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Employing artificial intelligence applications in developing the skills of early childhood teachers to keep pace with the labor market in accordance with the Kingdom's Vision 2030

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Abstract

The study aimed to explore the utilization of artificial intelligence applications in developing the skills of early childhood teachers to meet the labor market demands in line with Saudi Vision 2030, in addition to the role of these applications in improving the quality of education. The study adopted a descriptive-analytical approach and was applied to a sample of 100 early childhood teachers in Qatif Governorate, using a questionnaire as the main tool for the study. The results of the first axis showed that employing artificial intelligence in developing the skills of early childhood teachers is of great importance, as all statements received a high approval rating with a general arithmetic mean of 2.65 and a standard deviation of 0.51. The second axis showed that the use of artificial intelligence applications has a positive and significant impact on developing teachers' skills, including technological skills, teaching skills, planning, and analysis, with a general arithmetic mean of 2.65 and a standard deviation of 0.84. The third axis showed that artificial intelligence applications play an important role in improving the quality of education, time management, providing innovative educational tools, and enhancing children's interaction, with a general arithmetic mean of 2.78 and a standard deviation of 0.57. The study recommended the need to focus on artificial intelligence applications due to their demonstrated impact on developing the skills of early childhood teachers, integrating them into curricula, updating the educational environment infrastructure, holding training courses for teachers, and enhancing the utilization of artificial intelligence technologies to ensure the provision of the best educational services.

Keywords

Artificial Intelligence, Early Childhood, Early Childhood Teachers' Skills, Labor Market, Saudi Vision 2030

Introduction

The world is currently witnessing rapid development and an increasing use of artificial intelligence (AI) systems across various fields, including education, which is considered one of the most important sectors experiencing a growing application of AI technologies. The Kingdom of Saudi Arabia stands at the forefront of Arab countries in this regard, within the framework of its digital transformation strategy and Vision 2030, which revolves around key pillars such as "A Vibrant Society, a Thriving Economy, and an Ambitious Nation." Vision aims to reform the educational system at all levels as part of a comprehensive cognitive and digital transformation strategy to improve educational outcomes, foster creativity and innovation, and develop educational policies aligned with the digital era. Vision 2030 emphasizes "preparing future generations by providing educational opportunities for all, delivering high-quality education that contributes to character building and capacity development, and creating an educational environment that fosters innovation and creativity" (Saudi Vision 2030).

In this context, the features of the digital age have become evident, as AI applications play a pivotal role in transforming learning processes within educational institutions that are equipped with the necessary infrastructure and resources. This, in turn, has significant implications for the educational process and the development of early childhood education. For instance, AI can be used in classrooms to provide interactive and personalized learning activities for each child, continuously monitor their progress, generate detailed reports for teachers, and offer automated assessment tools that identify strengths and weaknesses. Educational robots and smart games can also be employed to deliver engaging and interactive learning experiences that foster creativity and cognitive skills. Moreover, by providing access to repositories rich in big data, AI enhances areas where learners show deficiencies, monitors their performance, and supplies teachers with precise feedback to take corrective actions (U.S. Department of Education, 2023).

At the **Beijing Forum on AI and Learning** during the **International Conference on Artificial Intelligence and Learning (2023)**, it was emphasized that AI can be used in education to enhance learning, management, teaching, and teacher empowerment (Beijing AI and Learning Forum, 2023). This is supported by several studies, such as **Al-Aqla (2024)**, which highlighted the importance of AI applications in early childhood education to improve learning quality and develop student skills; **Ibrahim (2021)**, which confirmed the role of AI in empowering early childhood teachers through technological enablement; and **Al-Atni & Alrubaian (2024)**, who recommended integrating AI applications of various forms into curricula at all educational stages. Similarly, **Jaaouani & Alkaabi (2024)** emphasized the importance of focusing on AI applications in educational processes, while **Tedre et al. (2021)** called for continuous training and support for teachers to help them effectively integrate AI tools into instruction.

Previous research indicates that AI applications have revolutionized the education sector, making it easier to design interactive digital interfaces and create digital textbook content across all educational stages. AI technologies also offer opportunities for incorporating digital tools into school activities to align education with labor market needs. The job market is currently undergoing major changes driven by AI, introducing new prospects and complexities for institutions and individuals alike. Consequently, academics and policymakers must understand these implications and analyze potential workforce transformations (El-Hady, 2020, p. 8).

Educational institutions in Saudi Arabia have adopted advanced technologies to enhance learning and improve the student experience. Among these innovations are interactive chatbots, which have

emerged as an effective tool to support the educational process and facilitate communication between students and teachers. The integration of chatbot technologies in Saudi educational institutions reflects a national commitment to improving education and elevating it to global standards through innovative digital solutions consistent with Vision 2030 (Al-Omari, 2023). As Vision 2030 asserts, education should "provide opportunities for all, deliver high-quality learning that builds character and develops skills, and foster an environment that encourages innovation and creativity" (Saudi Vision 2030).

Early childhood education represents a critical stage that requires highly skilled teachers to lay a solid developmental foundation for children. In Qatif Governorate alone, there are 244 early childhood teachers, highlighting the importance of leveraging AI applications for teachers in this region specifically, and across the Kingdom in general. The growing presence of AI continues to reshape the labor market, raising questions about what and how future generations should learn. Thus, there is a pressing need to prepare teachers with essential skills and competencies to thrive in a rapidly evolving society. This development aligns with Saudi Arabia's goal of nurturing a conscious, innovative, and productive generation capable of achieving sustainable development and adapting to global change. AI is expected to replace routine human tasks, saving time and improving efficiency (Qeshti, 2020, p. 20).

Accordingly, this study seeks to explore the employment of AI applications in developing the skills of early childhood teachers to meet labor market demands in line with Vision 2030. As the upcoming revolution in the labor market is expected to bring unique characteristics, there is an urgent need to strengthen teachers' competencies to adapt to changing job requirements. The education and training sector in Saudi Arabia is already undergoing substantial adjustments in response to these transformations.

Statement of the Problem

Saudi Arabia plays a leading role in adopting AI technologies across multiple sectors, including education, as part of Vision 2030's goal to achieve comprehensive digital transformation, improve education quality, and enhance the skills of teachers and students (Saudi Vision 2030). However, a pressing challenge remains: the extent to which early childhood teachers can keep pace with these technological advancements, particularly in utilizing AI applications to improve teaching quality and develop their professional skills to meet labor market needs.

Teacher preparation is one of the fundamental pillars of development under Vision 2030, which calls for aligning educational outputs with labor market demands in both public and private sectors. Enhancing early childhood teachers' skills requires preparing professionals capable of employing modern technologies in knowledge management (Almansour & Alghamdi, 2019).

Despite the ongoing efforts in the education sector, a skills gap persists among early childhood teachers regarding the use of AI applications. Recent studies highlight this deficiency: **Mishaal and Al-Eid (2023)** found that early childhood teachers have limited knowledge of AI applications, while **Bedair (2022)** emphasized the need to improve professional excellence standards among these teachers, revealing a gap between required and actual skills.

Research also suggests that AI can enhance teaching effectiveness and support teacher development. For instance, **Al-Qahtani (2024)** found that AI applications improve educational outcomes and develop teachers' competencies, while **Al-Mungdi (2024)** identified the role of AI technologies—such as virtual and augmented reality—in advancing education. Nevertheless, few studies—*to the best of the researcher's knowledge*—have focused on how AI

applications can be effectively employed in early childhood education to develop teachers' skills in line with Vision 2030. **Al-Hakami (2023)** noted challenges in AI integration in education, such as insufficient training and technical support, while **Tedre et al. (2021)** emphasized the need for robust infrastructure and ongoing teacher support.

Therefore, employing AI applications has become essential to meet labor market requirements in accordance with Vision 2030's focus on improving educational quality and promoting technological integration. Given the challenges faced by early childhood teachers in adopting AI applications, this study seeks to answer the following main research question:

How can AI applications be employed to develop the skills of early childhood teachers to meet labor market requirements in line with Saudi Vision 2030?

Research Questions

1. What is the conceptual framework of AI and its applications in early childhood education?
2. What are the essential skills and competencies required for early childhood teachers to meet labor market demands in line with Vision 2030?
3. What is the current reality of employing AI applications to develop early childhood teachers' skills in Qatif Governorate?

Research Objectives

1. To identify the most suitable AI applications for developing early childhood teachers' skills.
2. To clarify the relationship between teachers' skills and labor market requirements considering Vision 2030.
3. To assess the importance and benefits of employing AI applications in skill development from teachers' perspectives.
4. To identify the challenges and obstacles faced by early childhood teachers in Qatif when employing AI applications.
5. To propose recommendations and suggestions for improving the effective use of AI applications in developing teachers' skills.

Significance of Study

Theoretical Significance:

1. This study aims to fill a clear research gap in employing AI applications to develop early childhood teachers' skills within the framework of Vision 2030.
2. It contributes to advancing scientific knowledge regarding AI integration in education and provides new insights into improving teaching quality and teacher development.
3. It expands the scientific knowledge base concerning the use of AI applications in early childhood education.
4. It offers a deeper understanding of the core concepts related to AI and its role in enhancing teachers' professional skills.
5. It contributes to developing educational theories related to technology integration in teaching, opening new avenues for scholarly research.

Practical Significance:

1. The study identifies effective methods for developing teachers' skills to align with labor market requirements under Vision 2030.
2. It supports Vision 2030's educational goals by promoting the use of advanced technologies across all educational stages.
3. It provides practical recommendations for improving the quality of early childhood education through AI applications.
4. It helps prepare teachers capable of adapting to the evolving labor market through enhanced technological competencies.
5. It contributes to improving early childhood education quality by offering innovative digital tools and resources.
6. It provides actionable solutions for integrating AI into education to overcome challenges and achieve desired outcomes.
7. It offers empirical data and analysis to inform policymakers and decision-makers in adopting effective educational technology strategies.

Study Terminology:

Artificial Intelligence (AI):

Defined as "a set of technologies that enable a machine or system to learn, understand, act, and sense" (Saudi Data and Artificial Intelligence Authority [SDAIA], 2024).

Ramadan (2024) defined it as a group of applications or software programs that simulate the human mind in rapid response, enabling the user to obtain results instantly and coherently, as if interacting with another person rather than a computer or application.

Operationally, it is defined as: the use of computer systems and advanced technologies to simulate human mental abilities such as learning, analysis, and decision-making. In this study, AI applications are utilized to develop early childhood teachers' skills through innovative and interactive educational tools and are measured through teachers' responses to the study instrument.

Development:

Development is the process of improving and updating individuals', systems', or institutions' skills, knowledge, and abilities to achieve better performance, greater efficiency, and productivity. It includes a set of planned and organized activities that aim to achieve sustainable growth and continuous progress. It is essentially the process of changing something for the better, whether it is a product, service, skill, or system (Guskey, 2000).

Operationally, it refers to a set of activities and training programs provided to early childhood teachers to enhance their skills in using AI applications, including training on modern technological tools, AI applications in education, and developing innovative teaching strategies aligned with labor market demands under **Saudi Vision 2030**. It is measured through teachers' responses to the study instrument.

Early Childhood Teachers' Skills:

Defined as "the competencies, knowledge, and abilities that enable teachers to achieve educational goals at this stage, including technological skills, planning and assessment skills, teaching, and communication skills" (NAEYC, 2020).

Operationally, it refers to the abilities and knowledge teachers need to deliver effective education to early childhood learners. These skills include the ability to use modern technologies such as AI applications to enhance learning and interaction with children in innovative ways. They are measured through teachers' responses to the study tool that assesses technological, planning, assessment, teaching, and communication skills.

Labor Market:

The labor market is where people seeking suitable jobs meet employers offering such positions. It forms part of the economy where labor is exchanged for wages and encompasses all activities related to employment, unemployment, wages, and working conditions. It is the platform where services and skills are exchanged between employers and job seekers (Blau & Kahn, 2017).

Saudi Vision 2030:

Saudi Vision 2030 is an ambitious national plan aiming to achieve comprehensive transformation across various economic, social, and cultural sectors. The Vision seeks to reduce dependence on oil, diversify income sources, and promote sustainable development through building a vibrant society, a thriving economy, and an ambitious nation (Saudi Vision 2030).

Study Delimitations

- **Subject Delimitation:** The study focused on employing AI applications to develop teachers' skills in alignment with labor market requirements and Saudi Vision 2030.
- **Human Delimitation:** The study sample consisted of **100 early childhood teachers** in Qatif Governorate, Saudi Arabia.
- **Spatial Delimitation:** The study was limited to kindergartens in Qatif Governorate, Saudi Arabia.
- **Temporal Delimitation:** The study tool was administered, and data collected during the **second semester of the 1446 AH academic year**.

Theoretical Background of the Study

Axis One: The Conceptual Framework of Artificial Intelligence and Its Applications in Early Childhood Education

Artificial intelligence has become an integral part of educational institutions, assisting teachers in meeting students' needs and developing their skills. AI can overcome the drawbacks of traditional education and reduce individual differences among learners, thereby improving the educational process and enhancing interaction and problem-solving effectiveness (Hwang, 2017, p. 186).

1. The Concept of Artificial Intelligence:

Artificial intelligence is defined as "a branch of computer science that aims to create systems capable of simulating human mental processes such as learning, reasoning, and problem-solving" (Russell & Norvig, 2016).

It has also been defined as "a set of methods and techniques designed to create and innovate intelligent systems that simulate humans, enabling these systems to perform tasks on behalf of humans using logical and mathematical relationships and their qualitative properties" (Ibrahim, 2021, p. 29).

Moreover, it is defined as "a collection of diverse technologies, methods, and tools used to solve problems and develop models that simulate human behavior" (Aldosari, 2020, p. 145).

Another definition states that it refers to "programs that provide assistance and guidance to learners to achieve the desired goal and can support and develop their learning by identifying weaknesses and correcting them" (Al-Yazji, 2019, p. 266).

It has also been described as "the science that seeks to simulate human intelligence through computer systems that mimic human behavior in actions and speech" (Al-Obaidi, 2015, p. 44).

Generative artificial intelligence is defined as "a type of artificial intelligence technology that aims to generate new content—such as text, images, videos, and more. These technologies can produce novel and creative outputs based on prior training by learning complex data patterns and using them to create new material" (Saudi Data and Artificial Intelligence Authority [SDAIA], 2023, p. 8).

2. Objectives of AI in Education:

Al-Atal et al. (2021, pp. 36–37) indicated that the objectives of artificial intelligence (AI) in education include:

- Understanding the nature of human intelligence to create computer programs that simulate intelligent human behavior.
- Developing computer programs that learn from experience to solve problems.
- Facilitating the use of computers and maximizing their benefits in problem-solving, thereby enhancing training and learning processes.
- Developing intelligent training websites and programs that assess learners' learning styles, evaluate their knowledge, and design customized exercises.
- Achieving significant progress through individualized learning, curriculum adaptation, and generating detailed reports for teachers.
- Assessing learners' skills to improve their academic performance.
- Providing opportunities for remote testing with monitoring systems to prevent cheating.
- Meeting the needs of learners with special needs, motivating them to adapt, and improving their skills and comprehension.

3. The Importance of Using Artificial Intelligence in Education:

The role of AI extends beyond automating routine tasks to encompass achieving core educational objectives. It aims to personalize learning, improve quality, and empower educators. Its importance lies in its ability to create adaptive learning environments, provide instant assessments, and support administrative and educational decision-making with greater precision and efficiency (Holmes et al., 2019).

4. Use Cases of Artificial Intelligence in Education:

According to the Saudi Data and Artificial Intelligence Authority (SDAIA, 2024), AI technologies play a major role in developing the education sector and can be used to enable

personalized learning and create innovative educational experiences that foster creativity and enhance the desire to learn. Below are some of the main use cases, classified according to the beneficiary:

Students: AI can analyze student performance and provide personalized educational content suited to their levels and needs. It can also employ virtual and augmented reality technologies to create interactive learning environments that make education more enjoyable and effective.

Teachers: AI can assist teachers in designing curricula based on educational data analysis and identifying key topics. It can also automate test correction and provide immediate feedback to students.

Educational Administration: AI can analyze educational data to identify trends and improve decision-making processes, helping administrators allocate resources more effectively based on data analysis and actual needs.

5. Advantages of Using Artificial Intelligence in Education

The most prominent advantages of using AI in education lie in its ability to personalize the learning experience by providing adaptive content tailored to each learner's needs, and in enhancing operational efficiency through automating administrative and assessment-related tasks. It also contributes to improving the quality of education through intelligent real-time evaluation, predicting learning difficulties, and offering individualized academic support.

In addition, AI technologies enable the analysis of big data to support informed educational and administrative decisions and promote inclusivity by offering educational solutions that meet the needs of diverse learners, including those with special needs (Koutou, 2018, p. 26; Karsenti, 2019, p. 108).

6. Applications of Artificial Intelligence in Education

Al-Anzi (2020, p. 52), Ajjam (2018, p. 92), Al-Ghamdi & Al-Farhani (2023), and Al-Khabeeri (2020) highlighted several key applications of AI in education, including:

A. Direct Educational Applications:

Intelligent Adaptive Learning: Meeting each learner's individual educational needs.

Intelligent Assessment: Automatically grading tests and evaluating higher-order thinking skills.

Intelligent Educational Games: Purposeful games designed to achieve specific educational goals.

Educational Robots: Used to facilitate teaching and motivate learners.

B. Tools Supporting the Educational Process:

Natural Language Processing (NLP): Enabling systems to understand human language.

Text Recognition: Converting images and written materials into editable digital text.

Text Summarization: Automatically condensing lengthy texts.

Virtual Reality (VR): Simulating interactive learning environments.

C. Core Supporting Technologies:

Expert Systems: Programs that simulate expert knowledge to solve problems.

Neural Networks: Computational systems that mimic the functioning of the human brain.

7. Applications of Artificial Intelligence in Early Childhood Education

Previous studies, such as those by Al-Okla (2024) and Mishaal & Al-Eid (2023), have identified a range of AI applications suitable for early childhood education, which can be classified as follows:

A. Intelligent Learning Platforms:

Classera Platform: Provides a comprehensive virtual learning environment that includes digital materials and intelligent assessment systems.

Netex Learning Platform: Enables teachers to design interactive lessons that include multimedia components and self-assessment activities.

B. Specialized Interactive Applications:

Thinkster Math Application: Offers personalized math exercises for each child, tracks their problem-solving methods, and provides instant feedback.

C. Content Management Tools:

Intelligent Authoring Systems: Allow teachers to produce customized educational content tailored to different developmental levels of children.

8. The Efforts of the Kingdom of Saudi Arabia in Employing Artificial Intelligence in Education

Al-Okla (2024) and Mishaal & Al-Eid (2023) highlighted the Kingdom of Saudi Arabia's significant efforts in adopting artificial intelligence. The Saudi Data and Artificial Intelligence Authority (SDAIA) was established as the national reference body to regulate and develop this field. The authority contributes to the operation, research, and innovation in the data and AI sector, with projections that AI will add SAR 58.8 trillion to the global GDP by 2030.

Additionally, the National Center for Artificial Intelligence was founded to unify national efforts by implementing research projects, enhancing innovation ecosystems, and supporting the development of solutions that serve various sectors, while upgrading human capabilities in data science and artificial intelligence (SDAIA, 2023).

Key AI-related initiatives and applications in Saudi Arabia include:

SDAIA Academy: One of SDAIA's initiatives aimed at developing and preparing national talents for the labor market through collaborations with local, regional, and international partners. SDAIA launched several operational solutions to promote AI adoption, including:

"DEEM" Government Cloud: Provides secure and reliable cloud computing services for governmental and semi-governmental entities.

National Data Bank: Offers multiple data platforms that enhance data sharing and quality improvement.

"Istishraf" Platform: Provides foresight analyses and predictive insights to support decision-making in Saudi Arabia.

"Eatmarna" Application: Launched by the Ministry of Hajj and Umrah in cooperation with SDAIA to organize the entry of pilgrims and worshippers, facilitating trip planning and service booking.

"AAM" Application: An AI-powered generative application supporting the Arabic language; its beta version was launched in May 2023.

"Soutak" System: A speech recognition system applicable in various domains.

"Tahseen" System: Enhances the quality of visual and video materials and colorizes black-and-white content using deep learning technologies.

9. Challenges Facing Artificial Intelligence in Education

Jaouani & Al-Kaabi (2024) and Mishaal & Al-Eid (2023) identified several key challenges that hinder the application of AI in education, including:

Limited Knowledge and Training: A lack of understanding among teachers regarding AI applications and their effective integration into teaching, which necessitates intensive training programs to develop necessary skills.

Scarcity of Implementation: Despite growing awareness of AI's importance, its use in early childhood education remains limited, requiring greater efforts to promote adoption.

Infrastructure Limitations: Insufficient technological infrastructure—such as advanced hardware and software—poses a significant barrier to implementing AI solutions.

Financial Constraints: Limited funding for AI adoption in education, including the costs of equipment, software, maintenance, and teacher training.

Awareness and Acceptance: Low awareness among teachers and administrators regarding the benefits of AI, coupled with resistance from some educators who may fear change or lack confidence in using new technologies.

Privacy and Security Concerns: Issues related to data collection and analysis of students' personal information, necessitating strict policies to ensure data protection.

10. Features and Characteristics of Early Childhood Education Schools

Early childhood education is considered one of the most vital educational stages in the Kingdom of Saudi Arabia. The Ministry of Education focuses on providing a high-quality learning environment for children aged 3 years to Grade 3, aiming to develop their physical, social, emotional, and cognitive skills in an integrated manner (Ministry of Education, 2025).

Key Characteristics of Early Childhood Education Schools:

Comprehensive Development: Focuses on the holistic development of children's physical, social, emotional, and cognitive skills.

Learning Environment: Provides safe and stimulating educational environments using the ECERS (Early Childhood Environment Rating Scale) to evaluate the quality of the educational setting.

Curriculum: Based on developmental early learning standards designed to help children acquire essential skills and knowledge.

Expansion of Services: Covers all regions of the Kingdom, aiming to increase the enrollment rate of children in kindergarten from 17% to 90% by 2030.

According to data from the Education Department, Qatif Governorate includes 244 teachers, of whom 155 work in public kindergartens and 89 in private ones.

Axis Two: Core Competencies Required for Early Childhood Teachers to Meet Labor Market Demands in Line with Saudi Vision 2030

(1) Skills of Early Childhood Teachers to Meet Labor Market Demands:

Considering rapid technological developments that have transformed concepts of communication and work, professional training has become more important than traditional employment. Leading institutions now value talent, skills, and work ethics as key qualifications for modern positions. It is no longer sufficient for early childhood teachers to simply engage in learning environments; rather, they must possess multiple skills to qualify for contemporary teaching roles (Al-Mutairi, 2019).

Modern policies grant skilled professionals greater career advantages. Future occupations require specialized competencies and leadership abilities to foster innovative and diverse work environments. Professional excellence demands unique capabilities and expertise in the field, which enhance an institution's competitiveness and ensure sustainability in meeting labor market needs (Badeer, 2022).

Early childhood teachers in the 21st century face technological challenges that hinder their professional growth, as traditional training programs often fail to address continuous advancements. To overcome these challenges, teachers' skills must be refined to align with developments in information technology and meet labor market requirements in line with Vision 2030.

According to Al-Zouman (2022) and Al-Ghamdi & Al-Najm (2020), the essential skills for early childhood teachers in the era of artificial intelligence include:

Educational technology skills: the ability to use digital tools and AI applications to enhance and facilitate learning.

Higher-order thinking skills: promoting critical and creative thinking among children to foster independent problem-solving and decision-making.

Communication skills: effective written and verbal communication with children, parents, and colleagues to build a supportive learning environment.

Leadership and management skills: effective classroom management, organization of learning activities, and guiding children toward learning goals.

Self-learning skills: encouraging children to explore and learn independently within stimulating educational settings.

Diversity management skills: the ability to work with children from various cultural and social backgrounds, providing inclusive education that meets all learners' needs.

Assessment and evaluation skills: using diverse assessment tools to measure children's progress and design individualized learning plans.

Problem-solving skills: managing challenges in the workplace and making informed decisions to resolve them effectively.

(2) Applications of Artificial Intelligence and Their Impact on Developing Early Childhood Teachers' Skills:

Mahmoud (2024) noted that integrating AI applications can significantly enhance the professional competencies of early childhood teachers. Some essential skills and their AI-based development include:

A. Teaching skills:

Planning and assessment: AI tools can analyze children's performance and provide personalized recommendations to improve teaching strategies.

Classroom management: AI systems can offer insights for better classroom control by analyzing student behavior and suggesting effective interventions.

B. Personal skills:

Effective communication: AI simulations can train teachers in communication through interactive scenarios and role-play.

Adaptability and flexibility: AI platforms can expose teachers to multiple simulated situations to improve adaptability in diverse educational contexts.

C. Technical skills:

Technology utilization: AI-driven programs can train teachers to use smart boards, educational software, and interactive tools.

Data analysis: AI systems can analyze performance data to produce detailed reports that help teachers identify each child's strengths and weaknesses.

(3) Future Opportunities for AI Applications in the Labor Market:

A. Employee Development:

Continuous training: AI can deliver ongoing professional development programs, enabling employees to acquire new skills and enhance job performance.

Coaching and guidance: AI-powered chatbots can provide instant support and guidance on job performance, helping employees overcome daily challenges.

B. Recruitment Improvement:

Simplifying recruitment processes: AI can handle candidate communication, conduct preliminary interviews, and evaluate skills, thus ensuring efficient and accurate candidate selection.

Candidate evaluation: AI can analyze applicant data and generate recommendations based on predefined criteria, improving hiring decisions.

C. Productivity Enhancement:

Instant support: AI tools can offer real-time assistance and problem-solving for employees, increasing efficiency and reducing work interruptions.

Operational efficiency: AI can automate repetitive tasks, allowing employees to focus on more complex and creative responsibilities (Al-Hadi, 2021, p.136).

(4) The Impact of Artificial Intelligence on the Labor Market and Its Relationship with Education Development:

Enhanced efficiency and productivity: AI improves institutional efficiency by automating routine operations, enabling teachers to focus on more meaningful educational activities.

Changing job structures: AI transforms the nature of employment, eliminating some traditional roles while creating new positions requiring advanced technical skills.

Increased demand for technical skills: As AI becomes integral to education, demand grows for competencies in data analysis, software development, and machine learning (Abu Bakr, 2023).

(5) The Relationship Between Artificial Intelligence and Education Development:

AI can provide personalized learning experiences tailored to each student's individual needs, thereby enhancing engagement and learning effectiveness. It can analyze student performance data and generate detailed reports that help teachers design targeted instructional strategies. Moreover, AI facilitates continuous teacher training, allowing educators to stay current with educational innovations and improve their professional competencies.

(6) Saudi Vision 2030 and Its Implications for Education:

Saudi Vision 2030 is an ambitious national framework aimed at transforming Saudi Arabia into a global model across various sectors, including education. Built upon three core pillars—a vibrant society, a thriving economy, and an ambitious nation—the Vision seeks sustainable development through economic diversification, citizen empowerment, and global leadership.

Its main educational implications include:

Improving education quality: reforming curricula, promoting critical and creative thinking, and fostering engaging learning environments.

Expanding infrastructure: constructing new schools and universities while upgrading existing educational facilities.

Teacher training and development: implementing continuous professional training programs to enhance teaching quality.

Women's empowerment: increasing female participation in teaching and educational leadership positions through supportive initiatives.

Vocational and technical education: focusing on practical and technical learning to meet evolving labor market needs, reduce unemployment, and increase youth employment opportunities (Saudi Vision 2030, 2021).

Previous Studies

Axis One: Employing Artificial Intelligence in Education Development

Arabic Studies:

1. **Al-Aqla (2024):** Aimed to identify requirements for implementing AI in early childhood education from teachers' perspectives in Riyadh. Results indicated high importance for educational, training, human, and community-related factors, with administrative aspects rated moderately.

2. **Al-Atni et al. (2024):** Investigated the impact of AI applications on developing analytical thinking skills among middle school students, revealing a significant positive effect.
3. **Jaaouani & Alkaabi (2024):** Analyzed the role of AI applications in enhancing the quality of education by increasing interaction between teachers and learners.
4. **Al-Mungdi & Al-Sudi (2024):** Highlighted the role of AI technologies, such as virtual and augmented reality, in improving higher education quality and meeting learners' aspirations.
5. **Qirqaji (2023):** Examined teachers' awareness and use of AI applications, finding high awareness but low practical application, recommending more intensive training.

Foreign Studies:

1. **Holmes et al. (2019):** Explored how AI improves educational quality and personalization.
2. **Luckin et al. (2016):** Evaluated AI's potential in providing flexible, interactive, and individualized learning experiences.
3. **Tedre et al. (2021):** Identified challenges and requirements for integrating AI into education, emphasizing teacher support and training.
4. **Koutou (2018):** Highlighted AI's advantages, including individualized learning, intelligent assessment, efficiency, and data analytics.

Axis Two: Core Skills Required for Early Childhood Teachers

Arabic Studies:

1. **Ibrahim (2021):** Tested the effectiveness of an AI-based training program in developing digital cultural anthropology skills among kindergarten teachers, showing significant cognitive and skill improvements.
2. **Al-Qahtani (2024):** Found that AI applications substantially improve education quality and teacher competence.
3. **Abdullah (2022):** Developed a linguistic enrichment program using AI to enhance listening skills among children with autism, yielding notable progress.
4. **Bedair (2022):** Emphasized the need to bridge the gap between teachers' current competencies and labor market skill demands.

Foreign Studies:

1. **Yi, Liu, & Lan (2024):** Demonstrated AI's effectiveness in improving early childhood teachers' professional skills.
2. **White (2022):** Found that AI integration in teacher training programs enhances training quality.
3. **Alexandrowicz (2024):** Analyzed the integration of AI tools in teacher preparation programs, highlighting benefits and challenges.
4. **Aljemely (2024):** Explored opportunities and challenges of AI-based teacher training, concluding that AI provides vast potential despite certain limitations.

Commentary on Previous Studies

Similarities:

The current study aligns with previous research in adopting a descriptive methodology, focusing on early childhood education, and emphasizing AI applications and continuous teacher training.

Differences:

Unlike most prior studies, this research focuses specifically on *developing early childhood teachers' skills* to meet labor market demands under Vision 2030.

Contributions:

This study fills knowledge gaps identified in previous literature, offering a specialized framework for integrating AI in teacher skill development, refining data analysis and interpretation, and identifying key influencing variables for deeper investigation.

Distinctive Features:

This research stands out for its strategic focus on aligning early childhood teacher skill development with Saudi Vision 2030 and its emphasis on using AI as a tool for both teacher development and child education enhancement.

Field Study Objectives

- To identify the significance of employing AI applications in developing early childhood teachers' skills.
- To evaluate the impact of AI use on teachers' technological, planning, instructional, and assessment skills.
- To explore how AI applications contribute to innovative teaching tools, enhanced education quality, and enriched learning experiences for children.
- To provide practical recommendations for improving AI utilization in early childhood education settings.

Method and Research Procedures

Objectives of the Field Study:

- To identify the importance of employing artificial intelligence (AI) applications in developing the skills of early childhood teachers.
- To evaluate the impact of using AI applications on enhancing teachers' technological, planning, instructional, and assessment skills.
- To explore how AI applications contribute to providing innovative educational tools and improving the quality of education and children's learning experiences.
- To present practical recommendations for developing the use of AI in early childhood education.

Research Methodology:

The study employed the descriptive-analytical method, which focuses on examining the phenomenon as it exists and describing it accurately through both qualitative and quantitative approaches.

Population of the Study

- The study population consisted of early childhood teachers in Al-Qatif Governorate. The choice of Al-Qatif as the study field was based on several considerations, the most important of which are:
- The governorate's large number of early childhood teachers (244 teachers), providing a rich and diverse population for the study.
- Its evident orientation toward supporting digital transformation in education, making it an appropriate environment for exploring the practical reality of employing modern technologies such as artificial intelligence.
- The geographical proximity and organizational accessibility, which facilitated accurate and timely data collection.
- The sample size was determined using Stephen Thompson's formula, resulting in a sample of 100 teachers selected randomly to apply the study instrument.

Table (1) below presents the details of the study population.

Table (1): Study Population

Category	Population	Percentage (%)
Public kindergarten teachers	155	63.52%
Private kindergarten teachers	89	36.48%
Total	**244**	**100%**

Sample Characteristics

The study relied on a set of variables, and the following table presents the preliminary data of the study sample according to the personal variables related to the participants' characteristics.

Table (2): Demographic Data of the Study Sample (n = 100)

Variable	Response	Frequency	Percentage (%)
Academic Qualification	Bachelor's	89	89.9
	Master's	9	9.1
	Doctorate	1	1.0
Years of Experience	Less than 5 years	50	50.5
	5–10 years	14	14.1
	11–15 years	18	18.2
	More than 15 years	17	17.2

Study Instrument:

A. Questionnaire Construction:

The questionnaire was developed according to the following steps:

Literature Review:

A review of relevant Arabic and foreign literature and previous studies was conducted to benefit from them in formulating the initial items of the questionnaire, ensuring its comprehensiveness and alignment with the objectives of the study.

Initial Draft:

The initial version of the questionnaire included 30 items distributed across three main dimensions corresponding to the study questions, as follows:

Dimension 1: The importance of employing artificial intelligence (9 items).

Dimension 2: The impact of artificial intelligence on teachers' skill development (13 items).

Dimension 3: The role of artificial intelligence applications in developing teachers' skills (9 items).

A three-point Likert scale was used for responses as follows: Agree (3), Neutral (2), Disagree (1).

B. Validity Verification:

Content Validity:

The initial version of the questionnaire was presented to five experts specializing in educational technology, early childhood curricula and teaching methods, and educational measurement and evaluation. They were asked to judge the clarity, relevance, and linguistic accuracy of the items in relation to the purpose of the study.

Face Validity:

The experts' agreed-upon suggestions were adopted, and several items were rephrased for greater clarity and precision, while others were deleted based on the experts' recommendations. The final version of the questionnaire consisted of 28 items distributed as follows:

Dimension 1: 8 items, **Dimension 2:** 13 items, **Dimension 3:** 7 items

The questionnaire was deemed suitable for application after being tested on a pilot sample of 30 teachers, before being administered to the main sample of 100 teachers.

Internal Consistency Validity:

The correlation coefficient between each dimension's score and the total score of the questionnaire was calculated. The following table presents these results.

Table (3): Correlation Coefficients between Questionnaire Domains and Total Score

No.	Domain	Correlation
1	Importance of employing AI	0.92**
2	Impact of AI on developing teachers' skills	0.98**
3	Role of AI applications in developing teachers' skills	0.87**

(Correlation is significant at the 0.01 level)

As shown in Table (3), all correlation coefficients were statistically significant at the 0.01 level, indicating that the questionnaire demonstrated a high degree of validity and internal consistency.

C. Reliability Verification:

To measure the reliability of the instrument, Cronbach's Alpha coefficient was used to calculate the reliability values for each dimension and for the questionnaire as a whole.

Table (4): Reliability Coefficients of the Questionnaire Domains and Total Score

No.	Domain	Cronbach's Alpha
1	Importance of employing AI	0.91
2	Impact of AI on developing teachers' skills	0.94
3	Role of AI applications in developing teachers' skills	0.79
Total Instrument	**0.96**	

As shown in Table (4), the reliability coefficient for the entire instrument was 0.96, while the reliability coefficients for the sub-dimensions ranged between 0.79 and 0.94. These values are considered high and academically acceptable, confirming that the instrument possesses a high degree of reliability and consistency, making it suitable for application in this study.

D. Statistical Treatment:

The Statistical Package for the Social Sciences (SPSS) version 27 was used to perform the following analyses:

- Mean
- Standard Deviation
- Pearson Correlation Coefficient to verify internal consistency validity
- Cronbach's Alpha Coefficient to verify the reliability of the research instrument

Results and Discussion

Answering the Question:

What is the reality of employing artificial intelligence applications in developing the skills of early childhood teachers in Al-Qatif Governorate?

To answer this question, the mean and standard deviation were used. Table (5) presents the mean and standard deviation values of the participants' responses to the statements of all dimensions, as follows:

First Dimension: The Importance of Employing Artificial Intelligence Applications

Table (5): Means and Standard Deviations of Domain One Items

No.	Statement	Mean	Std. Deviation	Rank	Degree of Agreement
1	AI helps improve the quality of education in early childhood.	2.61	0.59	5	High
2	Using AI contributes to providing an interactive learning environment.	2.71	0.59	3	High
3	AI assists teachers in planning lessons more effectively.	2.73	0.57	1	High

No.	Statement	Mean	Std. Deviation	Rank	Degree of Agreement
4	AI applications enhance communication between teachers and children.	2.52	0.70	6	High
5	AI helps in accurately assessing children's performance.	2.71	0.58	3	High
6	AI contributes to saving teachers' time.	2.72	0.59	2	High
7	AI applications help personalize learning according to each child's needs.	2.61	0.64	5	High
8	AI contributes to improving critical and creative thinking skills.	2.65	0.58	4	High
Overall Mean	**2.65**	**0.51**	—	**High**	

It is evident from Table (5) that the results of the first dimension showed a high level of agreement among the participants on all items, with an overall mean of 2.65 and a standard deviation of 0.51. The main findings can be discussed as follows:

First: The statement related to the role of artificial intelligence in "planning lessons more effectively" obtained the highest mean score (2.73). This result not only highlights the practical importance of artificial intelligence but also aligns with the findings of Ibrahim et al. (2024), who confirmed its effectiveness in improving teachers' professional skills. However, the new contribution of this result lies in identifying "lesson planning" as the most significant area supported by AI from the perspective of early childhood teachers, which previous studies had not explicitly emphasized.

Second: The two statements concerning "providing an interactive learning environment" and "accurately assessing children's performance" also ranked highly (mean = 2.71). These results are consistent with the findings of Jaouani and Al-Kaabi (2024) regarding AI's role in enhancing educational quality through interactivity and objective evaluation.

Moreover, the high internal consistency of this dimension (reliability coefficient = 0.91) and its statistically significant correlation with the overall score add strong credibility to the participants' responses.

In addition to confirming previous research findings, this study offers a prioritization framework from the perspective of practicing teachers, highlighting the role of artificial intelligence as a strategic assistant in planning, implementation, and evaluation—thus providing a clear practical roadmap for policymakers in designing training and professional development programs.

Table (6): Means and Standard Deviations of Domain Two Items

No.	Statement	Mean	Std. Deviation	Rank	Degree of Agreement
1	AI helps teachers develop their technological skills.	2.83	0.49	1	High
2	AI contributes to improving teachers' planning skills.	2.79	0.55	3	High
3	AI applications assist teachers in enhancing their assessment skills.	2.68	0.61	7	High
4	AI contributes to improving teachers' communication skills.	2.72	0.79	6	High
5	The use of AI helps improve classroom management skills.	2.52	0.58	10	High
6	AI applications help teachers improve their teaching skills.	2.80	0.42	2	High

No.	Statement	Mean	Std. Deviation	Rank	Degree of Agreement
7	AI contributes to enhancing teachers' study and research skills.	2.77	0.42	4	High
8	The use of AI enhances teachers' analytical skills.	2.74	0.44	5	High
9	The use of AI improves collaboration among teachers.	2.62	0.49	8	High
10	AI applications assist teachers in improving problem-solving skills.	2.44	0.79	11	High
11	AI contributes to developing teachers' leadership skills.	2.43	0.79	12	High
12	The use of AI enhances teachers' adaptability to changes.	2.52	0.79	10	High
13	AI applications help teachers improve lifelong learning skills.	2.61	0.79	9	High

It is evident from Table (6) that there is a high positive impact of artificial intelligence applications on the development of early childhood teachers' skills, with an overall mean score of 2.65 and a standard deviation of 0.48. A detailed analysis of the results reveals the following:

First: The statement concerning the role of artificial intelligence in "developing teachers' technological skills" ranked highest, with a mean score of 2.83. This finding aligns with Alaqla (2024), who emphasized the importance of AI in enhancing educational quality. The novel contribution of the present study lies in identifying technological development as the most prominent area of impact, highlighting the urgent need for training programs focused on digital skills amid ongoing educational transformation.

Second: The statements related to improving "planning skills" (mean = 2.79) and "teaching skills" (mean = 2.80) also achieved high mean scores. These findings are consistent with the results of Al-Atni and Assai (2024), who reported the positive influence of AI on developing analytical thinking skills. These results gain further credibility through the high reliability coefficient of this dimension (0.94) and the statistically significant internal consistency correlations observed.

The present study confirms that artificial intelligence is not merely a technological tool but rather a comprehensive developmental catalyst that contributes to the advancement of both technological and pedagogical skills. This creates a new model of the teacher—one who can meet the demands of the digital-age labor market with competence and adaptability.

Table (7): Arithmetic mean and standard deviation of the third-dimension statements

No.	Statement	Arithmetic Mean	Standard Deviation	Rank	Degree of Agreement
1	AI applications provide innovative educational tools.	2.89	0.59	2	High
2	AI helps improve the quality of education provided to children.	3.00	0.59	1	High
3	The use of AI contributes to enhancing children's interaction with learning materials.	2.51	0.57	3	High
4	AI applications help teachers improve their time management skills.	2.89	0.70	2	High
5	AI contributes to improving the accuracy of educational assessments.	2.41	0.58	4	High

No.	Statement	Arithmetic Mean	Standard Deviation	Rank	Degree of Agreement
6	Using AI enhances children's learning experience.	3.00	0.59	1	High
7	AI applications introduce topics that stimulate thinking.	2.79	0.64	2	High
	Overall Mean	**2.78**	**0.57**		**High**

It is evident from Table (7) that the results provide strong evidence of the pivotal role of artificial intelligence applications in enhancing the educational process, with a high overall mean score of 2.78 and a standard deviation of 0.57. A detailed analysis of the findings reveals the following:

First: The two statements related to improving "the quality of education provided to children" and "children's learning experience" achieved the highest possible mean score (3.00). This result fully aligns with Jaouani and Al-Kaabi (2024), who emphasized the transformative potential of artificial intelligence in improving educational quality. The present study stands out by confirming that this impact extends specifically to early childhood education, thereby broadening the scope of previous studies that mainly focused on other educational stages.

Second: The statements related to "providing innovative educational tools" and "improving time management" ranked highly as well, with a mean score of 2.89. These results are strongly supported by Ramadan (2024), who reported noticeable improvement in students' performance following the use of smart applications. The credibility of these results is further reinforced by the acceptable reliability coefficient for this dimension (0.79) despite its limited number of items, in addition to the statistically significant correlation coefficients found in the internal consistency analysis.

This study presents a qualitative contribution by demonstrating that the impact of artificial intelligence extends beyond the development of teachers' skills to include the enhancement of the learning experience itself, creating a pedagogical feedback loop of mutual growth between teacher and child.

Study Recommendations and Proposals

Study Recommendations:

Based on the findings of this study, several recommendations were formulated:

- Establish an interactive digital platform that provides teachers with comprehensive educational resources on artificial intelligence and its applications in early childhood education.
- Develop a practical guide for teachers explaining in detail how to use AI applications in various aspects of the teaching process.
- Design interactive learning modules utilizing AI applications to teach children basic concepts in innovative ways.
- Develop smart educational games and applications suitable for the abilities of early childhood learners.
- Equip kindergartens with modern computer laboratories and high-speed internet networks.
- Provide continuous technical support for maintaining and updating devices and software.

- Organize specialized training programs for teachers on how to integrate AI applications in education.
- Offer interactive workshops for teachers to exchange experiences and implement best practices.
- Use AI applications to personalize learning and meet each child's individual needs.
- Develop long-term plans for the advancement of AI utilization in kindergartens.
- Update educational systems and policies to facilitate the integration of AI in early childhood settings.
- Ensure adequate financial support to implement these mechanisms effectively.
- Update the class schedule and schoolwork system to align with the requirements of AI-based teaching in early childhood education.

Conclusion

The study concluded with a set of findings confirming the transformative impact of artificial intelligence applications on preparing early childhood teachers. These technologies play a critical role in enabling teachers to adapt to the evolving demands of the labor market by developing both their technical and pedagogical competencies in an integrated manner.

At the technical level, the study recorded the highest level of impact in enhancing teachers' technological skills, making them more prepared to meet the demands of digital transformation in education. At the pedagogical level, smart applications contributed to improving the quality of fundamental educational processes—from lesson planning, through interactive implementation, to accurate assessment.

The novel contribution of this study lies in presenting an integrated model that links teachers' skill development through artificial intelligence to the requirements of the labor market under Saudi Vision 2030. The study also identified developmental priorities that should be emphasized in future training programs.

Ultimately, the findings provide strong evidence that investing in artificial intelligence applications represents a strategic cornerstone for achieving the goals of Vision 2030 in developing human capital, ensuring the quality of educational outcomes in early childhood education, and preparing a generation capable of competing in the future workforce.

References

Abubaker, S. S. A. (2023). *Chat GPT technology and labor market transformations: Challenges and opportunities in the era of artificial intelligence*. *Al-Maarefah Journal*, 18, 74–94. https://doi.org/10.35778/1756-000-018-004

Ajam, I. M. H. (2018). *Artificial intelligence and its implications for high-performance organizations: An exploratory study in the Ministry of Science and Technology*. Journal of Administration and Economics, 41(115), 88–102. https://search.mandumah.com/Record/926892

Al-Anazi, T. A. S. (2022). *Artificial intelligence as an entry point to achieve sustainable development in the business environment in accordance with the pillars of the Kingdom's Vision 2030*. Journal of Economic, Administrative and Legal Sciences, 6(13), 48–63. https://search.mandumah.com/Record/1273548

Al-Aqla, F. A. (2024). *Requirements for applying artificial intelligence in early childhood education from the perspective of female teachers in the Riyadh educational region*. Fayoum University Journal of Psychological and Educational Sciences, 3(8), 1–45. https://doi.org/10.21608/jfust.2024.281224.2124

Al-Atal, M. H. M., Al-Ajmi, A. S., & Al-Enezi, I. G. (2021). *The role of artificial intelligence (AI) in education from the perspective of students at the Faculty of Basic Education in the State of Kuwait*. Journal of Educational and Research Studies, 1(1), 30–64. https://search.mandumah.com/Record/1105537

Al-Atni, N. M., Ibn Asay, S. A., Al-Qudaibi, H. S., & Alrubaian, A. M. (2024). *The impact of artificial intelligence on developing analytical thinking skills among middle school female students*. The Arab Journal of Qualitative Education, 8(32), 459–496. https://doi.org/10.21608/ejev.2024.363970

Aldosari, S. A. M. (2020). *The future of higher education in the light of artificial intelligence transformations*. *International Journal of Higher Education*, 9(3), 145–151. https://doi.org/10.5430/ijhe.v9n3p145

Al-Ghamdi, A. K., & Al-Najim, A. S. (2020). *Early childhood teachers' skills in the twenty-first century: A predictive study*. Islamic University Journal of Educational and Psychological Studies, 28(6), 546–572. https://journals.iugaza.edu.ps/index.php/IUGJEPS/article/view/6589/0

Al-Ghamdi, S. F., & Alfarani, L. A. (2020). *The reality of using artificial intelligence applications in special education schools in Jeddah from the perspective of female teachers and their attitudes towards it*. International Journal of Educational and Psychological Studies, 8(8), 57–76. https://doi.org/10.31559/EPS2020.8.1.4

Al-Hakami, R. H. H., & Madawi, M. A. Q. (2023). *The reality of artificial intelligence applications in public education in the Kingdom of Saudi Arabia*. Arab Journal of Informatics and Information Security, 13(4), 33–76. https://search.mandumah.com/Record/1416571

Al-Khubairi, S. M. O. (2020). *The degree of secondary school female teachers' acquisition of artificial intelligence application skills in education in Al-Kharj Governorate*. Arab Studies in Education and Psychology, (119), 119–152. https://search.mandumah.com/Record/1037602/Details

Almansour, K. M., & Alghamdi, A. M. (2019). *Proposed policies for teacher preparation in Saudi Arabia in light of Vision 2030*. Educational Journal, 63(1), 1–31. https://doi.org/10.21608/edusohag.2019.55465

Al-Mungdi, A. M., & Al-Sawdi, M. S. (2024). *Artificial intelligence technologies and their role in developing education in higher education institutions: An analytical study*. Journal of the Arab Island Center for Educational and Human Research, 2(20), 26–50. https://search.mandumah.com/Record/1471082

Al-Obaidi, A. M. (2015). *Crisis management and electronic decision-making*. Journal of Babylon University, 18(1–2), 81–91. https://search.mandumah.com/Record/300166

Al-Omari, F. A. (2023). *The role of educational policies in digital transformation in light of Saudi Vision 2030 from the perspective of female teachers*. Scientific Journal of the Faculty of Education – Assiut University, 39(3), 89–122. https://doi.org/10.21608/mfes.2023.297211

Al-Qahtani, N. M. (2024). *The use of artificial intelligence applications in general education in the Kingdom of Saudi Arabia: A descriptive analytical study*. *International Journal of Research and Educational and Psychological Studies*, 11(24), 298–335. https://doi.org/10.21608/ijrs.2024.393039

Al-Yazji, F. H. (2019). *The use of artificial intelligence applications in supporting university education in the Kingdom of Saudi Arabia*. Arab Studies in Education and Psychology, (113), 257–282. https://doi.org/10.12816/SAEP.2019.54126

Al-Zoman, M. A. (2022). *The training needs required for early childhood teachers in light of the Human Capacity Development Program as one of the programs to achieve Saudi Vision 2030*. Journal of the Faculty of Education, Mansoura University, 120(4), 1221–1248. https://doi.org/10.21608/maed.2022.288745

Al-Mutairi, B. (2019). *The availability of quality standards in the learning environment in kindergartens and their relationship to children's interaction in learning situations* [Unpublished master's thesis]. College of Arab East Graduate Studies, Saudi Arabia.

Al-Hadi, M. M. (2021). *Artificial intelligence: Processing, applications, and its developmental and societal impacts* (1st ed.). Egyptian Lebanese Publishing House.

Bedair, K. M. (2022). *The extent of achieving the requirements of early childhood teacher professional excellence*. International Journal of Studies on Women and Children, 2(1), 38–48. https://search.mandumah.com/Record/1313944

Beijing AI and Learning Forum. (2023). *Proceedings of the Beijing AI and Learning Forum 2023*. Retrieved in 2025 from https://www.example.com

Blau, F. D., & Kahn, L. M. (2017). *The Gender Wage Gap: Extent, Trends, and Explanations*. *Journal of Economic Literature, 55*(3), 789–865. https://doi.org/10.1257/jel.20160995

Boudraa, Nader, & Boudraa, Abdelali. (2023). *Applications of Artificial Intelligence and Their Impact on Customer Experience and Banking Services: A Case Study of PayPal Electronic Bank.* Master's Thesis, Faculty of Economic Sciences, Commercial Sciences, and Management Sciences, University of Martyr Sheikh Larbi Tebessi – Tebessa.

El-Hady, M. M. (2021). *Artificial intelligence: Its features, applications, and developmental and societal impacts* (1st ed.). Al-Masriah Al-Lubnaniah Publishing House.

Guskey, T. R. (2000). *Evaluating professional development* (Vol. 1). Corwin Press.

Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign. https://curriculumredesign.org/wp-content/uploads/AIED-Book-Excerpt-CCR.pdf

Hwang, G. J., Xie, H., & Warschauer, M. (2015). *Gratifying and engaging learning with augmented reality for young children*. *Interactive Learning Environments, 23*(6), 727–741. https://doi.org/10.1080/10494820.2015.1057747

Ibrahim, M. H. M. (2021). *The extent of the applications of artificial intelligence and its ethics in the high school physics courses*. Journal of Educational Sciences, 2(29), 19–68. https://search.mandumah.com/Record/1213001

Karsenti, T. (2019). *Artificial intelligence in education: The urgent need to prepare teachers for tomorrow's schools*. *Formation et profession, 27*(1). https://doi.org/10.18162/fp.2019.a166

Kingdom of Saudi Arabia Vision 2030. (2021). *Achievements of the Kingdom of Saudi Arabia Vision 2030 (2016–2020)*. https://www.vision2030.gov.sa/media/v1dngtew/achievements-booklet_ar.pdf

Kingdom of Saudi Arabia. (2023). *Saudi Vision 2030*. https://www.vision2030.gov.sa/media/5ptbkbxn/saudi_vision2030_ar.pdf

Koutou, O. (2018). *Advantages of using artificial intelligence technologies in education*. *Journal of Educational Technology, 26*, 108–126.

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson.https://www.pearson.com/content/dam/corporate/global/pearson-dot-com/files/innovation/Intelligence-Unleashed-Publication.pdf

Mahmoud, H. M. (2024). *A proposed vision for developing the skills of employing artificial intelligence applications among kindergarten teachers*. *Journal of Studies in Childhood and Education*, 31(1), 105–181. https://doi.org/10.21608/dftt.2024.318127.1276

Meshal, M. T., & Al-Eid, N. M. (2023). The reality of employing artificial intelligence applications in the early childhood stage from the perspective of female teachers in Shaqra Governorate, Saudi Arabia. Journal of Education, Faculty of Education, Al-Azhar University, 42(198), 433–478. https://search.mandumah.com/Record/1391316

National Association for the Education of Young Children (NAEYC). (2020). *Professional standards and competencies for early childhood educators*. NAEYC. Retrieved from https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/standards_and_competencies_ps.pdf

Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning, 12*(1), 1–13. https://doi.org/10.1186/s41039-017-0062-8

Qeshti, N. A. (2020). *The effect of artificial intelligence on the development of educational systems*. International Journal of E-Learning, 19(1), 67–90. https://doi.org/10.21608/jaee.2020.107259

Qirqaji, A. D. (2023). *Employing artificial intelligence applications and their importance in the educational process from the point of view of computer teachers*. *Journal of Educational and Psychological Sciences*, 7(42), 65–86. https://doi.org/10.26389/edu2023.42.1745

Ramadan, S. Y. (2024). *The impact of employing artificial intelligence applications during reading instruction on developing some reading comprehension skills among third cycle female students*. Journal of Non-Arabic Speakers, 7(20), 137–156. https://doi.org/10.21608/jnal.2024.339461

Russell, S. J., & Norvig, P. (2016). *Artificial intelligence: A modern approach* (3rd ed.). Pearson Education Limited.

Saudi Data and Artificial Intelligence Authority (SDAIA). (2024). *Use cases of artificial intelligence in the education sector* (pp. 6–8). Retrieved from https://sdaia.gov.sa/ar/MediaCenter/KnowledgeCenter/Pages/SDAIAPublications.aspx

Saudi Data and Artificial Intelligence Authority (SDAIA). (2024). *Controls and guidelines for the use of generative artificial intelligence in education and training in the Kingdom of Saudi Arabia* (pp. 6–8). Retrieved from https://www.moe.gov.sa/ar/mediacenter/MOEnews/Pages/news1_24012025.aspx

Saudi Data and Artificial Intelligence Authority (SDAIA). (2024). *AI ethics guide*. Artificial Intelligence for Executives Series (3), 2nd ed. Kingdom of Saudi Arabia. Retrieved from https://sdaia.gov.sa/en/SDAIA/about/Documents/ai-principles.pdf

Tedre, M., Toivonen, T., Kahila, J., Vartiainen, H., Valtonen, T., Jormanainen, I., & Pears, A. (2021). *Teaching machine learning in K–12 classroom: Pedagogical and technological trajectories for artificial intelligence education*. IEEE Access, 9, 110558–110572. https://doi.org/10.1109/ACCESS.2021.3097962

U.S. Department of Education. (2023). *Artificial intelligence and the future of teaching and learning: Insights and recommendations*. Office of Educational Technology. https://files.eric.ed.gov/fulltext/ED631097.pdf

Abdullah, M. A. (2022). *A language enrichment program based on an application of artificial intelligence to develop the listening skill of autistic children*. *Journal of Childhood Education and Culture*, 22(3), 225–255. https://doi.org/10.21608/jkfb.2022.265506

Yi, H., Liu, T., & Lan, G. (2024). *The key artificial intelligence technologies in early childhood education: A review*. *Artificial Intelligence Review*, 57, Article 12. https://doi.org/10.1007/s10462-023-10637-7

White, R. (2022). *The use of artificial intelligence in teacher training programs: A descriptive analytical study*.

Alexandrowicz, V. (2024). *Artificial intelligence integration in teacher education: Navigating benefits, challenges, and transformative pedagogy*. *Journal of Education and Learning*, 13(6), 346–360. https://doi.org/10.5539/jel.v13n6p346

Aljemely, Y. (2024). *Challenges and best practices in training teachers to utilize artificial intelligence: A systematic review*. *Frontiers in Education*, 9, Article 1470853. https://doi.org/10.3389/feduc.2024.1470853

Jaaouani, A., & Al-Kaabi, S. B. M. B. (2024). *The impact of artificial intelligence applications on the development of the educational process*. *International Journal of Educational and Psychological Studies*, 13(4), 786–796. https://doi.org/10.31559/EPS2024.13.4.9

Ministry of Education. (2025). *Early childhood education*. Retrieved from [Saudi Ministry of Education] https://moe.gov.sa/ar/education/generaleducation/pages/kindergarten.aspx

توظيف تطبيقات الذكاء الاصطناعي في تطوير مهارات معلمات مرحلة الطفولة المبكرة لمواكبة سوق العمل وفق رؤية المملكة ٢٠٣٠

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الملخص

هدفت الدراسة إلى استكشاف توظيف تطبيقات الذكاء الاصطناعي في تطوير مهارات معلمات مرحلة الطفولة المبكرة لمواكبة سوق العمل وفق رؤية المملكة ٢٠٣٠، بالإضافة إلى دور هذه التطبيقات في تحسين جودة التعليم. اعتمدت الدراسة على المنهج الوصفي التحليلي، وتم التطبيق على عينة مكونة من ١٠٠ معلمة بمرحلة الطفولة المبكرة بمحافظة القطيف، وتم استخدام الاستبانة كأداة رئيسة للدراسة. أظهرت النتائج للمحور الأول أن توظيف الذكاء الاصطناعي في تطوير مهارات معلمات مرحلة الطفولة المبكرة له أهمية كبيرة، حيث حصلت جميع العبارات على درجة موافقة مرتفعة بمتوسط حسابي عام ٢.٦٥ وانحراف معياري ٠.٥١. وأظهر المحور الثاني أن استخدام تطبيقات الذكاء الاصطناعي له تأثير إيجابي وملحوظ على تطوير مهارات المعلمات، بما في ذلك المهارات التكنولوجية، ومهارات التدريس، والتخطيط، والتحليل، بمتوسط حسابي عام ٢.٦٥ وانحراف معياري ٠.٨٤. كما أظهر المحور الثالث أن تطبيقات الذكاء الاصطناعي تلعب دورًا مهمًا في تحسين جودة التعليم، وإدارة الوقت، وتوفير أدوات تعليمية مبتكرة، وتحسين تفاعل الأطفال، بمتوسط حسابي عام ٢.٧٨ وانحراف معياري ٠.٥٧. أوصت الدراسة بضرورة الاهتمام بتطبيقات الذكاء الاصطناعي لما أظهرته من تأثير في تطوير مهارات المعلمات في مرحلة الطفولة المبكرة، وإدخاله في المناهج الدراسية، وتحديث البنية التحتية للبيئة التعليمية، وعقد دورات تدريبية للمعلمات، وتعزيز الاستفادة من تقنيات الذكاء الاصطناعي لضمان تقديم أفضل الخدمات التعليمية.

الكلمات المفتاحية:

الذكاء الاصطناعي، الطفولة المبكرة، مهارات معلمات الطفولة المبكرة، سوق العمل، رؤية المملكة ٢٠٣٠.