sudden irruption of this technology in everyday life, which has facilitated its access from any connected device, without necessarily involving an institutional provision of equipment for teachers or students.

Although some institutions have incorporated digital platforms for administrative or learning support purposes, a teaching culture oriented to the pedagogical implementation of AI has not been consolidated. In this sense, School Zone 61 of primary education, located in the state of Aguascalientes, although it has the minimum conditions to introduce digital technologies in its schools, has not conducted a formal evaluation on the use that teachers make of artificial intelligence in their daily practice.

In this context, the central question that guides this study arises: What is the level of integration of artificial intelligence tools in the *teaching* practice *of elementary school teachers in School Zone 61?*

The general objective of this research is to offer an objective view of the use of artificial intelligence in elementary schools in School Zone 61. To this end, an analysis will be carried out to identify not only the frequency of use, but also the pedagogical approach with which these tools are implemented, as well as the perceptions, barriers and areas of opportunity faced by teachers in their incorporation.

THEORETICAL FRAMEWORK

EMERGING TECHNOLOGIES

Emerging technologies refer to developing innovations with high potential to transform education, although they are not yet fully consolidated in teaching practices. Crawford et al. (2024) define them as *"technological innovations with the capacity to change teaching and learning methods, but which are not yet fully integrated"* (p. 4). Their incorporation at the primary level should be based on pedagogical and contextualized criteria, avoiding their adoption due to fashion or technological pressure, and prioritizing the integral development of students.

*Artificial Intelligence***:** Artificial intelligence (AI) comprises systems capable of simulating human cognitive processes such as learning, decision-making and reasoning. In education, the U.S. Department of Education (2023) notes that *"educational AI adapts content and feedback in real time to enhance personalized learning"* (p. 12). In primary education, these technologies offer possibilities such as automatic feedback or early assessment; however, their effectiveness depends on teacher support and the didactic approach with which they are applied.

*Information and Communication Technologies (ICT)***:** ICT are defined as digital tools oriented to management, communication and access to information. UNESCO (2023) describes them as *"essential tools that facilitate access to knowledge, collaboration and educational flexibility"* (p. 10). Their importance was evidenced during the COVID-19 pandemic; however, their real impact on learning depends on their pedagogical integration, not only on their technical availability.

*Educational Big Data***:** Educational Big Data involves the collection and analysis of large volumes of data to support pedagogical decision making. Martínez et al. (2020) state that *"Big Data makes it possible to identify learning patterns and personalize teaching, provided that privacy is guaranteed"* (p. 15). Although its implementation in primary school is still limited, it represents a tool with potential to guide more personalized practices, always under ethical and data protection principles.

LEARNING THEORIES

*Cognitivism and cognitive load***:** The cognitivist approach emphasizes the importance of internal processes such as attention, memory and perception. In this framework, the cognitive load theory argues that too much information can saturate the learner's mental capacity. Sweller (2021) points out that *"AI can adequately reduce cognitive load by offering adaptive routes"* (p. 3), which is particularly relevant for task design in primary education.

Constructivism: From the constructivist approach, learning is actively constructed through interaction with the environment and with others. Vygotsky remains a central figure in this paradigm. Wang (2024) warns that technology-including AI-*"must be placed at the service of dialogue and the active construction of knowledge"* (p. 12). This approach is especially appropriate for the primary level, as it promotes meaningful and contextualized learning experiences.

Connectivism: Connectivism, proposed by Siemens, understands learning as the establishment of connections between knowledge nodes in digital environments. According to Siemens (2021), *"learning is the connection of knowledge nodes in networked environments"* (p. 8). Although this approach is more associated with advanced levels, its application in primary school requires active teacher mediation to avoid isolation and ensure clear pedagogical guidance.

THEORIES APPLIED TO THE USE OF ICT IN EDUCATION

The pedagogical use of ICT is based on theoretical frameworks that allow its coherent integration with disciplinary contents and classroom needs. One of the most recognized is the ISTE framework, developed by the *International Society for Technology in Education*, which establishes international standards for the ethical, creative and reflective use of technology by students, teachers, school leaders and curriculum designers. According to ISTE (2017), teachers should *"design authentic learning experiences that use digital tools to maximize learning for all students"* (Standard 5). This framework provides a practical guide based on digital competencies, useful for ICT-mediated educational transformation processes. In the present study, it is particularly relevant as a reference to diagnose the level of integration of technological tools by the teaching staff of School Zone 61.

METHODOLOGY

The present study was developed under a mixed approach, since it combines the analysis of quantitative and qualitative data to obtain a comprehensive view of the phenomenon under investigation. This approach allowed us to identify not only the frequency and type of use of artificial intelligence (AI) tools among teaching staff, but also their perceptions, experiences, and barriers.

Research design: The research is framed within a case study with a descriptive-exploratory scope, focused on the elementary level School Zone 61 in the state of Aguascalientes. This design allowed for an in-depth examination of a specific educational context that, although it has minimal conditions for incorporating emerging technologies, has not been the subject of previous studies related to the didactic use of AI.

Participants: The sample consisted of 36 active teachers belonging to different elementary schools in School Zone 61. The selection was made by convenience, taking into account the willingness of the participants and accessibility to the context. Anonymity, informed consent and confidentiality of the information collected were guaranteed, in accordance with ethical principles of educational research.

Data collection techniques and instruments: The following techniques were used to obtain data:

- Likert scale questionnaire: elaborated with 20 items that explored knowledge, frequency of use, attitudes and perceptions about AI. It was applied online using digital forms.
- Semi-structured interviews: conducted with a selected sample of teachers in order to deepen their experiences, obstacles and expectations regarding the pedagogical use of artificial intelligence.

- Direct observation: applied in some class sessions, it allowed contrasting the declared use of digital tools with the actual classroom practice.
- Documentary analysis: class plans, didactic materials and institutional reports were reviewed to identify evidence of the use of AI in educational processes.

DATA ANALYSIS

- Quantitative data from the questionnaire were processed by descriptive statistical analysis, obtaining frequencies and representative percentages for each item.
- The qualitative data (interviews, observations and documents) were coded and organized thematically through content analysis, which made it possible to identify patterns, emerging categories and points of convergence.

This methodology allowed triangulating the information obtained from various sources, strengthening the validity of the study and providing a richer understanding of the didactic use of AI in the context of School Zone 61. The data collection instruments used in this research project are shown below.

ANALYSIS OF RESULTS

QUESTIONNAIRE RESULTS (LIKERT)

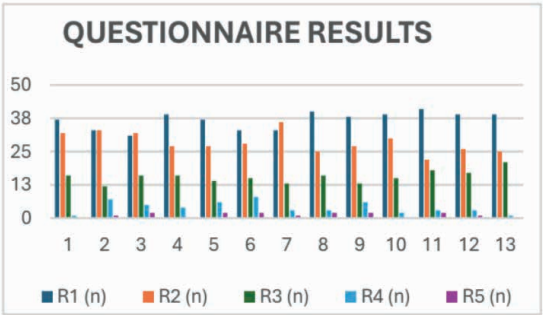
a) Knowledge and use of AI tools

- *General knowledge of AI*: 70% of the teachers rated their knowledge as low (values 1-2), with an average of 3.4 in the question "*I know the general concept of AI*".
- *Frequency of use*: More than 75% have never used AI for pedagogical purposes (average 2.9 on "*I have used some AI tool in my classes*").
- *Administrative vs. pedagogical approach*: The item "*The use of AI in my teaching practice is mainly oriented to administrative tasks*" obtained an average of 3.2, while "*When I use AI, I do it to enrich my didactic strategies*" was at 2.5, which confirms a predominance of non-didactic uses.

The following tables show the aforementioned results.

Item	R1 (n)	R2 (n)	R3 (n)	R4 (n)	R5 (n)	R1 (%)	R2 (%)	R3 (%)	R4 (%)	R5 (%)
1	37	32	16	1	0	43.02	37.21	18.6	1.17	0
2	33	33	12	7	1	38.37	38.38	13.95	8.14	1.16
3	31	32	16	5	2	36.05	37.21	18.6	5.81	2.33
4	39	27	16	4	0	45.35	31.4	18.6	4.65	0
5	37	27	14	6	2	43.02	31.4	16.28	6.98	2.32
6	33	28	15	8	2	38.37	32.56	17.44	9.3	2.33
7	33	36	13	3	1	38.37	41.86	15.12	3.49	1.16
8	40	25	16	3	2	46.51	29.07	18.6	3.49	2.33
9	38	27	13	6	2	44.19	31.4	15.1	6.98	2.33
10	39	30	15	2	0	45.35	34.88	17.44	2.33	0
11	41	22	18	3	2	47.67	25.58	20.93	3.49	2.33
12	39	26	17	3	1	45.35	30.23	19.77	3.49	1.16
13	39	25	21	1	0	45.35	29.07	24.42	1.16	0

Average number of responses per questionnaire item (Likert 1-5).



Average number of responses per questionnaire item by percentage of teachers (Likert 1-5).

Figure 1. Average number of responses per questionnaire item by number of teachers (Likert 1-5).

b) Perception of AI potential

- The item "*I believe that AI has the potential to improve my students' learning*" scored relatively high (3.6), indicating a positive assessment of its possibilities.
- Interest in training was the item with the highest average (4.2), showing a clear willingness of teachers to be trained in AI.

QUESTIONNAIRE			
Item	**Specific indicator**	**Likert rating scale 1(not at all) -5(very much)**	**Observed result**
I know the general concept of artificial intelligence.	Level of general knowledge about AI	1 - 5	3.4
I am familiar with at least one AI tool applied to education.	Familiarity with AI tools	1 - 5	3.0
I feel confident using AI-based tools.	Confidence in using AI tools	1 - 5	3.1
I have used some artificial intelligence tool in my classes.	Practical use of AI in teaching	1 - 5	2.9
I integrate AI tools such as ChatGPT, Google Gemini, or similar in my planning.	Integration of AI in didactic planning	1 - 5	2.5
I use AI to generate didactic materials (worksheets, quizzes, presentations).	Use of AI to create educational resources	1 - 5	2.8
I use AI to provide feedback to students or to evaluate learning.	Application of AI in evaluation and feedback	1 - 5	2.7
The use of AI in my teaching practice is mainly oriented to administrative tasks.	Administrative approach to the use of AI	1 - 5	3.2
When I use AI, I use it to enrich my teaching strategies.	Pedagogical use of AI	1 - 5	2.9
I consider that AI has the potential to improve my students' learning.	Perception of the pedagogical impact of AI	1 - 5	3.6
I have received formal training on the educational use of artificial intelligence.	Previous training received	1 - 5	2.1
Responsible use of emerging technologies such as AI is promoted in my school.	Institutional support for the use of AI	1 - 5	2.3
I would like to receive more training to integrate AI pedagogically.	Interest in being trained in educational use of AI	1 - 5	4.2

Table 1. Questionnaire-type data collection instrument.

INTERVIEW	
Question	**Synthesis of common answers**
What do you understand by artificial intelligence in the educational context?	Some relate it to "robots" or programs that "solve things on their own". Most recognize it as advanced technology, but do not link it to their teaching practice.
Have you used any AI tool in your teaching practice? Which one?	Very few mention having used ChatGPT or AI functions in Google; others have only heard about, but do not know how to access or apply these tools.
For what specific activities have you used artificial intelligence?	The few who have used it mention that it was for planning, searching for ideas or completing texts. There is no direct use in the classroom with students.
Do you consider that AI has helped you to improve your teaching? In what way?	Those who have tried it consider that it speeds up administrative work, but feel insecure about its pedagogical use. Others say they don't know if they are doing it right.
What risks or concerns do you identify in the use of AI in education?	They fear that students will "copy" or become too dependent. There is also distrust in the accuracy of the information generated. They clarify that **AI cannot replace the teacher** for the human role in teaching.
Have you received any formal training on the educational use of artificial intelligence?	Most have not received any formal training. Only a few have explored self-taught or have seen content on social networks.
What would you like to learn or develop regarding the use of AI?	They would like to learn "how to use it well" and "what exactly it is used for at school". They ask for concrete examples, practical guides and accompaniment.
What conditions do you think are needed at school to take better advantage of AI?	They agree that reliable internet, functional computers and accessible training are needed. They point to lack of time and technical support as limitations.

Table 2. Interview-type data collection instrument.

RESULTS OF THE INTERVIEWS

From the semi-structured interviews with 12 selected teachers, the following categories emerged:

1. Barriers to AI use.

- Lack of formal training: Most have never received workshops or specialized courses.
- Insufficient resources: Equipment and connectivity limitations in some schools.
- Insecurity in its use: Fear of technical or pedagogical errors.

2. Perceptions of risks and benefits

- Potential benefits: Streamlining of tasks, personalization of feedback.
- Risks feared: Dehumanization of teaching, loss of teaching authority, dependence on technology.

3. Wishes and expectations

- They ask for practical examples, step-by--step guides and institutional support.
- They ask for contextualized training spaces, preferably in available school hours.

CONCLUSIONS

- *Regarding the identification of the level of knowledge and use of artificial intelligence tools***:** Teachers in School Zone 61 of primary education present a low level of knowledge about artificial intelligence and its educational applications. Most of them recognize that they do not have conceptual clarity on the subject, nor have they used these tools in their teaching practice.
- *On the detection of factors that influence the incorporation of AI in teaching practice*: The results evidence that the marginal urban context severely limits the incorporation of emerging technologies. Factors such as lack of connectivity, limited availability of devices, lack of updated professional training and resistance to change in some teaching sectors hinder the use of artificial intelligence in the classroom. The lack of clear institutional policies and technical support reinforces this digital exclusion.
- *On teachers' perception of AI in education***:** Although teachers express interest in learning more about the educational use of AI, this interest has not yet translated into concrete actions or personalized training plans. There is an attitude of curiosity, but also of uncertainty and fear in the face of technologies that they consider complex or alien to their school reality. The general perception is that AI can be useful, but only if the necessary conditions are provided to learn how to use it.
- *On the proposals for improvement to promote the integration of AI*: Based on the findings, three priority lines of action are identified:

a) Establish continuous training programs in the pedagogical use of artificial intelligence, focused on practical and contextualized skills.

b) Guarantee the minimum infrastructure necessary for access to technologies in schools in the area, including connectivity and functional devices.

c) Promote a clear institutional policy that legitimizes the integration of AI tools as part of teacher planning, ensuring that this innovation responds to curricular objectives.

These conclusions provide the basis for pedagogical and organizational proposals aimed at strengthening teachers' digital competence and reducing the technological appropriation gap in vulnerable school contexts. Artificial intelligence should not be seen as a futuristic luxury, but as a current tool that, with the right conditions, can enhance learning and educational equity.

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