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Table Of Contents

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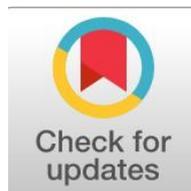
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Artificial Intelligence in the Advancement of Education in Iraq: A Theoretical Analytical Study of Systemic Readiness and Structural Constraints

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Abstract

General Background: Artificial Intelligence (AI) is increasingly positioned as atransformative driver in modern education through adaptive learning, intelligent tutoring, automated assessment, and data-driven decision-making. **Specific Background:** Despite global advancements, AI integration in developing and post-conflict education systems such as Iraq remains constrained by infrastructural, institutional, and governance limitations. **Knowledge Gap:** There is a lack of a comprehensive analytical framework assessing systemic readiness and structural barriers to AI adoption within the Iraqi educational context. **Aims:** This study aims to examine AI applications in education, evaluate systemic readiness factors, identify implementation constraints, and propose a strategic adoption framework. **Results:** The analysis identifies four primary domains of AI application: personalized learning, automated assessment, teacher support, and institutional decision-making, while highlighting critical barriers including unstable electricity, limited broadband access, overcrowded classrooms, insufficient digital infrastructure, and low teacher digital competence, alongside ethical risks such as algorithmic bias and data privacy concerns. **Novelty:** The study offers a context-specific theoretical synthesis integrating global AI trends with Iraq's systemic conditions through a readiness-based analyticallens. **Implications:** Findings suggestthatsustainable AI integration requires phased implementation focusing on infrastructure development, policy alignment, teacher training, and ethical governance to support educational modernization without exacerbating inequality.

Highlights:

- Identifies Four Functional Domains of AI Application in National Schooling Systems
- Reveals Infrastructure Instability and Skill Gaps as Primary Adoption Barriers
- Proposes Phased National Strategy Integrating Policy, Capacity, and Governance

Keywords: Artificial Intelligence In Education, Iraqi Education System, Digital Infrastructure, Intelligent Tutoring Systems, Educational Technology Policy.

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I. Introduction

Artificial Intelligence (AI) has become more than a niche field of computation, now being an enabler of digital transformation in a variety of industries, such as healthcare, finance, governance, and education. Within the educational sector, AI is becoming more and more represented as a stimulus of adaptive learning, intelligent tutoring, automatic grading, predictive analytics, and data-driven decision-making models [1], [2]. These changes represent an overall trend toward technology based teaching that aims at improving personalization, scaling and efficiency of learning systems.

According to recent reports across the world, educational technologies based on AI can enhance learner engagement, streamline assessment procedure, and be used in the differentiation of instruction in case of being integrated with properly designed pedagogical schemes [3], [4]. Machine-learning models can currently analyze large-scale student data to determine learning gaps, academic success, and instructional trajectories based on the individual cognitive profiles [5]. The intelligent tutoring systems, specifically, have shown quantifiable improvement in student performance in comparison with conventional one-size-fits-all models of teaching and learning [6].

However, the spread of AI technologies in educational systems is unequal despite such developments. The high-income nations have expedited digital integration initiatives by national AI policies, infrastructure investment, and an institutional preparedness plan [7]. Conversely, the educational systems in developing and post-conflict countries frequently face structural constraints limiting their implementation, such as the unreliable electricity supply, lack of broadband connectivity, inaccessible technological tools, and appropriate training of teachers on digital skills [8], [9].

The Iraqi education system is a complicated situation in this world system. The system which was historically known to perform well in education in previous decades has been affected by the unending conflict with sustained interruption of its operations, economic volatility, damage to infrastructure and lack of resources [10]. The modern problems encompass, but are not limited to: congested classes, multi-shift schooling, inadequate school facilities, lack of technological infrastructure, and access disparity between urban and rural schools and educational facilities [11]. These institutional forces make it difficult to implement modern digital technology such as AI-based teaching devices.

However, the opportunities of AI in Iraq are high. Artificially intelligence-based platforms may be used to solve the problem of teacher shortage by employing automated tutoring and reduce the number of administrators by using automated evaluation mechanisms, offer students personalized remediation in overcrowded classes, and create a data-driven educational plan at both institutional and ministerial scales [12], [13]. In addition, AI might provide scalable solutions to the situations when physical infrastructure growth is limited due to financial factors, yet digital transformation is one of the strategic priorities.

At the same time, the implementation of AI is associated with the ethical and governance consequences. The issues of the algorithmic bias, the protection of data privacy, the threat posed by cybercrime, and the possible enhancement of the education disparity should be thoroughly scrutinised prior to the implementation on a large-scale basis [14], [15]. The absence of adequate regulatory standard practices and fair infrastructure repair can make AI interaction consciously or unconsciously support structural disequilibrium instead of alleviating it.

With that in mind, the systematic theoretical examination is necessary to assess the potential opportunities and limitations of AI implementation in the Iraqi schooling system. This study explains AI in a much wider context of systemic preparedness, infrastructural capacity, regulation of governance, and the development of human capital in contrast to providing purely technological advocacy. With the synthesis of the current global literature in the area (2019-2025) and the realisation of educational situations in the country, the research is set to offer an analytical platform of the future policy-based and factual research projects in Iraq.

II . Problem Statement

Although the world is becoming increasingly globalized in the application of Artificial Intelligence in the educational system, the adoption of this technology is extremely uneven in various national settings. Even though the developed nations have institutionalized AI-based platforms in instructional designs, assessment systems, and administrative governance frameworks [1], [3], several developing education systems still have structural constraints that restrict technological change [8]. This inequality forms a new digital divide that not only exists between countries but also within the educational systems of a country.

In Iraq, the educational sector is faced with complex problems such as infrastructural frailty, overpopulated classrooms, inconsistent electricity supply, low penetration by broadband, inadequate digital hardware, and lack of teacher digital competence [10], [11]. Despite the evidence of global literature on how AI would help to improve the customization of instructions, automate the assessment tools, and optimize the decision-making process in institutions [5], [6], there is still a lack of systematic research on a case where the institutional decision-making system is ready to apply AI with proper responsibility.

The main issue discussed in the paper is that no analytical framework was developed that can assess the transformative capacity of Artificial Intelligence in Iraqi education as well as the infrastructural, institutional, and governance barriers that can affect its implementation. In the absence of such analysis, the policy debates are prone to being technologically aspirational as opposed to being strategically based.

Thus, the proposed research aims to fill in the analytical gap by analyzing the integration of AI in Iraq through a systemic preparedness prism that involves the infrastructural capacity, teacher preparedness, regulatory framework, and consideration of ethical governance.

III . Research Objectives

This theoretical analysis research project will seek to: Explore modern global trends in the use of Artificial Intelligence in the education sector (2019 - 2025).

• Examine the possible areas in which AI has the potential to enhance education in Iraq.

• Find infrastructural, institutional, and human-capacity constraints that can contribute to the impediments of the implementation of AI.

• It is accompanied by ethical, fairness, safety, and governance issues with the involvement of AI in educational systems.

• Proposal: Suggest an organized strategic plan of gradual AI implementation in the education sector of Iraq.

IV. Significance o f The Study

The importance of this study arises upon four major dimensions:

• It also makes contributions to the academic literature by offering a context-specific analytical evaluation of AI integration into a developing and post-conflict educational system, which has not yet been fully addressed by recent research [7].

• It provides a policy based framework which can guide national education reform policies in the sense that it can bring together technological innovation and infrastructural preparedness and governance capacity.

• It puts into focus the ethical and equity implications, that AI deployment that lacks structural protection can create instead of diminish educational inequalities [14], [15].

• It creates a cognitive base of future empirical studies, such as pilot implementation research, institutional preparedness, and impact analysis of Iraq in schools and universities.

V. Research Method

The overall research design in this study is a descriptive-analytical research design as it seeks to explore the role that Artificial Intelligence plays in the development of education in Iraq. The study is founded on the systematic examination of the recent scholarly literature, global policy reports, and institutional research published since 2019 and 2025. The descriptive aspect is concerned with defining key areas of AI implementation in the education system, whereas the analytical one contains an assessment of the organizational preparedness of the Iraqi education sector to integrate AI. The sources of data are the international reports of educational technology, the research-based scholarly articles, and the policy frameworks of the organisations like UNESCO, the World Bank, and the OECD. These were reviewed to determine similar themes in the context of infrastructure preparedness, digital skill, governance policies, and ethical principles used in the adoption of AI in education. Using this methodological approach will allow synthesizing global evidence and putting it into perspective in relation to its implications on the Iraqi education system.

VI . Theoretical Framework a nd Literature Review

A. Artificial Intelligence in the Education Conceptualization

Artificial Intelligence in Education (AIED) is the use of computational systems that can execute computational duties that are traditionally handled by human cognitive processes, such as learning, reasoning, pattern recognition, decision making, and adaptive generation of feedback [1]. The modern AIED systems are based on machine learning, natural language processing, predictive analytics, and neural network architecture to process education data and optimise the instructional processes [2], [3]. Recent sources underline that AI in education cannot be held as a simple conceptualization of technological automation, but as a socio-technical system, which is integrated into pedagogical, institutional, and governance frameworks [4]. According to global recommendations on AI and education developed by UNESCO, AI should be consistent with the human-centred principles of education, equity, and ethical governance systems in order to be integrated in a sustainable manner [5]. This view reconsiders AI as an educational aid as opposed to a substitute of the teacher. Adaptive learning theory and data-driven instructional design are usually associated with the theoretical basis of AI integration in education. Adaptive systems examine the interactions of learners in order to increase or decrease the difficulty level, suggest learning materials and give specific feedback in accordance with each learner performance patterns [6]. These systems disrupt the conventional standardized methods of instruction through the provision of differentiated learning opportunities in large and heterogeneous classes.

B. Artificial Intelligence in Education Domains

According to recent empirical and policy-directed studies (20192025), the four big areas of AI spaces of involvement in educational systems include: Individualized and Recovery Learning Systems. Predictive modelling and learner analytics are adaptive learning platforms that customize learning content based on performance trends of students [6], [7]. Research suggests that AI-based learning resources can be more engaging to students and raise academic achievement, specifically in the mathematics and language learning settings [8]. Such systems are especially pertinent in crowded classrooms where the teacher-student interaction is restricted. Computer aided evaluation and feedback. Automated grading systems based on AI use natural language processing algorithms and machine-learning algorithms to rate multiple-choice, short-answer, and even essay-based answers [9]. Automated assessment helps to decrease the workload of a teacher as well as make it possible to provide real-time feedback, which has been linked to better learning retention and student motivation [10]. Such automation can help tremendously to improve the efficiency of administration in systems of teacher shortages. Smart Tutoring Systems. Intelligent tutoring systems (ITS) are systems that provide scaffolding instructional support simulating one-to-one instructional support by modeling student cognitive states [11]. According to the results of meta-analysis, ITS is capable of producing internal to high-level of learning outcomes in situations where the system is incorporated into systematic pedagogical contexts [12]. The systems are especially helpful where it is difficult to access qualified subject specialists. Learning Analytics and institutional Decision Support. Learning analytics AI can help educational institutions analyse the data on student performance, detect dropout points, and streamline curriculum planning [13]. Predictive models are useful to help the administrators to allocate resources better and to develop specific intervention programmes. The concept of data-driven governance is a strategic modernisation pillar of education that has been gradually realised [14].

C. Developing World Infrastructure and Systemic Preparedness

Although the pedagogical possibilities of AI are already much-reported and hypothetically justified, the success of implementation requires the systemic and standardized preparedness. The digital infrastructure, such as reliable power supply, an Internet connection with high-speed, cloud-computing, cybersecurity protection, and access to hardware, is the base on which AI has to be integrated [5], [15]. Research on the use of AI in the developing world shows that weak infrastructure is a major limiting factor to implementation, despite the existence of policy support [16]. The teacher digital competence also proves to be a determining factor. In the absence of a well-organized professional development programmes AI tools will also face an under-utilization or misuse in instructional practice [17]. Educational infrastructure in Iraq is also poorly distributed between the urban and rural areas, and it has been reported that most of the areas face difficulties such as overcrowded schools, multi-shift systems, and the lack of technological facilities [10], [11]. These organizational facts require a slow, gradual process of introducing AI instead of implementing it across the system at once.

D. Ethical, Governance, and Equity

Ethical governance is one of the core aspects in the modern AI discourse. The algorithmic bias can recreate the existing societal inequalities when the training datasets have structural inequalities [18]. In an educational environment, data privacy issues are of special concern because the records of student performance and personal data need the upkeep of rigid protection systems [19]. Furthermore, the lack of digital infrastructure can also contribute to the inequality in education in case AI-based tools are only available to students in well-equipped schools [20]. Consequently, the necessity to regulate, have an open design of algorithms, accountability systems, and a fair infrastructure is supported by international policy standard procedures [5]. In late systems, it is necessary to not only implement ethical systems through technology but through modernization of law, institutional responsibility and stakeholder participation.

E. Analytical Synthesis

It is shown in the literature that there are strong grounds that AI can be used to improve personalization, assessment efficiency, tutoring support, and institutional planning in a digitally mature educational system [6], [12], [14]. Nevertheless, studies have also shown that the introduction of AI in the absence of infrastructure maturity, regulatory measures, and training of teachers can have minimal effect or even increase inequalities [16], [18]. This is why AI implementation in Iraq should be considered in a dualistic perspective, that is, the opportunity of technology and the constraint of the system. The balanced approach suggests the strategic planning that should be consistent in terms of the coordinated technological implementation and the investment in the infrastructure, educator training, governance control, and ethical protection.

VII . Previous Studies

A number of recent studies have investigated the aspects of Artificial Intelligence in changing the educational setting and enhancing the learning outcomes. The studies offer useful knowledge on the opportunities and the challenges involved in the adoption of AI technologies in the educational systems.

Zawacki-Richter et al. [2] carried out a study that examined a substantial amount of literature regarding artificial intelligence in tertiary education. The authors have discovered that intelligent tutoring systems, learning analytics, and automated assessment tools are the most widespread utilization of AI technologies. Their results show that AI can be used to a great extent to improve personalised learning and student performance in the context of organized teaching systems.

A review of the application of artificial intelligence technologies in various educational settings was carried out by Chen et al. [3]. It was determined that AI-enhanced learning experiences have the potential to enhance engagement, as well as give adaptive learning experiences to diverse student needs. The authors however highlighted that institutional preparedness and availability of digital infrastructure was a critical factor in successful implementation.

The other study that investigated the use of such analytics on educational decision-making was conducted by Khosrover, Kitto and Gasevic [6]. Their results proved that AI-based analytics systems could help teachers and administrators to detect learning patterns, forecast academic risks, and create specific educational intervention.

Likewise, VanLehn [12] has done a meta-analysis of intelligent tutoring systems and has found that AI-based tutoring environments have the potential to generate measurably positive student learning outcomes as compared to conventional teaching methods. The research revealed the value of AI tutors to give customized feedback and adaptive advice.

Lastly, Al-Maroof et.al. [16] explored the use of artificial intelligence technology within developing nations. In their study, they found that there are many barriers that have an impact on the adoption of AI in education, such as poor infrastructures, lack of teacher training, and institutional inertia to technology change.

All of these studies done previously prove the increasing significance of Artificial Intelligence in the educational process, as well as validate the significant importance of the infrastructure preparedness, institutional capability, and teacher digital competence. Continuing on the findings of the previous researches, the current work is specifically aimed at the investigation of the opportunities and the structural constraints related to the implementation of AI into the Iraqi system of education.

VIII . Analytical Discussion: Artificial Intelligence a nd Iraqi Education System

A. Realities of the Iraqi Education System.

The introduction of Artificial Intelligence into the Iraqi education sector should be analyzed in the context of the general structural factors that determine the industry. Iraq is an example of a country that had disrupted education infrastructure over decades as a result of conflict, economic stress, and institutional disintegration [10]. Despite the current advances in reconstruction, there are still some issues, such as the overcrowding of schools, multi-shift schedules, inequality of resources in the metropolitan and rural regions of the country, and the lack of technological facilities [11]. There are still issues of electricity instability in most parts and the broadband penetration is far different in different provinces. Those AI-integrated systems, especially those based on the use of cloud computing, real-time data processing, and stable network connections demand the stable connection and safe data storage environment [15]. The lack of these critical elements makes the integration of AI rather a symbolic than a practical approach. Moreover, digital transformation is a technological process but, in the first place, an institutional one. The capacity of governance, inter- ministerial coordination and clarity of standardization are significant factors that influence sustainability of technological reform of education [14]. As such, the adoption strategy that AI is currently undertaking should also meet with the systemic modernization initiatives and cannot be conducted outside of larger changes in education.

B. Future Applications of AI in the Iraqi Case.

Artificial Intelligence has real educational opportunities in Iraq although its implementation has structural limitations that must be addressed to promote educational development in the country. Meeting Teacher Shortages and Workload Pressure. Tutoring systems which are based on AI may offer extra teaching opportunities in areas where there is a lack of qualified educators in the particular fields [11], [12]. Smart tutoring systems can be used after school to provide practice and automatic commentaries to the students. Moreover, automated grading systems have the potential of alleviating administrative pressures giving teachers the opportunity to spend more time on instructional interaction and mentoring [9], [10]. Individualised Learning in High Density Classrooms. The classrooms are overcrowded and decrease the individualised teacher attention. The adaptive learning platforms are AI-driven and can to some extent overcome this limitation by providing exercises according to individual performance levels [6], [7]. These systems can possibly assist in distinguishing instruction in heterogeneous learning settings, especially with mathematics and language subjects that have sequential skill development. Evidence-Based Educational Governance. The AI-based learning analytics systems might assist the Ministry of Education in revealing the risks of dropouts, performance differences, and inequalities by region [13], [14]. Predictive analytics could facilitate the early intervention programmes and optimisation of the resources allocation. In emerging systems, there can be improved transparency and responsiveness of policies inspired by data-reliant governance. Ongoing Curriculum revision. The stagnation of the traditional textbooks is endangered by the swift technological and scientific development. AI-based content management systems may be used to help with the dynamic updating of the curriculum, as well as the distribution of digital resources [4]. It can be especially useful when the process of textbook revision is slow and administrative in nature.

C. Systemic Constraints and Risks.

Although the opportunities are high, the premature application of AI can create unforeseen effects. To start with, disparity on a digital access between provinces may enhance inequality in education [20]. Schools that get stable internet and digital infrastructures might receive an unequal share over those under-resourced schools. Second, the misalignment of culturally-relevant algorithms and inadequately localised training data can result in culturally-resonant outputs [18]. AI systems that are designed with educational settings in other linguistic or socio-cultural contexts might need to be adjusted to Iraqi curriculum and Arabic-based instructional systems. Third, the laws on data protection and cyber-security models need to be reinforced prior to the implementation of mass data gathering on students [19]. Lack of a well-established data governance framework can put institutions at risk of privacy. Fourth, teacher preparedness has been a focal point of determining the

implementation success. Technological tools will be superficially adopted without the existence of organized professional development programmes in digital pedagogy and AI literacy [17].

D. A gradualized strategic plan regarding AI in Iraq.

According to the analytical synthesis of the literature and placing it in the context of constraints, the implementation of AI in Iraq must be conducted in a gradual strategy approach: Phase 1: Stabilisation of Infrastructure. - Provide continual power in schools. - Increase broadband access especially in more remote locations of urban centers. - Implement safe cloud and cyber-security systems. Phase 2: Capacity Building - implement country level teacher competency and AI literacy improvement programmes online. - Build specialised AI policy units in the Ministry of Education. - Facilitate AI research at the university level in conformity with educational applications. Phase 3: Pilot Implementation - Roll out AI pilot programmes that are controlled by the leaders of a few schools which will represent various socio -economic backgrounds. - Carry out impact assessment based on the performance of the students, the distribution of workload to teachers and equity. Phase 4: Governance Ethical and Regulatory. - Internationalize AI-in-education standards on the issues of data privacy, algorithmic openness and responsibility. - Develop mechanisms of monitoring to determine long-term systemic effects. This incremental strategy of adoption will decrease the chance of technological overload and will make sure that the AI adoption process is consistent with institutional preparedness and equity theories.

E. Analytical Conclusion of the discussion.

Artificial Intelligence is not a general solution and marginal innovation. The AI can serve as an important modernisation vehicle in the Iraqi educational framework when introduced as an element of a wide-ranging reform agenda. Nonetheless, unsynchronised implementation of technology in the absence of infrastructural stabilisation, regulations, and human-capital building can have little effect or enhance structural disparities. This will mean that the success of AI implementation in Iraq will not be as much technological availability-based but rather governance capacity-based, policy coherence-based, and long-term commitment to investment.

IX. Conclusions

Conclusions The paper is a theoretical analytical work exploring how Artificial Intelligence can help the Iraqi education system to develop in terms of systemic readiness. The discussion shows that AI has a high potential to increase the level of personalisation in instruction, automate assessment, aid in the professional enhancement of teachers, and enhance the data-based educational governance [6], [12], [14]. when used under the strategy of engagement, AI-based systems would probably alleviate structural issues, including the over-crowding of classrooms, teacher shortages, and administrative inefficiencies.

Yet, the results also show that the introduction of AI is essentially dependent on the stability of infrastructures, the availability of digital resources, institutional capability, and regulatory readiness. Iraqi education system is still experiencing structural limitations, such as uneven broadband penetration, intermittent electricity supply, low levels of digital hardware availability, and missing gaps in digital competencies of the teachers [10], [11]. Without considering these pre-requisites, AI implementation stands the danger or generating tokenized reform and not actual change.

Moreover, ethical factors, such as privacy of data, reduction of algorithmic bias, and fair access, are invaluable conditions of responsible AI implementation [18], [19], [20]. Weaknesses in the lack of detailed governance structures can lead to vulnerabilities in security to educational institutions and increase socio-economic inequity.

Thus, AI cannot be regarded as a replacement of teachers, and it is rather a set of cognitive support, which improves teaching performance and institutional productivity. The environment of sustainable integration also needs a long-term strategic planning that is consistent with the modernization of infrastructure, development of human capital, and regulatory reform.

X. Recommendations

According to the results of the analysis, the recommendations are proposed as follows:

Infrastructure Prioritization

A. A national education reform policy must come to stable electricity, broadband services, secure cloud infrastructure, and cyber-security infrastructure before large-scale AI deployment. Increment of Teacher Capacity.

B. Use systematic country level professional capacity building interventions in relation to digital pedagogy, AI literacy and ethical technology use [17]. Phased Pilot Programmes

C. It can be considered to commence with controlled pilot programs in various provinces to check the influence on student achievement, teacher-to-student ratio, and equity before taking this to the national level. Formulation of regulatory framework.

D. Determine a clear set of national principles that regulate the protection of student data, the transparency of algorithms,

accountability, and procurement standards of AI [5], [19]. Equity Safeguards

E. As a measure to avoid the amplification of digital inequality, make sure that AI-based educational tools are fairly distributed in both urban and rural schools [20]. Research and Innovation Ecosystem.

F. Fund the process of synchronization between universities, research centers, and the Ministry of Education to create localized AI systems that are based on the requirements on the Iraqi curricula and teaching the Arabic language. By these actions, the Artificial Intelligence can play a significant role in the contemporary modernization of education in Iraq without losing ethical values and long-term sustainability.

References

1. Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Boston: Center for Curriculum Redesign.
2. Zawacki-Richter, O., Marin, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. International Journal of Educational Technology in Higher Education, 16(39).
3. Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. IEEE Access, 8, 75264-75278.
4. Luckin, R., Holmes, W. (2021). Intelligence Unleashed: An Argument for AI in Education. Pearson Education Policy Series.
5. UNESCO (2021). AI and Education: Guidance for Policy-makers. Paris: UNESCO Publishing.
6. Khosravi, H., Kitto, K., & Gasevic, D. (2020). Design and implementation of AI-supported learning analytics. British Journal of Educational Technology, 51(4), 1075-1093.
7. OECD (2021). AI and the Future of Skills. Paris: OECD Publishing.
8. World Bank (2020). Realizing the Future of Learning: From Learning Poverty to Learning for Everyone, Everywhere. Washington, DC.
9. Dikli, S. (2020). Automated essay scoring in educational contexts: Advances and challenges. Educational Technology Research and Development, 68, 2561-2585.
10. UNICEF (2022). Education Under Strain in Iraq: System Performance and Recovery Assessment. Baghdad.
11. World Bank (2021). Iraq Education Sector Analysis. Washington, DC.
12. VanLehn, K. (2020). Intelligent tutoring systems: A meta-analysis update. Educational Psychologist, 55(3), 171-188.
13. [Siemens, G., & Baker, R. (2020). Learning analytics and educational data mining. British Journal of Educational Technology, 51(4), 1029-1045.
14. European Commission (2020). Digital Education Action Plan 2021-2027. Brussels.
15. ITU (2022). Measuring Digital Development: ICT Development Report. Geneva.
16. Al-Maroof, R., et al. (2021). AI adoption in developing countries: Educational perspectives. Education and Information Technologies, 26, 6739-6760.
17. Redecker, C. (2020). European Framework for the Digital Competence of Educators (DigCompEdu). Joint Research Centre Report.
18. Williamson, B., & Eynon, R. (2020). Historical threads, missing links, and future directions in AI ethics for education. Learning, Media and Technology, 45(3), 223-235.
19. Selwyn, N. (2022). Datafication and digital governance in education. Educational Review, 74(3), 369-384.
20. Holmes, W., Porayska-Pomsta, K., & Holstein, K. (2022). Ethics of AI in education: Equity and inclusion challenges. Computers and Education: Artificial Intelligence, 3.
21. UNESCO (2024). Artificial Intelligence and the Future of Learning.
22. OECD (2025). Artificial Intelligence in Education: Policy Perspectives and Future Directions. Paris: OECD Publishing.
23. World Bank (2025). Digital Transformation in Education Systems: Opportunities and Challenges for Developing Countries. Washington, DC.
24. UNESCO (2025). AI Competency Framework for Teachers: Advancing Digital Education Systems. Paris: UNESCO Publishing.
25. Holmes, W., & Tuomi, I. (2025). State of Artificial Intelligence in Education: Trends, Challenges, and Policy Implications. Computers and Education: Artificial Intelligence.
26. Al-Sharafi, M. A., Arshah, R. A., & Abu-Shanab, E. (2025). Adoption of Artificial Intelligence in Education: A Developing Country Perspective. Education and Information Technologies.
27. Khan, M. A., & Ally, M. (2025). Artificial Intelligence and Personalized Learning: Future Trends in Digital Education. International Journal of Educational Technology in Higher Education.
28. European Commission (2025). AI in Education and Training: Strategic Framework for Digital Transformation. Brussels.