

Challenges of Employing Artificial Intelligence in Early Childhood Education in Sharjah

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Abstract

This study aims at investigating the challenges of employing Artificial Intelligence (AI) in Early Childhood Education (ECE) in Sharjah, United Arab Emirates. A quantitative descriptive survey was conducted with 100 participants, working in early childhood school. Data were collected using a 30-item questionnaire covering four domains: perceived benefits, technical challenges, ethical concerns, and proposed solutions. The results show that educators strongly recognize the educational value of AI, with a high mean score of 4.28 and 84% agreement regarding its benefits, particularly for personalized learning and supporting children with special educational needs. However, technical and professional barriers remain significant ($M = 4.12$, 78% agreement), mainly due to limited training and infrastructure challenges. Ethical and developmental concerns produced moderate agreement ($M = 3.85$, 65% agreement), reflecting mixed views about issues such as data privacy and reduced social interaction. The strongest consensus appeared in the domain of proposed solutions ($M = 4.45$, 92% agreement), highlighting educators' strong demand for continuous professional training, clear ethical guidelines, and culturally responsive AI tools. The findings indicate that while educators in Sharjah are highly ready to adopt AI in early childhood classrooms, successful implementation requires improved training, stronger infrastructure, and clear ethical governance.

Keywords

Artificial Intelligence, Early Childhood Education, Teacher Perceptions, Educational Technology, Sharjah, UAE, AI Ethics

1. Introduction

The rapid rise of Artificial Intelligence (AI) is transforming how we live and learn

globally, and the United Arab Emirates (UAE) is a leader in this digital shift. Driven by national goals like the National Vision 2021 and the National Innovation Strategy, the UAE is committed to building a knowledge-based economy through the adoption of innovative technologies (Mohebi, 2025, p. 372). Within this landscape, the city of Sharjah has placed a significant focus on modernizing its educational system, with institutions like the Sharjah Education Academy exploring how AI can be integrated into classrooms to support both teachers and students. This study focuses specifically on Sharjah, UAE, to investigate the challenges and solutions associated with employing AI in Early Childhood Education (ECE).

Early Childhood Education covers the critical developmental window from birth to age eight. In Sharjah's classrooms, AI tools, ranging from interactive applications and augmented reality to intelligent tutoring systems, are beginning to reshape traditional learning. One of the most significant benefits is the ability to provide personalized learning experiences. AI can analyze a child's progress and adjust educational content to match their specific needs, which helps boost their engagement, self-esteem, and confidence.

In recent years, advancements in science and technology have brought about significant transformations in many aspects of the life, especially in education (Jahnke, 2023). AI offers practical advantages by automating administrative tasks and providing data-driven insights into student performance, allowing teachers to focus more on direct student interaction. Furthermore, AI has proven to be an invaluable resource for inclusivity; it provides specialized support for children with special needs, offering interactive games and sensory activities tailored to their unique learning requirements. (Alatal et al., 2021; Atlas, 2023).

Despite these opportunities, integrating AI into early childhood settings in Sharjah presents several hurdles. Some are well-documented, including technical limitations, infrastructure demands, and ethical concerns related to data privacy and bias. Another primary concern is the lack of specialized training for teachers, many of whom feel they lack the knowledge and technical support needed to use these tools effectively. There are also deep concerns regarding the social and emotional impact on young children; over-reliance on technology can potentially reduce physical activity and the vital face-to-face social interactions necessary for healthy growth (Dong, 2025, p. 52).

Ethical and safety issues are also top priorities. Protecting the privacy and security of a child's data is critical, as is ensuring that AI algorithms are fair and free from bias. Additionally, there is an ongoing debate about how AI might influence higher-order thinking; while these tools provide quick answers, they must be used carefully to ensure they do not discourage a child's natural ability to think critically and solve problems independently. (Dong, 2025; Nguyen et al., 2023).

As Sharjah continues to adopt AI-infused classrooms, it is essential to understand the specific barriers faced by local educators and identify solutions that ensure technology remains a helpful partner in education. This research focuses

on the specific challenges that hinder the effective use of Artificial Intelligence in Sharjah's early childhood classrooms. By exploring the perspectives of local teachers, the study aims to move beyond theoretical benefits to address the practical barriers they face daily. Through identifying critical obstacles, such as the lack of professional training, overly complex technology, and a lack of ethical safeguards. This study seeks to provide a realistic roadmap for overcoming these hurdles.

2. The Research Problem

Artificial Intelligence is no longer a futuristic concept; it is actively entering classrooms in Sharjah. On paper, this is a major win for the UAE's digital goals. However, in reality, there is a significant gap between the "high-tech" promise of AI and the "day-to-day" experience of a preschool teacher. Many educators feel caught between the pressure to innovate and a lack of clear guidance on how to use these tools without harming a child's social growth or privacy. The research problem can be stated in the following question: *What are the primary professional, technical, and ethical challenges that prevent the effective use of Artificial Intelligence in Sharjah's early childhood centers, and what practical solutions can bridge this gap?*

3. Research Aims

This study is conducted with the four following aims:

- 1) To identify what is stopping teachers in Sharjah from using AI, whether it is a lack of high-speed internet, expensive equipment, or a simple lack of training.
- 2) To evaluate how teachers feel about AI. Do they see it as a helpful "co-pilot" or a threat to their professional status and the children's social skills?
- 3) To determine the level of concern regarding data privacy and the potential for "cultural bias" in AI tools that aren't designed for the UAE.
- 4) To propose a set of clear, actionable solutions (like the SAMR model and specialized training) that school leaders can use to make AI work in the real world.

4. Importance of the Research

This research is deeply important because it provides a voice to the teachers and administrators who are on the front lines of education in Sharjah. Instead of just looking at AI as a collection of "cool gadgets," this study highlights that successful innovation requires human support, specialized training, and a clear understanding of local culture. For organizations like the Sharjah Education Academy, these findings offer a practical map to help them decide where to invest in better internet, how to design more helpful training workshops, and how to create safety rules that protect children's privacy. Ultimately, the study ensures that as the UAE moves toward its big digital goals for 2031 and 2071, the youngest learners are not just using technology, but are using it in a way that is safe, fair, and truly helpful for their growth.

5. Research Limitations

While this study offers a critical diagnostic of Artificial Intelligence (AI) integration in early childhood settings, several methodological and contextual boundaries must be acknowledged. Primarily, the research is geographically restricted to the Emirate of Sharjah. Methodologically, the study utilizes a quantitative descriptive survey design, capturing self-reported perceptions and attitudes from 100 participants (80 teachers and 20 administrators) rather than utilizing longitudinal data or qualitative classroom observations to verify daily practice.

6. Research Terminologies

- **Early Childhood Education (ECE):** Refers to the foundational developmental period occurring between birth and age eight, with this study specifically examining the formative window of ages 3 to 8.
- **Artificial Intelligence (AI):** Defined in this pedagogical context as adaptive “smart” software, including interactive applications, voice-responsive tools, and automated systems designed to augment instructional planning and personalized learning.
- **The SAMR Model:** A theoretical framework consisting of four levels, **S**ubstitution, **A**ugmentation, **M**odification, and **R**edefinition, used to evaluate the depth of technology integration and its impact on transforming the learning experience.
- **Pedagogical Readiness:** The alignment of an educator’s instructional philosophy, technical competence, and psychological confidence required to effectively integrate AI into early childhood classrooms.
- **Digital Divide:** The socio-economic disparity regarding access to robust digital infrastructure, high-speed connectivity, and advanced hardware between different educational institutions.

7. Literature Review

This literature review examines the current state of Artificial Intelligence (AI) in Early Childhood Education (ECE), with a focus on the specific context of Sharjah and the wider United Arab Emirates (UAE). By analyzing the benefits, challenges, and potential solutions identified in recent research, this review establishes the foundation for a quantitative study.

Part 1: The Digital Transformation of Early Education in the UAE

The integration of Artificial Intelligence (AI) into the educational sector of the United Arab Emirates (UAE) is not merely a trend; it is a fundamental part of the nation’s long-term vision to move from an oil-dependent economy to a knowledge-based one. This transformation is driven by high-level government strategies that view technology as the primary engine for future growth (Massouti et al., 2025).

National Strategic Frameworks

At the heart of this change are two major policy frameworks: the UAE Centennial 2071 and the National Strategy for Artificial Intelligence 2031. These strate-

gies aim to make the UAE a world leader in AI by 2031, targeting sectors such as healthcare, transport, and most importantly, education (Miao & El Sebaaly, 2021; Mohebi, 2025). The government believes that by embedding AI into the classroom from a young age, they can prepare a workforce that is fluent in the language of the Fourth Industrial Revolution (4IR). This top-down approach has created a unique environment where educational institutions are encouraged, and often funded, to experiment with cutting-edge tools (Khadragy et al., 2024; Massouti et al., 2025).

The Sharjah Educational Landscape

Within the UAE, the Emirate of Sharjah has carved out a distinct identity as a hub for culture and education. The establishment of the Sharjah Education Academy (SEA) is a prime example of this commitment. The SEA focuses on professional development for teachers, emphasizing that while technology is important, the human element, the teacher, must be prepared to manage it (El Samaty, 2025). For Early Childhood Education (ECE) centers in Sharjah, this means a shift toward “AI-infused” environments where the goal is to foster 21st-century skills like critical thinking, digital literacy, and collaboration from the very start of a child’s academic journey (El Samaty, 2025; Mohebi, 2025).

Redefining Early Childhood Education (ECE)

Early Childhood Education typically refers to the formative years of a child’s life, from birth to age eight (Atwa, 2024). Historically, this stage has been dominated by play-based learning and physical social interaction. However, the concept of “Intelligence Unleashed” (Luckin et al., 2016, as cited in Cipi & Cipi, 2025) suggests that AI can significantly enhance these traditional methods. Rather than replacing it. The incorporation of Artificial Intelligence (AI) tools into Early Childhood Education (ECE) has surfaced as a revolutionary trend in pedagogical innovation, with substantial implications for teaching and learning in the formative years. Research indicates that AI technologies, such as Augmented Reality (AR), Virtual Reality (VR), intelligent tutoring systems, and tangible AI, provide personalized, interactive, and engaging experiences suited to the developmental phases of young learners (Cipi & Cipi, 2025, p.2).

The Shift from “Screen Time” to “Smart Interaction”

In the past, the debate around technology in ECE was largely focused on the dangers of “screen time.” However, recent research in the UAE context suggests a shift toward “smart interaction.” Educators are no longer just looking at whether a child is using a device, but *how* the device is interacting with the child. Modern AI tools in classrooms are designed to be “proactive” rather than “reactive”, meaning they can sense when a child is struggling and offer a hint, or recognize when a child is bored and introduce a more challenging concept (Al-Ali et al., 2025; Atwa, 2024; Fikri & Rhalma, 2024; Khadragy et al., 2024).

Global Ambition vs. Local Implementation

While the global discourse on AI focuses on high-level ethical theories, the UAE’s focus is intensely practical. The challenge for educators in Sharjah is “trans-

lational”, how to take these national goals and turn them into daily classroom activities (Al-Ali et al., 2025; Khadragy et al., 2024; Massouti et al., 2025). This requires a delicate balance: maintaining the cultural and social values of the UAE while adopting technologies that are often developed in different cultural contexts. As schools in Sharjah adopt these tools, they must ensure that AI supports the Arabic language and local cultural norms, a challenge that is frequently cited by local researchers (Atwa, 2024).

Part 2: Pedagogical Opportunities and Personalization in the Early Years

In the educational landscape of Sharjah, the adoption of Artificial Intelligence (AI) is driven by the promise of making learning more effective and enjoyable for every child. Rather than being a replacement for the teacher, AI is increasingly viewed as a powerful tool that can customize the educational journey (Ara-
bee',2023). This section explores the specific pedagogical benefits identified by researchers in the UAE and globally.

The Concept of Personalized Learning Paths

One of the most transformative aspects of AI in Early Childhood Education (ECE) is its ability to move away from a “one-size-fits-all” approach. In a traditional classroom, a teacher often has to teach to the “middle” of the class, meaning some children may find the material too easy, while others may struggle to keep up. AI systems, however, act like a personal tutor for each child.

These tools use algorithms to analyze a child’s responses in real-time. If a child in a Sharjah nursery is playing an AI-powered math game and consistently gets questions right, the system can automatically increase the difficulty to keep them challenged. Conversely, if the child is struggling, the system provides immediate hints or simplifies the task (Cipi & Cipi, 2025; Fikri & Rhalma, 2024). This immediate feedback loop is crucial in the early years because it prevents frustration and helps build a child’s self-esteem and confidence in their own abilities (Fikri & Rhalma, 2024; Miao & El Sebaaly, 2021).

Inclusive Education and Special Needs (SEND)

The UAE has a strong commitment to inclusive education, and research conducted in the region highlights AI as a “game-changer” for children with special educational needs and disabilities (SEND). Special education teachers in the UAE have noted that AI can adapt to a child’s unique sensory and cognitive requirements in ways that were previously impossible (Atwa, 2024).

For example, for a child with sensory processing challenges, AI-driven tools can suggest specific sensory activities or interactive games that help with cognitive development without being overwhelming (Atwa, 2024; Miao & El Sebaaly, 2021). Furthermore, AI-powered speech recognition and predictive text tools can help children with communication difficulties express themselves more clearly, ensuring they can participate fully in classroom activities alongside their peers. This capability not only supports the child’s learning but also fosters a more inclusive social environment in Sharjah’s schools (Atwa, 2024; Mohebi, 2025).

AI as the Teacher’s “Co-Pilot”

A common theme in the literature from the UAE is that AI should support, not replace, the educator. Teachers in Sharjah often face heavy administrative workloads, including lesson planning, tracking student progress, and generating reports. Researchers have found that AI can act as a highly efficient “co-pilot,” taking over these time-consuming tasks (Alhawery & Aljamali, 2021; Atwa, 2024).

By automating the “paperwork” side of teaching, AI allows educators to spend more high-quality, face-to-face time with their students. This “augmented” teaching model means that a teacher can use data-driven insights provided by AI to understand exactly where each student stands, allowing for more targeted and meaningful human interaction (Khadragy et al., 2024; Massouti et al., 2025; Mohebi, 2025). In the context of your closed questionnaire, this “perceived usefulness” for administrative efficiency is a key variable to measure among Sharjah’s educators.

Fostering 21st-Century Skills Through Play

In Sharjah, there is a growing emphasis on using AI to foster “higher-order thinking skills” from a young age. This involves moving beyond simple memorization toward skills like creativity, problem-solving, and critical thinking (El Samaty, 2025).

Using frameworks like the **SAMR Model** (Substitution, Augmentation, Modification, and Redefinition), educators are encouraged to use AI to redefine learning tasks. For instance, instead of just reading a digital book (Substitution), children might use AI to create their own interactive stories where the characters respond to the child’s choices (Redefinition). This type of engagement encourages children to be “discerning learners” who can navigate a digital world with a critical eye (El Samaty, 2025). This shift is essential in the UAE, where the goal is to raise a generation of innovators and creators (Mohebi, 2025).

Engagement and Motivation

Finally, the “fun factor” of AI cannot be ignored. Early childhood is a time of exploration, and AI tools, such as augmented reality (AR) and smart toys, make learning feel like play. Studies have shown that these interactive elements significantly increase a child’s motivation to learn (Cipi & Cipi, 2025). Whether it is a virtual assistant that tells stories or a robot that helps children learn to code, these tools capture the imagination of young learners in Sharjah, making the classroom a place of excitement and discovery (Fikri & Rhalma, 2024; Mohebi, 2025).

Part 3: Professional and Institutional Challenges

While the theoretical benefits of AI in Early Childhood Education (ECE) are significant, the actual implementation in Sharjah’s classrooms faces a series of practical and professional hurdles. These challenges represent the “barriers to adoption” that educators must navigate daily. Understanding these obstacles is essential for identifying why certain AI tools may not be reaching their full potential in the classroom.

Teacher Readiness and the “Competence-Confidence” Gap

A primary challenge identified across the UAE is the gap between a teacher’s

interest in AI and their actual ability to use it. Many pre-service and in-service teachers in Sharjah express a high level of “readiness” or enthusiasm for AI, but this does not always translate into classroom practice (Albasalah et al., 2022; Mas-souti et al., 2025).

Researchers have found that while teachers understand the *concept* of AI, they often lack the technical “know-how” to integrate it into a pedagogy that suits young children (Mohebi, 2025). This lack of competence often leads to a lack of confidence; if a teacher is afraid that the technology will fail or that they won’t be able to answer a child’s question about it, they are less likely to use it. This makes “technical self-efficacy” a critical variable to measure in your questionnaire (Mas-souti et al., 2025; Mohebi, 2025).

Infrastructure Limitations and High Costs

Implementing high-quality AI is not just about software; it requires a robust physical and digital infrastructure. In Sharjah, as in other parts of the world, schools face challenges related to high-speed internet reliability and the high cost of purchasing and maintaining AI-enabled hardware, such as smart robots or tablets (Atwa, 2024; Cipi & Cipi, 2025; Khan et al., 2022).

For smaller ECE centers or those with limited budgets, these costs can be prohibitive. This creates a “digital divide” where children in better-funded schools have access to cutting-edge AI tools, while others are left behind. Furthermore, the need for continuous software updates and technical support adds a layer of operational complexity that many schools are not yet equipped to handle (Atwa, 2024).

Complexity and the Usability Barrier

For technology to be effective in an early childhood setting, it must be “invisible”, meaning it should be so easy to use that it doesn’t distract from the learning process. However, many current AI interfaces are viewed as overly complex by educators (Atwa, 2024; Fadlelmula & Qadhi, 2024).

Teachers have reported that setting up AI tools, managing student accounts, and troubleshooting technical glitches takes up too much valuable classroom time. There is a strong call in the literature for “simplified AI interfaces” designed specifically for the ECE environment. If a tool is too difficult to navigate, it will likely be abandoned, regardless of its educational value (Atwa, 2024; Cipi & Cipi, 2025).

Community Apprehension and Cultural Resistance

The introduction of AI into schools is sometimes met with skepticism from parents and the wider public. This “community apprehension” often stems from a fear that robots or algorithms might replace the nurturing role of the teacher (Atwa, 2024; DerSimonian & Montagnino, 2025).

There are also concerns about whether AI tools, which are often developed in Western contexts, align with the cultural and linguistic values of the UAE. For instance, an AI virtual assistant that only speaks English or does not recognize local cultural nuances may be viewed with resistance by both parents and teachers. Ensuring that AI is “culturally responsive” is a significant hurdle for local imple-

mentation (Al-Ali et al., 2025; Atwa, 2024; Harb & Arafat, 2024).

The Fear of “De-professionalization”

Finally, there is a subtle professional challenge regarding the role of the teacher. Some educators fear that as AI becomes more capable of delivering content and assessing students, the professional status of the teacher might be diminished. This fear can lead to “passive resistance,” where teachers go through the motions of using technology without truly integrating it into their teaching philosophy (Khan et al., 2022; Massouti et al., 2025; Mohebi, 2025). Addressing these professional anxieties through transparent policy and clear definitions of the “human-AI partnership” is essential for successful adoption in Sharjah (El Samaty, 2025).

Part 4: Ethical Concerns and Developmental Impacts

In the unique cultural and educational environment of Sharjah, the integration of Artificial Intelligence (AI) into Early Childhood Education (ECE) brings up a complex set of ethical and developmental questions. While technology offers efficiency, researchers and parents in the UAE are increasingly concerned about how these “smart” systems affect the delicate process of a child’s growth. For a study using a closed questionnaire, these concerns represent the “perceived risks” that can influence whether a teacher chooses to adopt or reject AI tools.

Protecting Data Privacy and Security

The most immediate ethical concern is the protection of a child’s personal information. AI systems function by collecting vast amounts of data, ranging from a child’s voice patterns and learning speed to their emotional reactions (Dignum, 2021; Kilag et al., 2024; Mohebi, 2025; Rhem, 2023). In Sharjah, where family privacy is highly valued, the question of who owns this data and how it is stored is paramount.

National laws in the UAE provide a framework for data protection, but many educators still worry about the “black box” nature of AI. They fear that without clear, transparent guidelines from school leadership, student data could be misused or exposed. This “privacy anxiety” is a significant factor that your questionnaire should address, as it often dictates how comfortable a teacher feels allowing children to interact with AI-powered devices (Atwa, 2024; Mohebi, 2025).

The Risk to Social and Emotional Development

Early childhood is the most critical period for developing “human” skills, empathy, teamwork, and social cues. A major debate in the literature is whether AI interaction might replace the vital face-to-face time children need with their peers and teachers (Fikri & Rhalma, 2024).

If a child in a Sharjah classroom spends a large portion of their day interacting with a virtual assistant or a robot, there is a risk that they may miss out on physical play and real-world social problem-solving. Researchers emphasize that while AI can simulate interaction, it cannot replace the emotional warmth and moral guidance provided by a human educator (Fikri & Rhalma, 2024). For the purposes of your research, it is important to measure whether teachers perceive AI as a threat to the social-emotional “fabric” of the classroom.

Algorithmic Bias and Cultural Sensitivity

AI is only as good as the data it is trained on. Because many AI tools used are developed globally, they may carry hidden biases, ranging from gender and racial biases to cultural misunderstandings (Dong, 2025; El Samaty, 2025; Harb & Arafat, 2024).

For example, an AI might use examples or language that do not resonate with the local Emirati culture or the Arabic language. If the technology displays bias, it can unintentionally teach children unfair stereotypes or exclude certain groups (El Samaty, 2025). In the Arab world, ensuring that AI is “culturally responsive” and recognizes local dialects and values is not just a technical requirement, but a deep ethical obligation (Harb & Arafat, 2024).

Critical Thinking vs. “Intellectual Laziness”

There is a growing concern that Generative AI tools might encourage what some call “intellectual laziness.” If a child can ask an AI for an answer and receive it instantly, they may not go through the difficult but necessary process of trial and error (El Samaty, 2025; Miao & El Sebaaly, 2021).

Educators in Sharjah are particularly focused on “fostering discerning learners.” They worry that an over-reliance on AI-provided solutions could weaken a child’s ability to think critically or question the information they are given. To counter this, researchers suggest that AI should be used to *spark* questions rather than just provide answers, keeping the “spirit of inquiry” alive in young children (El Samaty, 2025).

The Digital Divide and Equity

Finally, the ethical issue of “equity” is central to the Sharjah context. If only high-fee schools can afford advanced AI tools, a “digital gap” emerges between children from different economic backgrounds (Atwa, 2024; Mittelstadt et al., 2016). This raises the question of whether AI is democratizing education or creating new forms of inequality. Teachers’ perceptions of whether AI is accessible to *all* students, regardless of their background, is a vital area for your questionnaire to explore (Massouti et al., 2025).

Part 5: Potential Solutions and Future Directions

To move from the challenges of AI implementation to a successful, sustainable model, researchers in Sharjah and the wider UAE have proposed several strategic solutions. These pathways are designed to ensure that technology serves as a bridge rather than a barrier, providing a useful framework for the “solutions” section of your closed questionnaire.

Comprehensive and Continuous Professional Development (CPD)

The most frequently cited solution in UAE literature is a total rethink of teacher training. Basic digital literacy is no longer enough; educators in Sharjah need “AI-specific pedagogy” training (Al-Ali et al., 2025; Massouti et al., 2025).

Rather than one-off workshops, studies suggest a model of continuous professional development where teachers are given hands-on time to experiment with AI tools in a low-stakes environment. This training should focus not just on *how*

to turn on the machine, but on *how* to use AI to enhance critical thinking and social interaction among young children (Mohebi, 2025). By building this technical self-efficacy, schools can close the “competence-confidence” gap and reduce teacher apprehension (Massouti et al., 2025).

Adopting Developmental Frameworks (The SAMR Model)

To ensure AI is used meaningfully, researchers suggest that Sharjah’s schools adopt established frameworks like the SAMR Model (Substitution, Augmentation, Modification, and Redefinition). This model provides a roadmap for moving away from using AI as a simple “screen” (Substitution) toward using it to create entirely new learning experiences that were previously impossible (Redefinition) (El Samaty, 2025).

For example, a teacher might use the SAMR model to evaluate a new AI story-telling app. Instead of just replacing a paper book with a digital one, the teacher could use the app to allow children to co-create the story’s ending, thereby fostering creativity and problem-solving. Using such frameworks helps educators justify the use of technology and ensures it aligns with developmental goals (El Samaty, 2025).

Developing “Culturally Responsive” AI

To address concerns about cultural bias and language, a key solution involves the development and selection of “culturally responsive” AI. In the Arab world, this means prioritizing tools that support the Arabic language, including local dialects, and reflect the social values of the UAE (Al-Ali et al., 2025; Harb & Arafat, 2024).

By involving local educators in the selection and even the design process of AI software, Sharjah can ensure that the technology feels like a natural extension of the classroom rather than an imported “foreign” tool. This cultural alignment is essential for gaining the trust of both parents and teachers (Atwa, 2024; Harb & Arafat, 2024).

Establishing Clear Ethical and Governance Guidelines

Transparency is the best cure for anxiety regarding data privacy. Schools in Sharjah are encouraged to establish clear, written guidelines on how student data is collected, used, and protected. This “AI Governance” should be a collaborative effort between school leaders, IT specialists, and parents (Al-Ali et al., 2025; Rhem, 2023).

When parents and teachers understand the safety protocols in place, they are much more likely to support the use of AI. Furthermore, setting ethical boundaries, such as strictly limiting the amount of “AI-only” time a child has per day, ensures that the technology does not infringe upon vital social and physical activities (Fikri & Rhalma, 2024; Mohebi, 2025).

Simplified Interfaces and Collaborative Support

Finally, the literature suggests that for AI to be sustainable, it must be easy to use. Researchers advocate for “simplified AI interfaces” that reduce the cognitive load on the teacher (Atwa, 2024). Additionally, creating “Professional Learning

Communities” (PLCs) within Sharjah’s schools allows teachers to share their successes and troubleshoot challenges together. This collaborative approach turns the individual struggle of learning new technology into a shared community journey, making the adoption of AI feel more manageable and less isolating (Li et al., 2022; Massouti et al., 2025; Mohebi, 2025).

8. Methodology

This chapter outlines the research design and procedures used to investigate the integration of Artificial Intelligence (AI) in Early Childhood Education (ECE) within Sharjah, UAE. It provides a detailed description of the participants, the instrument used for data collection, and the methods employed to analyze the findings.

8.1. Research Design

This study employs a quantitative research design using a descriptive survey method. A descriptive-analytic approach was adopted.

8.2. Participants

The participants in this study consist of 80 early childhood teachers and 20 school administrators who are currently working in private and public ECE centers and nurseries that serve children between the ages of 3 and 8 in the Emirate of Sharjah, UAE.

8.3. Research Instrument

Data were collected using a structured, closed-ended questionnaire developed following a review of the literature on Artificial Intelligence (AI) in Early Childhood Education (ECE). Previous studies addressing the benefits, challenges, ethical concerns, and implementation of AI were examined to identify the key themes relevant to the study. The questionnaire was reviewed by specialists in educational technology, early childhood education, and research methodology, and a pilot test was conducted with a small group of educators to improve clarity and relevance.

The final questionnaire consisted of 30 items distributed across four domains: Perceived Benefits (Items 1 - 8), Technical Challenges (Items 9 - 16), Ethical and Developmental Concerns (Items 17 - 24), and Proposed Solutions (Items 25 - 30). Responses were measured using a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5).

The reliability of the instrument was assessed using Cronbach’s alpha coefficient in SPSS. The results indicated good internal consistency for all domains, with coefficients ranging from 0.81 to 0.88, while the overall reliability coefficient was 0.89.

Domain scores were calculated by averaging the responses to the items within each domain. For the Technical Challenges domain, positively worded items were reverse-coded before analysis to ensure consistency in score interpretation. Con-

sequently, higher scores reflected greater perceived challenges. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated using SPSS to analyze the data.

9. Results

The data collected from 100 participants (80 teachers and 20 administrators) has been processed using SPSS. Below is the comprehensive breakdown of the results, followed by a detailed discussion of the findings.

Descriptive Statistics

The table below summarizes the weighted means, standard deviations, and the frequency distribution (represented as percentages) across the four primary domains.

Domain	Mean ($\bar{x}$)	SD (σ)	SA/A %	N %	D/SD %
Domain 1: Perceived Benefits	4.28	0.68	84%	10%	6%
Domain 2: Technical Challenges	4.12	0.82	78%	12%	10%
Domain 3: Ethical Concerns	3.85	0.95	65%	20%	15%
Domain 4: Proposed Solutions	4.45	0.54	92%	5%	3%

Key: SA/A (Strongly Agree/Agree), N (Neutral), D/SD (Disagree/Strongly Disagree).

The statistical data presented provides a comprehensive diagnostic of the current state of Artificial Intelligence (AI) integration within the Early Childhood Education (ECE) sector in Sharjah. By analyzing the interaction between the means, standard deviations, and percentage distributions, we can derive an understanding of the professional climate and the specific hurdles educators face.

Domain 1: Perceived Benefits

The findings indicate a highly positive perception of Artificial Intelligence (AI) among Early Childhood Education (ECE) educators in Sharjah. This domain recorded a mean score of 4.28 (SD = 0.68), with 84% of participants selecting either “Agree” or “Strongly Agree.” The relatively low standard deviation suggests a high degree of consistency in participants’ responses, indicating broad agreement regarding the educational value of AI.

The item-level results further explain this positive perception. Participants expressed strong agreement with the statement that AI tools help create personalized learning experiences for individual children (Item 1). This finding suggests that educators recognize the potential of AI to accommodate different learning styles, abilities, and developmental needs. Similarly, high levels of agreement were reported for the statement that AI applications support children with special educational needs and disabilities (SEND) (Item 3), indicating that educators view AI as a valuable tool for promoting inclusive education and providing additional support to diverse learners.

Participants also agreed that AI enables children to learn at their own pace (Item 4), enhances engagement through interactive learning activities (Item 2),

and provides useful information about children's learning progress (Item 7). Furthermore, respondents acknowledged the administrative benefits of AI, particularly its ability to reduce the time spent on routine tasks such as attendance and reporting (Item 6). Collectively, these findings suggest that educators perceive AI as a tool capable of enhancing both teaching effectiveness and student learning outcomes.

Domain 2: Technical and Professional Challenges

The Technical and Professional Challenges domain produced a mean score of 4.12 ($SD = 0.82$), with 78% of participants agreeing that significant barriers exist to the successful implementation of AI in ECE settings. Although agreement was generally high, the larger standard deviation compared with other domains indicates greater variation in participants' experiences and perceptions.

Analysis of individual items reveals several key challenges. Participants expressed concerns regarding their level of technical knowledge and preparedness to use AI effectively in classroom settings (Item 9). Many respondents also indicated that additional technical support from their institutions would be beneficial (Item 10). These findings highlight the importance of professional development opportunities to enhance educators' confidence and competence in using AI technologies.

Infrastructure-related concerns were also evident. Responses to Item 14 suggest that internet connectivity and technological resources remain important factors affecting AI implementation. Participants further identified the time required to set up and manage AI tools (Item 13) as a practical challenge, while the high cost of AI devices and software (Item 16) was viewed as a potential obstacle to equitable access. Concerns were also raised regarding the complexity of some AI applications for young learners (Item 15). Overall, these findings indicate that although educators recognize the potential benefits of AI, successful implementation depends on addressing issues related to training, infrastructure, technical support, and resource availability.

Domain 3: Ethical and Developmental Concerns

The Ethical and Developmental Concerns domain recorded a mean score of 3.85 ($SD = 0.95$), making it the domain with the greatest variation in responses. While 65% of participants expressed agreement with the statements in this domain, the relatively high standard deviation suggests that opinions regarding the ethical implications of AI are less uniform than those related to its educational benefits.

The strongest concerns were associated with the privacy and security of children's data (Item 17). Many participants indicated apprehension about how personal information collected through AI systems might be stored, managed, or accessed. This finding reflects a growing awareness of data protection issues and the need for clear policies governing the use of AI in educational environments.

Respondents also expressed concern that increased reliance on AI could lead to excessive screen time and reduce opportunities for peer interaction and social de-

velopment (Items 18 and 19). Given the importance of social and emotional learning during early childhood, these concerns are particularly significant. Additional concerns were raised regarding the possibility of cultural and linguistic bias within AI systems (Item 20), especially in relation to the UAE educational context and the Arabic language. Participants also questioned whether excessive dependence on AI could negatively influence children's critical thinking and problem-solving abilities (Item 21). These findings demonstrate that while educators acknowledge the potential advantages of AI, they remain cautious about its possible developmental and ethical implications.

Domain 4: Proposed Solutions

The Proposed Solutions domain achieved the highest mean score among all domains ($M = 4.45$, $SD = 0.54$), with 92% of participants expressing agreement. The low standard deviation indicates a strong level of consensus regarding the actions required to support the effective integration of AI into ECE settings.

Item-level analysis shows particularly strong support for continuous professional development and specialized training programs (Item 25). Participants emphasized the need for ongoing opportunities to develop the knowledge and skills required for effective AI implementation. High levels of agreement were also observed for the establishment of clear ethical guidelines (Item 26), reflecting educators' desire for greater clarity regarding issues such as privacy, data security, and responsible use.

Participants further supported the development of AI applications that align with UAE cultural values and educational priorities (Item 27). Collaborative initiatives, such as sharing experiences and best practices among educators (Item 29), were also viewed positively. In addition, respondents emphasized the importance of designing AI tools specifically for young children (Item 30), ensuring that technologies are developmentally appropriate and easy to use. Overall, the findings indicate a strong consensus that successful AI integration requires not only technological investment but also professional training, ethical governance, and culturally responsive implementation strategies.

10. Conclusion

Looking at the overall landscape in Sharjah, the findings suggest that educators hold generally positive perceptions regarding the potential of Artificial Intelligence (AI) in Early Childhood Education. These perceptions are reflected in four key findings that highlight both the perceived opportunities and barriers associated with AI integration.

First, participants reported positive perceptions regarding the educational potential of AI (4.28/5.00). Educators expressed favorable views about the possibility of AI supporting teaching and learning. In particular, 84% of participants agreed that AI could provide valuable support for personalized learning and students with special educational needs. These findings indicate positive attitudes toward the potential educational benefits of AI and are consistent with the UAE's broader

interest in educational innovation.

Second, the study identifies perceived operational barriers (4.12/5.00). Although participants expressed positive attitudes toward AI, 78% reported concerns related to technical support, infrastructure, and professional training. These findings suggest that educators perceive challenges that could hinder the effective use of AI within educational settings.

Third, the findings highlight perceptions of ethical and developmental concerns (3.85/5.00). Participants reported concerns regarding issues such as data privacy, children's social development, and the ethical use of AI technologies. The relatively high level of variation in responses ($SD = 0.95$) suggests differing views among educators regarding the potential risks and implications of AI use in early childhood settings. This finding points to the need for clearer guidance and policies to support informed decision-making.

Finally, the study reveals strong support for future action (4.45/5.00). This was the highest-rated domain, with 92% of participants agreeing on the importance of measures such as specialized training, professional development, ethical guidelines, and implementation frameworks such as the SAMR model. These findings indicate that educators perceive structured support as important for facilitating the responsible use of AI in Early Childhood Education.

Overall, the findings suggest that educators in Sharjah perceive AI as a potentially valuable educational tool while also identifying important technical, professional, and ethical barriers. Because the study examined participants' perceptions through self-reported questionnaire data, the results should not be interpreted as evidence of actual classroom adoption, effectiveness, or system-wide preparedness. Rather, they provide insight into how educators view their readiness, the potential benefits of AI, and the challenges they believe must be addressed to support its future integration in Early Childhood Education settings.

11. Recommendations

Based on the high agreement rates in the study, the following actions are recommended:

- The Sharjah Education Academy (SEA) and school boards should establish a formal "AI Ethics Charter" specifically for ECE. This must address the data privacy of minors and ensure algorithms are audited for cultural and linguistic alignment with Emirati values.
- To close the "digital divide" identified in the findings, policymakers should provide targeted financial support or subsidies to help nurseries upgrade high-speed internet and maintain advanced AI hardware.
- Move away from one-off workshops in favor of ongoing, pedagogical-focused training. These programs should train teachers to act as "AI-pilots" who use technology to enhance, rather than replace, human-centric play.
- Schools should prioritize the procurement of AI applications that offer high-quality Arabic language support and culturally relevant content to protect the

national identity of young learners.

- Educators should be encouraged to use the SAMR (Substitution, Augmentation, Modification, Redefinition) model as a standard tool for evaluating whether a piece of technology truly redefines the learning experience or is merely a digital substitute for traditional methods.
- Establish platforms for teachers across Sharjah to share successful AI-integrated lesson plans and strategies, helping to build collective confidence and reduce technical anxiety.

12. Suggestions for Future Research

The following topics are suggested for further academic inquiry to expand upon the findings of this study:

- The Impact of AI-Powered Adaptive Learning Systems on Arabic Literacy Development in Emirati Early Childhood Centers.
- A Comparative Analysis of AI Implementation Barriers: Public vs. Private Nurseries in the Emirate of Sharjah.
- The Longitudinal Effects of Virtual Assistant Interactions on the Social-Emotional Development and Empathy of Children Aged 3 - 5.
- Digital Trust and Privacy Anxiety: Assessing Parental Perspectives on AI Integration in Sharjah's ECE Sector.
- Evaluating the Efficacy of the SAMR Model as a Professional Development Tool for AI Integration in Early Childhood Classrooms.
- The Role of AI in Supporting Inclusion: A Case Study of Assistive Technologies for SEND Students in Sharjah Education Academy Schools.

Bridging the Competence-Confidence Gap: Effectiveness of Peer-to-Peer Mentorship in Enhancing Teacher Readiness for AI.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Research Questionnaire: AI in Early Childhood Education

Section 1: Perceived Benefits and Opportunities

1. AI tools help me create a more personalized learning experience for each child.
2. Using AI makes learning more fun and engaging for young students.
3. AI applications are very helpful for supporting children with special educational needs (SEND).
4. AI tools allow children to learn at their own speed.
5. AI can help children develop better problem-solving skills through interactive play.
6. Using AI for administrative tasks (like attendance or reports) gives me more time to teach.
7. AI tools provide helpful data that shows me exactly where a child is struggling.
8. AI-powered games help boost a child's confidence when they succeed at a task.

Section 2: Professional and Technical Challenges

9. I feel I have enough technical knowledge to use AI tools effectively in my classroom.
10. My school provides enough technical support when AI tools have problems.
11. I am confident in my ability to explain how AI tools work to parents.
12. The AI software currently available is easy for young children to use without constant help.
13. Setting up AI technology in the classroom takes up too much teaching time.
14. My school has a strong enough internet connection to support AI tools.
15. I find most AI interfaces too complicated for the early childhood environment.
16. The high cost of AI devices makes it difficult for all students to have equal access.

Section 3: Ethical and Developmental Concerns

17. I am worried about the privacy and security of children's data when using AI.
18. I fear that children will spend too much time with screens and not enough time playing with peers.
19. Over-using AI might negatively affect a child's social and emotional growth.
20. I am concerned that AI tools might have cultural or language biases that don't fit the UAE.
21. I worry that children might become "lazy" thinkers if AI gives them answers too quickly.
22. I feel that AI can never replace the emotional connection between a teacher and a child.
23. I am concerned that AI tools might not support the Arabic language well enough.

24. I worry that the use of AI might reduce the physical activity of children during the school day.

Section 4: Potential Solutions and Future Directions

25. Continuous training workshops would make me more comfortable using AI.

26. Having a clear set of ethical guidelines from the school would reduce my privacy concerns.

27. AI tools would be more effective if they were better aligned with UAE cultural values.

28. I believe a “human-AI partnership” is the best way to move forward in education.

29. Sharing experiences with other teachers in Sharjah would help me use AI more effectively.

30. Simplified AI tools designed specifically for young children would encourage me to use them more often.