

 Research Article

Implementing AI in Preschool Education: Pedagogical, Ethical, and Cultural Dimensions in the Cyclades, Greece

Zoi Apostolou¹ , Irimi Psarra² 

¹Department of Educational Sciences and Early Childhood Education, University of Patras, Patras, Greece

²Department of Informatics and Telematics, Harokopio University, Athens, Greece

Abstract

The accelerating integration of Artificial Intelligence (AI) into contemporary education has generated both opportunities and challenges across all educational levels, including early childhood education. This study investigates the perceptions, attitudes, and practices of kindergarten teachers in the Cyclades regarding the incorporation of AI into their pedagogical work. It aims to identify the perceived benefits and limitations of AI applications in early learning environments, as well as the extent to which prior professional training influences teachers' readiness to adopt such technologies. An anonymous structured online questionnaire (five-point Likert scale) was employed to collect data on teachers' knowledge, attitudes, and classroom practices related to AI. The findings reveal that participants generally acknowledge the pedagogical potential of AI to support creativity, individualized learning, and instructional efficiency. Nonetheless, significant concerns persist regarding data privacy, algorithmic bias, and the possible erosion of the interpersonal dimension that characterizes early childhood education. Statistical analysis (SPSS v.29) further indicates that teachers who have participated in AI-related training programs exhibit more favorable attitudes and a higher level of self-efficacy in implementing innovative digital tools. Overall, the results suggest that kindergarten educators in the Cyclades possess a basic conceptual understanding of AI and already apply its elements in practice, albeit cautiously and selectively. The study underscores the need for systematic and ethically informed teacher training programs that emphasize the critical use of AI as a supportive—not substitutive—agent in early education. Such an approach aligns with a pedagogical vision where technological innovation remains firmly grounded in human values and educational purpose.

Keywords: Artificial Intelligence, Kindergarten, Collaborative Networks, Teacher Training

✉Correspondence

Zoi Apostolou

apostolo@upatras.gr

Received

October 26, 2025

Accepted

February 24, 2026

Published

May 4, 2026

Citation: Apostolou, Z., & Psarra, I. (2026). Implementing AI in preschool education: Pedagogical, ethical, and cultural dimensions in the Cyclades, Greece. *Journal of Research in Education and Pedagogy*, 3(2), 204–216.

DOI: [10.70232/jrep.v3i2.163](https://doi.org/10.70232/jrep.v3i2.163)

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Published by

Scientia Publica Media



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1. INTRODUCTION

The rapid development of Artificial Intelligence (AI) in recent decades has brought profound changes to nearly every aspect of social and professional life. AI—defined as the field of computer science focused on creating systems capable of simulating cognitive processes such as learning, problem-solving, and decision-making (Russell & Norvig, 2020)—has begun to permeate all levels of education.

Its educational applications offer new possibilities for personalized learning, dynamic assessment, the cultivation of creative skills, and the enhancement of collaborative interaction (Luckin, 2018; Uğraş et al., 2025). However, the introduction of AI into sensitive learning environments such as kindergartens raises significant questions about pedagogical appropriateness, data privacy, and the teacher's role within an algorithmically enhanced context (Williamson & Eynon, 2020).

In the Greek educational landscape, the use of AI in early childhood education remains in its infancy. Training initiatives tend to focus more on digital tools in general than on a systematic understanding of

AI's capabilities and limitations (Kölemen & Yıldırım, 2025). Consequently, exploring kindergarten teachers' perceptions and practices constitutes a crucial prerequisite for a rational and pedagogically sound integration of AI into learning processes.

The purpose of this study is to examine the attitudes, perceptions, and practices of kindergarten teachers in the Cyclades regarding AI, to identify both the perceived benefits and concerns, and to investigate the extent to which their previous training is related to their willingness to use innovative technological tools in their professional practice.

1.1. Theoretical Approach

The introduction of Artificial Intelligence (AI) into early childhood education is regarded internationally as an innovative approach capable of supporting children's learning and development in multiple ways (Bers, 2020; Luckin, 2018). AI can facilitate personalized learning by adapting activities and educational content to each child's level, interests, and pace. Through this process, differentiated instruction is enhanced, and potential disparities in learning progress among children are reduced (Holmes et al., 2019).

In kindergarten—where everything is born from experiential engagement, imagination, and human connection—the incorporation of such technology requires critical thinking, sensitivity, and pedagogical awareness. Moreover, AI can foster creativity and critical thinking through activities that promote problem-solving, experimentation, and peer collaboration (Druga et al., 2019). The ability to collect and analyze data from children's interactions with digital tools allows educators to monitor progress, identify difficulties, and provide timely and targeted feedback (Luckin, 2018). Despite these evident benefits, the integration of AI in kindergarten presents significant challenges and limitations. The first relates to ethics and data security: the use of systems that collect information about children's learning behavior requires strict protocols for data protection and respect for privacy (Williamson & Eynon, 2020). The second challenge concerns pedagogical appropriateness. Digital systems cannot replace human interaction, empathy, or the emotional support that a teacher provides. There is thus a risk that learning activities may become excessively technocentric, diminishing the social and emotional development of young children (Bers, 2020).

Furthermore, AI may lead to overreliance on technological tools and a reduction in creativity if it is not integrated under sound pedagogical guidance. Algorithmic systems may also introduce undesirable biases in assessment and activity recommendations, especially if the training data for those algorithms are not representative (Uğraş et al., 2025; Long & Magerko, 2020). Nonetheless, AI can play a valuable role in supporting collaborative learning communities—both among children and among educators. Through digital platforms that enable the sharing of activities, analysis of learning progress, and exchange of ideas, AI fosters collaborative learning, dissemination of good practices, and the development of professional learning communities (Popenici & Kerr, 2017; Wenger, 1999).

In summary, the introduction of AI in kindergartens offers multiple benefits: personalized learning, enhanced creativity, collaborative engagement, and optimization of pedagogical practices. At the same time, its application requires systematic teacher training, careful planning, adaptation to children's developmental needs, and ethical as well as technical vigilance. Successful AI integration thus depends on collaboration among educators, researchers, and designers of educational technologies, ensuring that these tools complement rather than replace pedagogical practices. AI in education may therefore be defined as the set of digital systems capable of adaptation, data analysis, and support of learning through personalized or collaborative approaches (Holmes et al., 2019). At the early childhood level, research emphasizes the need for cautious incorporation of AI tools that respect the developmental stage of young learners, nurturing imagination, social interaction, and creativity (Bers, 2020).

The theory of communities of practice (Wenger, 1999) provides a useful conceptual framework for understanding how teachers learn collectively, share experiences, and co-construct new pedagogical practices. AI can enhance such communities by offering tools for data analysis, digital feedback, and collaborative creation of educational content (Popenici & Kerr, 2017). According to recent theoretical perspectives, the pedagogical use of AI must align with human-centered design principles, where technology functions as a supportive mechanism for learning, not as a substitute for the teacher (Uğraş et al., 2025). Educators are therefore called to cultivate critical AI literacy—to use AI tools creatively but also responsibly within the classroom (Long & Magerko, 2020).

1.2. Literature Review

Internationally, research on teachers' perceptions of Artificial Intelligence (AI) has attracted growing interest. Studies conducted among primary and secondary education teachers show a generally positive attitude toward the use of AI, yet they also express concerns regarding control, ethical use, and the reliability of AI-based tools (Druga et al., 2019; Miao et al., 2021). In the field of early childhood education, Bers (2020) highlights in her research on robotics and AI components in preschool programs the importance of teacher guidance for the effective integration of these technologies. Empirical evidence suggests that systematic training enhances educators' confidence and preparedness to use AI tools meaningfully. A recent study shows that professional development programs designed to converge technology, pedagogy, and knowledge significantly improve pre-service teachers' AI readiness and self-efficacy, demonstrating that targeted training can bridge gaps between teachers' perceived preparedness and actual pedagogical application (Ramazanoglu & Akin, 2025). Moreover, research involving the development of validated scales for teacher AI competence self-efficacy highlights the multidimensional nature of AI competence—spanning knowledge, AI pedagogy, assessment, ethics, and professional engagement—suggesting that comprehensive PD should address these domains to foster instructional confidence and readiness (Zhai, 2024).

Plakia, Gasparinatou, and Sofianopoulou (2025) found that AI tools are now widely integrated into secondary education—especially in written assignments—enhancing linguistic fluency, confidence, and idea visualization, while potentially constraining reflective thinking, analytical depth, and students' personal voice. They also note a shift toward process-oriented assessment and a more facilitative teacher role, with concerns about authenticity and academic integrity highlighting the need for clear institutional guidelines for the pedagogically and ethically responsible integration of AI (Plakia, Gasparinatou & Sofianopoulou, 2025).

Beyond general investigations of attitudes toward AI, recent research has underscored the critical role of professional development (PD) in shaping educators' capacity to integrate AI into pedagogical practice. Systematic reviews highlight that while AI technologies are rapidly infiltrating educational contexts, teachers' access to structured and ongoing PD opportunities remains limited, and the alignment between PD provision and teachers' needs is inconsistent, which may hinder effective AI adoption (Zawacki-Richter et al., 2021).

Complementary international evidence indicates that teachers universally express a strong desire for professional development tailored to AI, with many reporting limited prior training yet a high perceived need for workshops, instructional support, and equitable access to AI resources (Tan, 2024; Philippakos & Rocconi, 2025). Collectively, these studies suggest that effective AI PD should be sustained, context-sensitive, and integrated within broader pedagogical frameworks, thereby both enhancing teacher competence and addressing concerns related to ethical use, control, and meaningful classroom application.

In Greece, only a limited number of studies have explored kindergarten teachers' attitudes toward AI. Most research has focused on the use of digital tools—such as interactive applications or robotics kits—and on educators' perceptions of the importance of ICT in learning (Nikolopoulou et al., 2025). However, there is still a lack of data regarding teachers' views on AI itself as a concept and pedagogical tool, which makes the present study both timely and necessary.

Studies focusing on professional learning in AI emphasize that competence development must extend beyond technical familiarity to encompass pedagogical integration, ethical frameworks, and reflective practices to truly impact teacher readiness and instructional self-efficacy (Zawacki-Richter et al., 2021).

2. METHODS

2.1. Research Design

The present study aims to explore the perceptions and practices of kindergarten teachers in the Cyclades regarding the integration of Artificial Intelligence (AI) in the educational process. It also seeks to examine the role of prior training in shaping teachers' attitudes and intentions to utilize AI-related tools.

The main research questions are:

1. What are kindergarten teachers' perceptions of the benefits and challenges of AI in early childhood education?
2. What practices or intentions for implementing AI tools do teachers report?
3. Are there differences in perceptions and practices depending on whether teachers have attended AI-related training?
4. How do kindergarten teachers perceive the role of AI in creating and strengthening collaborative learning communities and communities of practice?

The study follows a descriptive research design incorporating elements of mixed methodology, combining both quantitative (closed-ended questions) and qualitative (open-ended questions) data. This approach was deemed appropriate for capturing not only general attitudinal trends but also an in-depth understanding of participants' experiences and concerns (Creswell & Plano Clark, 2017).

2.2. Participants

The study invited 102 preschool teachers from the Cyclades, using a convenience sampling approach based on accessibility and voluntary participation. Of those invited, 53 teachers ultimately responded, resulting in a response rate of 52.0%. Sampling was conducted using a convenience method, as participants voluntarily responded to an invitation distributed via email and professional networking groups for educators. While convenience sampling allowed practical access to participants, it also imposes limitations on the generalizability of findings, as the sample may not fully represent the broader population of Greek early childhood educators. These constraints are considered in the interpretation of results and the formulation of implications.

Of the 53 participants, 51 were women (96.2%) and 2 men (3.8%).

In terms of age distribution:

- 29 teachers (54.7%) were aged 41–50,
- 16 (30.2%) were aged 31–40,
- 6 (11.3%) were over 51 years old,
- 2 (3.8%) were between 20 and 30 years old.

Regarding teaching experience:

- 25 participants (47.2%) had 11–20 years of service,
- 14 (26.4%) had 6–10 years,
- 7 (13.2%) had 0–5 years,
- 7 (13.2%) had over 21 years of experience.

As for prior training on AI and digital tools,

- 38 participants (71.7%) had attended relevant professional development programs,
- 15 (28.3%) had no prior training.

The composition of the sample reflects the broader demographic of Greek kindergarten teachers, characterized by a predominance of women, extensive teaching experience, and varied levels of digital literacy and professional training.

2.3. Research Instruments

Data were collected through a custom-designed online questionnaire created with Google Forms. The questionnaire consisted of three parts:

1. Demographic and professional information (gender, age, years of service, previous training in AI or ICT).
2. Scale of attitudes and perceptions comprising 15 statements on a five-point Likert scale (1 = Strongly disagree to 5 = Strongly agree), addressing:
 - perceived pedagogical value of AI,
 - concerns about ethical and technological issues,
 - willingness to use AI tools in the classroom.

The Attitudes and Perceptions Scale included one negatively worded item: “*When utilizing AI tools in the classroom, I do not limit myself to the capabilities and feedback provided by these tools, but act as a critical mediator of the educational process.*” To ensure consistent interpretation with positively worded items, responses to this item were reverse-coded during scoring, such that higher scores uniformly reflected more favorable attitudes toward AI integration. This procedure mitigates potential response bias arising from item phrasing and allows the composite scale to validly represent the underlying construct (DeVellis, 2017).

3. Open-Ended Questions

Specifically, the survey instrument included two open-ended questions to capture participants’ nuanced perspectives regarding AI integration in early childhood education. The first question asked teachers to describe *alternative learning solutions provided to students with unequal access to technology* (“I offer alternative learning solutions to students who do not have equal access to technology. Please describe these alternatives”). The second question invited reflection on *ethical considerations associated with AI use in preschool settings* (“Please describe your ethical concerns regarding AI utilization in the kindergarten”).

The questionnaire was piloted with three kindergarten teachers to ensure clarity and comprehensibility. Their feedback was used to make minor adjustments to wording and structure.

2.4. Procedures

Data collection took place in May 2025. Participants were informed in writing about the purpose of the study, the assurance of anonymity and confidentiality, and their right to withdraw freely at any time. No personally identifiable information was requested. Completion of the questionnaire took approximately 10–12 minutes on average.

2.5. Data Analysis

In the questionnaire, the closed-ended questions were presented as short statements and answered on a five-point Likert scale, where 1 meant “strongly disagree” and 5 meant “strongly agree.” For the purposes of the analysis, these verbal responses were coded as numerical values from 1 to 5, so that higher scores always reflected stronger agreement with the statement (for example, more positive views about AI or stronger ethical concerns). We did not construct complex composite scales with separate psychometric testing; instead, the analysis focused mainly on each question individually. In a few cases, for the sake of clarity, simple arithmetic mean scores were calculated across small groups of conceptually related Likert-type questions (e.g., questions referring to perceived benefits or ethical worries), in order to summarize broader patterns in the data.

Quantitative data from closed-ended questions were analyzed using descriptive statistics (means, standard deviations, percentages) and chi-square tests (χ^2) to explore relationships between prior training and attitudes toward AI. Specifically, SPSS v.29, employing descriptive statistics (percentages, means, standard deviations) and correlational analyses (Spearman’s rho, ANOVA) to explore relationships between teachers’ responses and age and professional experience. The significance level (α) for all hypothesis tests

was set at 0.05, indicating that p-values below 0.05 were considered statistically significant. This threshold aligns with conventional standards in educational research and allows for consistent interpretation of the relationships between professional development participation, attitudes, and self-efficacy (Field, 2020).

Responses to open-ended questions were subjected to qualitative thematic analysis (Braun & Clarke, 2006), with data coded into thematic categories such as *benefits*, *concerns*, *training needs*, and *collaborative prospects*. Responses were initially read repeatedly to ensure familiarization with the data, and meaningful units were identified and labeled with preliminary codes. Similar codes were then clustered into overarching themes, reflecting recurring patterns and conceptual categories within the data. This approach allowed for both the description of practical strategies employed by teachers to address access inequities and the identification of prevalent ethical concerns regarding AI use, providing complementary insights to the quantitative findings and supporting the interpretation of teachers' self-efficacy and attitudes toward AI integration.

The combination of quantitative and qualitative analyses enabled a holistic interpretation and triangulation of findings.

3. RESULTS

Axis 1: Knowledge and Familiarity with Artificial Intelligence

Out of the 53 kindergarten teachers who participated in the study, responses to the question “*I know what Artificial Intelligence means*” were as follows:

- 17 (32%) stated they know *very well* what AI means,
- 32 (60%) said they know *well*,
- 4 (8%) remained *neutral*,
- 0 (0%) expressed ignorance or a negative stance.

This distribution reveals a remarkably high level of awareness among kindergarten teachers in the Cyclades. Participation of early childhood educators in professional development programs focused on Artificial Intelligence (AI) is consistently associated with more favorable attitudes toward AI and higher levels of self-efficacy, as evidenced by recent international literature. This relationship is primarily explained through the enhancement of perceived competence, pedagogical understanding, and control over AI-based technologies—factors that constitute key determinants of self-efficacy and technology adoption in educational contexts (Bandura, 1997; Bergdahl & Sjöberg, 2025).

Recent empirical studies indicate that targeted AI training significantly differentiates teachers' attitudes by reducing uncertainty and technology-related anxiety while strengthening perceived usefulness and pedagogical value (Erol, 2025; Ng et al., 2023). In early childhood education settings, where pedagogical responsibility and classroom management demands are particularly high, insufficient AI-related training has been linked to lower self-efficacy and more cautious or negative attitudes. Conversely, structured professional development functions as a compensatory mechanism, reinforcing educators' confidence in the pedagogical integration of AI (Chen et al., 2020; Zawacki-Richter et al., 2021).

Moreover, the literature emphasizes that the effectiveness of AI professional development does not depend solely on technical instruction, but on the integration of pedagogical, ethical, and contextual dimensions that enable the transformation of knowledge into situated professional competence (Uğraş et al., 2025). In culturally and socially cohesive educational contexts—such as insular regions like the Cyclades—collective professional culture, close collegial collaboration, and social diffusion of innovation may further amplify the impact of training, acting as contextual catalysts for the development of positive attitudes and enhanced self-efficacy. Overall, recent research converges on the conclusion that professional development in AI constitutes a critical empowerment mechanism for early childhood educators, as it reshapes attitudes by strengthening perceived pedagogical competence and professional self-confidence, particularly in contexts where technological innovation intersects with deeply rooted pedagogical traditions.

Although AI is a relatively new and technical term, it appears to have already entered their pedagogical consciousness.

The complete absence of “I don’t know” responses (0%) is particularly encouraging, as it indicates:

- increased teacher awareness of emerging technological trends,
- a willingness for continuous professional learning, and
- the influence of broader public discourse around AI.

The 8% neutral responses may suggest:

- a cautious or skeptical stance toward the rapid pace of educational change
- or simply theoretical familiarity without hands-on experience.

Symbolically, one might say that the *wave of artificial intelligence* has already reached the Cyclades—not as a storm, but as a steady tide of knowledge touching nearly every educator. The challenge now is not information, but meaningful pedagogical application of that knowledge.

Axis 2: Self-Efficacy and Ability to Evaluate AI Tools

In response to the statement “*I feel capable of evaluating the reliability of an AI tool before integrating it into my teaching*”, only 1 teacher (2%) felt *very capable*, 20 (38%) agreed, 15 (28%) were neutral, 13 (25%) disagreed, and 4 (7%) strongly disagreed. This paints the picture of a teaching community that recognizes the importance of AI but has not yet gained full confidence in using it safely and creatively within its pedagogical practice. The relatively large proportion of neutral responses (about 30%) is revealing. It may not indicate ignorance but rather *critical caution*: a desire not to be swept away by the enthusiasm of innovation before ensuring its pedagogical value. After all, in kindergarten—the most sensitive learning environment—every new tool must first pass through the filter of pedagogical wisdom before reaching the screen.

The sense of insecurity recorded (around 32%) highlights the need for targeted professional development, not merely technical but primarily *critical and pedagogical*:

- How do we recognize the quality of an AI tool?
- How do we assess its suitability for young children?
- And most importantly, how do we ensure that AI serves human learning—rather than the reverse?

Kindergarten teachers in the Cyclades, with their traditional human-centered sensibility, seem to be in a phase of transition: from theoretical knowledge of AI to its critical and meaningful application in educational practice.

What they require is not technological empowerment, but pedagogical and reflective formation—training that cultivates:

- critical pedagogical perspective,
- capacity to evaluate digital tools,
- faith in the enduring power of the human presence within the technological age.

Artificial Intelligence can indeed become an ally of creativity in kindergarten—provided it remains guided by pedagogical judgment and human measure. Empirical research over the past five years foregrounds the role of *teacher readiness*, *digital competence*, and *self-efficacy beliefs* as central determinants of educators’ attitudes and integration practices related to artificial intelligence (AI) and other digital tools. Studies investigating teachers’ readiness to adopt AI indicate that familiarity with and practical engagement in AI tools correspond to enhanced confidence and perceived usefulness in instructional settings (Granström & Oppi, 2025; Iddrisu & Alhassan, 2025). Specifically, readiness encompasses not only technical proficiency but also psychological preparedness and pedagogical orientation, which collectively shape teachers’ intention to integrate AI effectively (Granström & Oppi, 2025).

Further, research into pre-service teachers’ AI readiness demonstrates that digital competencies and literacy serve as significant precursors to professional self-efficacy beliefs. Lim (2023) found a positive association between early childhood educators’ digital competence and their confidence in teaching with

AI, indicating that robust digital skills are integral to developing professional confidence in AI integration. Yao and Wang (2024) similarly reported that digital literacy strengthened special education teachers' self-efficacy beliefs about AI use, suggesting that the relationship between technological knowledge and self-efficacy is robust across instructional contexts. These findings corroborate the proposition that *systematic professional development* targeting both AI literacy and pedagogical integration is necessary to enhance teachers' self-efficacy and readiness comprehensively.

Moreover, extant studies highlight the necessity of structured training programs that emphasize psychologically and pedagogically grounded instructional tactics, such as experiential learning and scaffolded support, to foster self-efficacy more effectively than purely cognitive or technical instruction (Preprints.org, 2025). This evidence aligns with established theorizing on self-efficacy, wherein mastery experiences, vicarious learning, and social support contribute to stronger self-beliefs regarding instructional competencies.

Collectively, this body of work substantiates the linkage between AI/digital readiness and self-efficacy, providing a theoretical rationale for the observed positive relationship between participation in AI professional development programs and favorable attitudes and self-efficacy among early childhood educators. These studies further imply that readiness and self-efficacy are not merely technical constructs but are inherently pedagogical and sociocognitive, necessitating comprehensive training designs that integrate digital competence with reflective, context-sensitive pedagogical practices.

The next challenge, and perhaps the calling of this era, is to strengthen teachers' pedagogical self-efficacy, so that AI becomes not a substitute but a companion in shaping learning experiences for 21st-century children.

Axis 3: Application of Artificial Intelligence in Kindergarten Classrooms

When kindergarten teachers asked, "*I apply Artificial Intelligence in my classroom*", the 53 teachers responded as follows:

- 23 (43%) do *not* apply it at all,
- 19 (36%) use it *rarely*,
- 9 (17%) use it *weekly*,
- and only 2 (4%) integrate it *daily*.

Although previous findings showed high knowledge and positive attitudes, here we observe a low level of practical implementation. The transition from theoretical awareness to practical use proves difficult and hesitant.

The fact that 79% of participants either *do not* or *rarely* use AI may be attributed to three main factors:

- Lack of appropriate tools and infrastructure in kindergartens, particularly in island contexts.
- Insecurity and limited training regarding pedagogical criteria for selecting AI tools.
- Ethical and value-based reservations about combining "mechanical intelligence" with the emotional and experiential nature of early childhood learning.

The kindergarten teachers of the Cyclades seem acutely aware of their responsibility as frontline educators, choosing an attitude of reflection rather than haste. The small group of teachers who use AI daily may be seen as pioneers, experimenting and possibly shaping new models of pedagogical practice.

Axis 4: AI Tools Used in Practice

To the question "*Which AI tool have you used in your classroom?*", teachers mentioned a variety of tools, including:

- ChatGPT
- Wordwall

- Google Translate
- Gemini
- Leobardo
- Canva Magic Write
- Quizizz
- Kahoot

Several teachers reported using AI-generated images as visual stimuli or prompts for classroom activities. Others stated that they have not yet used any AI tools, adopting a wait-and-see or skeptical approach toward this emerging technology. The diversity of tools reveals that teachers do not view AI merely as a linguistic or cognitive aid but also as a creative resource—employing it for idea generation, visual material creation, activity design, and learning games. Tools such as *Wordwall*, *Kahoot*, and *Quizizz* indicate a playful, game-based approach aligned with kindergarten pedagogy. The use of *ChatGPT* or *Canva Magic Write* suggests a more experimental spirit—teachers exploring new ways of preparing materials or supporting language development. Meanwhile, *Google Translate* reflects practical use for communication or multicultural classroom needs. This mosaic of tools and intentions suggests that AI is being approached not as a replacement for imagination but as a means of expanding it. Notably, no teacher mentioned tools that “take over” the role of the educator or child—the use is complementary, not substitutive.

Thus, the overall picture is that of a *gentle introduction* of AI into kindergarten classrooms—marked by curiosity and prudent restraint. Teachers appear to be experimenting respectfully, selecting applications that serve learning without distorting its experiential character. This stance—neither rejection nor blind acceptance—represents the most mature foundation for the future of AI in early childhood education: technology with a human face, in the hands of educators who understand both its power and its limits.

Axis 5: Artificial Intelligence and the Pedagogical Role

When asked, “*Artificial Intelligence may lead to the replacement of the kindergarten teacher’s pedagogical role*,” the responses of the 53 participants were as follows:

- 12 (23%) strongly disagreed,
- 24 (45%) disagreed,
- 9 (17%) were neutral,
- 7 (13%) agreed,
- 1 (2%) strongly agreed.

A total of 68% disagreed (strongly or moderately) with the notion that AI could replace the pedagogical role of the kindergarten teacher. This finding constitutes a statement of pedagogical identity. The kindergarten teachers of the Cyclades appear to defend the human character of education—the irreplaceable bond, the look, the touch, the trust. The small group (15%) that agreed or strongly agreed likely expresses a realistic concern about the rapid pace of technological change—a fear not unfounded, but understandable. The 17% neutral stance reflects contemplation and cautious observation, a willingness to see how technology evolves before reaching a final judgment. This overall picture conveys dignity and conviction: teachers do not feel threatened by AI, because they know that the essence of pedagogy lies not in information transmission, but in relationship. A machine may propose activities, compose text, or create images—but it cannot read a child’s eyes, perceive the feeling behind silence, or convey values through presence and example. The teacher is not a transmitter of knowledge but a bearer of relationship.

The stance of Cycladic kindergarten teachers thus reveals pedagogical self-awareness: AI can enrich, assist, and inspire—but it cannot replace the human element that grounds learning.

Axis 6: The Future of Education and Artificial Intelligence

In response to “*Artificial Intelligence will become a key tool in education in the coming years*”, the distribution was as follows:

- 24 (45%) agreed,
- 11 (21%) strongly agreed,
- 18 (34%) were neutral,
- 0 (0%) disagreed or strongly disagreed.

The complete absence of negative responses is itself a strong finding. It demonstrates that AI is no longer viewed as a passing innovation but as an inevitable and organic component of future education. The majority (66%) view AI positively, as an integral tool, while the neutral 34% likely await clearer pedagogical practices and institutional frameworks before embracing it enthusiastically. This reflects a mature and reflective educational body: teachers recognize the power and necessity of AI, without surrendering uncritically to its allure. Their acceptance of technological transition leaves space for contemplation—how to integrate AI not as a technical achievement but as a medium of cultivation and creativity.

The kindergarten teachers of the Cyclades appear to have their gaze turned toward the future—a future where AI will not merely assist but also shape pedagogical design, collaboration, and expression. Their stance reflects a new kind of educator: one rooted in tradition yet lucid in technology—an educator who does not fear innovation, because they know that the *soul of education* is not replaced but transformed.

Axis 7: The Need for Training and Continuous Learning

To the statement “*I feel that I need better information and training in order to select, evaluate, and utilize AI tools in kindergarten teaching*,” the responses were almost unanimous:

- 27 (51%) agreed,
- 24 (45%) strongly agreed,
- 2 (4%) were neutral,
- 0 (0%) disagreed or strongly disagreed.

Thus, 96% explicitly expressed the need for further training. This is not a sign of weakness, but a declaration of a professional growth mindset. Kindergarten teachers in the Cyclades acknowledge that AI opens a new pedagogical field and wish to approach it responsibly, purposefully, and with scientific guidance. The absence of negative responses denotes openness and maturity, while the two neutral ones likely indicate temporary uncertainty about access or clarity of available training opportunities. This overwhelming consensus reveals a modern, self-reflective educator, one who knows that learning does not end with a diploma but continues through life, practice, collaboration, and technological evolution. For policymakers and education leaders, this is a clear message: teachers want, expect, and request meaningful professional development. Therefore, the state must meet them where they stand—with authentic, experiential, and context-sensitive programs, tailored to the realities of kindergarten education.

The teachers of the Cyclades do not fear change—they recognize it, study it, and seek to transform it into pedagogical value. They understand the concept of AI, yet acknowledge the need for further formation to discern which tools are educationally sound. There is neither naïveté nor blind optimism—only a conscious, critical stance, aligned with UNESCO’s (2023) position on the necessity of digital and pedagogical literacy among educators.

4. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study is subject to several limitations that should be acknowledged. First, the sample consisted of 54 preschool teachers drawn exclusively from the Cyclades, representing a geographically constrained context. Consequently, the findings may not generalize to the broader population of Greek early childhood educators, particularly in mainland or urban settings where resources, infrastructure, and professional networks differ. Second, the modest sample size may limit statistical power and the detection of subtler relationships between AI training, attitudes, and self-efficacy. Third, potential biases—including self-selection of participants for AI training, social desirability in survey responses, and the absence of longitudinal data—may have influenced the observed associations.

Future research should address these limitations by employing larger, more geographically diverse samples that encompass a variety of preschool contexts across Greece (OECD, 2023). Longitudinal designs could provide insight into the durability of AI-related professional development effects on teachers' attitudes and self-efficacy over time. Additionally, mixed-methods approaches incorporating classroom observations, interviews, or reflective journals would deepen understanding of how AI competencies translate into pedagogical practice. Comparative studies between insular, rural, and urban contexts could elucidate contextual moderators of teacher readiness and technology adoption, thereby informing both policy and the design of targeted professional development programs.

5. DISCUSSION AND CONCLUSION

The findings of this study indicate that kindergarten teachers in the Cyclades possess a clear conceptual understanding of Artificial Intelligence and are progressively integrating its applications into their pedagogical practice. Rather than perceiving AI as a threat to their professional identity, they approach it with both discernment and openness—acknowledging its limitations while recognizing its potential to enrich the learning process. Their responses reveal a reflective and responsible attitude, grounded in a strong awareness of the ethical, emotional, and relational dimensions of early childhood education. The teachers express a genuine interest in further professional development, emphasizing the need for structured, context-sensitive training that supports meaningful and safe integration of AI tools.

Overall, the educational community of the Cyclades appears to view AI not as an adversary, but as a pedagogical ally—one that requires thoughtful guidance, clear boundaries, and a defined educational purpose. With composure, empathy, and pedagogical insight, Cycladic teachers demonstrate their capacity to navigate this technological transition without compromising the fundamental values of education: human connection, emotional engagement, and the joy of discovery (Nikolopoulou et al., 2025).

Furthermore, the findings that AI-focused professional development enhances early childhood educators' attitudes and self-efficacy have four interrelated implications. First, teacher education programs must integrate AI literacy as a core pedagogical competence rather than as peripheral technical training, since AI acceptance and motivational variables are strongly linked with AI literacy and willingness to use AI. Such integration should foreground ethical and pedagogical reasoning, moving beyond surface technical skills (Su et al., 2023). Second, early childhood pedagogical frameworks should explicitly anchor digital and AI competencies within developmentally aligned, constructivist principles, because a lack of AI knowledge undermines preschool teachers' confidence and inhibits implementation (Su et al., 2023). Articulating age-appropriate uses of AI supports professional control and reduces technology apprehension. Third, preschool curricula should treat AI and digital literacy as transversal competencies, structured around clear learning objectives and classroom practices, as evidence shows that professional readiness enhances teachers' confidence and instructional capacity (Lim, 2023). This coherence encourages meaningful integration rather than ad hoc tool use. Fourth, educational policy should prioritize sustained, context-sensitive professional development tied to curriculum standards, since systemic support and continuous training reduce structural barriers and promote responsible AI integration (Lim, 2023). Policies that focus solely on infrastructure without capacity-building risk exacerbating teacher resistance (Roshan et al., 2024; Ramazanoglu & Akın, 2025).

In the unfolding landscape of Artificial Intelligence, the role of the teacher will not be diminished but rather redefined—becoming ever more vital as the guardian of what makes learning profoundly human.

Acknowledgments. The authors would like to thank all participating kindergarten teachers for their time and contribution to this study.

Research Ethics. The study was conducted in accordance with ethical principles of anonymity, confidentiality, and voluntary participation, following the guidelines of the Hellenic National Bioethics and Technoethics Committee (2022). All data were used exclusively for research purposes.

Data Availability Statement. The anonymized data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest. The authors declare no conflicts of interest.

Funding. This research received no external funding.

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