



# Designing an Artificial Intelligence Model for School Management in Iraq

**Ahmad Haddad Alfayyadh<sup>1</sup>, Elham Kaviani<sup>2</sup>, Mehdi Sadeghi<sup>3</sup>, Anahita Faraji<sup>4</sup>**

<sup>1</sup>PhD student in Educational Management, Department of Educational Sciences, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.

<sup>2</sup>Assistant Professor, Department of Educational Sciences, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.

<sup>3</sup>Assistant Professor, Department of Educational Sciences, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.

<sup>4</sup>Assistant Professor, Department of Educational Sciences, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.

## Abstract

**Objective:** This study aimed to design an artificial intelligence model for school management in Iraq.

**Methodology:** This qualitative study employed grounded theory as its research method. Data was collected through semi-structured interviews with 15 experts. The research validity was confirmed by both the interviewees and expert faculty. The research reliability was obtained using the intra-rater agreement method with a coefficient of 66%. For data analysis, the constant comparative method was used in three stages: open coding, axial coding, and selective coding.

**Findings:** The analysis of the interviews yielded 116 key concepts, categorized into 32 categories, and 16 main classes under six dimensions. The main classes included technology infrastructure, human resources, creation of intelligent educational content (causal conditions), advanced technology in education, cybersecurity (core phenomenon), policies and regulations, organizational factors (contextual conditions), technological challenges, and security and cultural barriers (intervening conditions), improving communication infrastructure, enhancing educational skills and reducing skill gaps (strategies), improving educational quality, efficiency of school management, data-driven feedback for students, and integration of educational assessment (consequences).

**Conclusion:** The application of artificial intelligence in school management in Iraq requires the development of technological infrastructure and the enhancement of educational skills. Despite technological challenges and security and cultural barriers, the effective use of artificial intelligence can improve the quality of education and the efficiency of school management.

**Keywords:** Artificial intelligence, school management, Iraq

**Received:** 08 May 2024    **Revised:** 10 June 2024    **Accepted:** 25 June 2024

## Introduction

Artificial Intelligence (AI) is an advanced technology that simulates human intelligence processes using machine learning algorithms, neural networks, and natural language processing (Igbovi, 2023). The genesis of AI can be traced back to the 1950s when John McCarthy organized a two-month workshop at Dartmouth College in the United States. McCarthy coined the term "Artificial Intelligence" at this workshop in 1956 (Russell & Norvig, 2016). AI is often defined as the ability of machines or computer systems to perform tasks that typically require human intelligence, such as thinking and decision-making

(Russell & Norvig, 2016). This phenomenon represents extensive efforts in technology aimed at recreating and modeling human mental processes and behaviors using computer systems (Wartman & Kemps, 2018). In this context, AI can be defined as an attempt to accurately and skillfully simulate human thought and behavior processes through software and digital devices (Mohammad & Watson, 2019).

AI has rapidly established itself as a transformative force across a wide range of industries, including education (Kamalov et al., 2023). The application of AI in education has been heralded as one of the most pivotal developments of the century (Becker et al., 2018). In an era of rapid technological change, schools, and educational institutions are recognized as key institutions that need to align with these digital transformations and integrate the necessary skills for the 21st century into their curricula. New technologies attract young people, positioning schools to undergo changes and create a suitable environment for leveraging these technologies (Karnes, 2019). The potential applications of AI in education include personalized learning, intelligent tutoring systems, automated assessment, and teacher-student collaboration (Volny et al., 2021). Kamalov et al. (2023) further argue that AI is transforming the educational landscape by personalizing learning experiences, automating administrative tasks, and providing real-time feedback, bridging gaps, and fostering more inclusive and effective learning environments. One of the most prominent manifestations of AI is chatbots, which have also impacted the field of education (Huang & Chang, 2021). A recent survey revealed a continuous increase in the use of chatbots in education (Volny et al., 2021). Several studies have demonstrated that chatbots can enhance students' learning experiences and facilitate their education (Okenowo & Adabiyola, 2021). AI can also be used to grade assignments and exams, saving teachers time and providing more consistent grading (Ecker et al., 2018). In addition, Wang et al. (2022) suggest that artificial intelligence can be utilized to analyze student data, enabling the identification of at-risk students and the provision of targeted interventions. Furthermore, Sain and Sain (2021) argue that AI can assist educators in analyzing student performance data and feedback to optimize curriculum design and delivery.

Artificial intelligence has the potential to revolutionize school management by improving the efficiency and effectiveness of various processes. However, there are limitations to the application of AI in educational management that must be considered. Some of the most significant limitations include bias and discrimination (Mason & Renny, 2018), lack of transparency and interpretability (Voltsios, 2019), data privacy concerns and security breaches (Akayakalayci & Ildirim, 2020), and dehumanization and loss of personal connection (Peters & Besley, 2020).

Due to these limitations, there is a growing body of work that highlights the importance of AI policy and governance. Some suggestions for institutional activities in this space include considering human agency and oversight (including AI literacy, collaboration, and inclusivity), technical robustness (e.g., sustainability), and integrity (including privacy, transparency, and accountability) (Selvaratnam & Venaroso, 2023).

Furthermore, there is no strong and widespread evidence of the effectiveness of AI tools in education (Holmes et al., 2019). No one truly knows where these new AI advancements will lead, and all that remains are widespread speculations (Fulan et al., 2023).

Numerous studies have investigated the application of AI in education and school management. For example, Hagag and Sharif (2023) examined the impact of AI-based solutions on the managerial skills of school leaders. The system they designed included a dashboard for predicting student performance, a chatbot for answering parents' questions, and an electronic survey to measure employee satisfaction. The results indicated a significant improvement in the managerial competencies of leaders after implementing the system, emphasizing the importance of using AI to optimize educational management processes.

Labeza et al. (2023) demonstrated that chatbots have a significant impact on learning outcomes, explicit reasoning, and knowledge retention. The use of chatbots in education offers benefits such as immediate support, quick access to information, improved learning outcomes, and personalized learning experiences. However, findings regarding critical thinking, collaborative learning, and motivation have

shown mixed results. In terms of application, chatbots are primarily used for teaching various subjects, including mathematics, computer science, foreign languages, and engineering. Some chatbots follow pre-defined dialogue paths, while others employ personalized learning approaches. Challenges in chatbot development include a lack of sufficient training data, a lack of emphasis on usability principles, ethical concerns, evaluation methods, user attitudes, programming complexities, and data integration issues.

Smith (2021, 2022) has identified various applications of artificial intelligence in educational management, including personalized learning, intelligent tutoring systems, student performance prediction, automated grading, learning analytics, chatbots and virtual assistants, school safety, recruitment and admissions, financial aid and student services, and curriculum development. Goçen and Aydemir (2020) reported that schools and teachers will face new opportunities, benefits, and challenges with the advent of AI in education. This research suggests that the use of AI in education can enhance individualized learning, provide more effective learning experiences, help students discover their talents, improve their creativity, and reduce teachers' workloads. However, this study emphasizes the need to prepare teachers to work with these support structures so that they can be more effective in a future where AI technologies play a more significant role.

Ali Karimi et al. (2023) have stated that AI technologies, with the ability to process large datasets, engage in human-like cognition, thinking, and dialogue, make decisions, and take actions, create numerous opportunities to improve school-level leadership, practice open management based on the principles of transparency, participation, and digital skills, and create the necessary synergy to achieve evolving educational goals by integrating teachers, students, and parents into educational processes. These technologies have also demonstrated their ability to assist school administrators in managing various technical tasks, such as managing food/transportation services, procuring educational materials, managing human resources, security, and processing student information. AI also enables learning analytics or educational data mining, which allows for preventive actions and the provision of customized instruction by obtaining comprehensive data on students' learning activities over some time. It is undeniable that the integration of AI-based digital technologies presents both opportunities and challenges for adapting school performance to new conditions for the benefit of students, teachers, and other stakeholders.

In summary, focusing on the components of AI in school management contributes to ongoing research and development in this field. By identifying and examining how AI is used in educational settings, researchers and developers can provide innovative solutions to address educational challenges. This helps strengthen the link between technology and education and ensures that schools can benefit maximally from AI (Lakhin et al., 2016). By accurately identifying these components, schools can effectively use AI-based technologies to enhance the learning experience and create a dynamic and efficient environment for students and teachers (Zawacki et al., 2019). AI in school management facilitates the successful adoption and integration of new technologies. Understanding these components allows school administrators to design specific strategies for teacher training and the optimal use of these technologies in instructional and administrative processes. This helps improve digital skills among the teaching staff and increases flexibility in addressing modern educational challenges (Holmes et al., 2019).

Identifying the components of AI in school management in Iraq can help the country overcome existing challenges in its education system and create new opportunities for educational advancement. Given the cultural diversity and geographical differences in Iraq, the application of AI in school management can help provide customized solutions for different schools in different regions. By accurately identifying key AI components, schools can optimize their instructional and administrative processes while addressing the specific needs of students and teachers within a diverse cultural framework. Therefore, this research aims to design a model for the use of AI in school management in Iraq.

### **Research Methodology**

This research employed a qualitative approach using grounded theory. Grounded theory involves three systematic, emergent, and constructivist approaches (Nouri & Mehrmohammadi, 2010). In this study, the

systematic approach (Strauss & Corbin) was utilized. This approach emphasizes the precision of the research process, the transparency of the coding process, the distribution of data into specific categorical clusters, and the applicability of the paradigmatic model (Farastkhah, 2015). According to this perspective, the researcher must go through three stages of open coding, axial coding, and selective coding to develop an evolving theory.

The population included school administrators, teachers, information technology and artificial intelligence experts, and educational and technological researchers. These individuals were selected using a snowball sampling technique. Data collection in this study was primarily based on library research, internet searches, and in-depth, open-ended interviews. Fifteen interviews were conducted in this study, and from the ninth interview onwards, repetition in the information received was observed. From the eleventh interview onwards, the data was completely repetitive and had reached theoretical saturation; however, for assurance, the interviews continued until the 15th. The interviews began with questions about the "obstacles and challenges of using artificial intelligence in school management in Iraq," and other questions were raised based on the interviewees' responses.

To ensure the validity and reliability of the data, the research findings were presented to the participants, and the theory text was reviewed by them. Their comments and suggestions were incorporated into the final theory. Finally, the research was reviewed and revised by professors, and suggestions for modifying or changing the final theory were made. Additionally, the method of "inter-rater reliability" was used to calculate the reliability of the interviews. To calculate the reliability of the interviews using this method, an information technology and artificial intelligence expert was invited to participate in this research as a research collaborator (coder). The necessary techniques and training for coding the interviews were provided to them. In each interview, the codes that were similarly determined by two people were identified as "agreement," and the different codes were identified as "disagreement." Then, the researcher, along with this research collaborator, coded three interviews, and the percentage of inter-rater agreement, which is used as a reliability index for analysis, was calculated using the following formula:

$$\text{Inter-rater reliability} = (\text{Number of agreements} \times 2 / \text{Total number of codes}) \times 100$$

Table 1: Inter-rater Reliability Results

Interview Number	Total Codes	Number of Agreements	Number of Disagreements	Inter-rater Reliability (%)
6	39	26	13	66.67
9	25	31	6	72.00
12	51	29	22	56.86
Average	38.75	29	12.75	65.18

As shown in the table, the total number of codes recorded by both the researcher and the collaborator is 118. The total number of agreements between these codes is 86, and the total number of disagreements is 20. The inter-rater reliability, calculated using the aforementioned formula, is 66%, which is higher than 60%. Therefore, the reliability of the coding is confirmed.

## Results

### Individual Characteristics of Interviewees

**Table 2: Frequency Distribution of Interviewees' Expertise**

Expertise	Frequency	Percentage
Educational Management Professors	4	26.7%
Information Technology and AI Experts	3	20.0%
Educational and Technological Researchers	3	20.0%
School Administrators	3	20.0%
Teachers	2	13.3%
<b>Total</b>	<b>15</b>	<b>100%</b>

In this study, the primary data source relied heavily on library research, internet searches, and semi-structured, open-ended interviews. Initial interviews were exploratory and descriptive. Semi-structured interviews were conducted with 15 experts, and the analysis of interview data was conducted concurrently through three stages: open coding, axial coding, and selective coding. Initially, the interview transcripts were transcribed, and the resulting data was converted into text format. This data was then divided into smaller units for detailed analysis and categorization. In the initial stage of open coding, 150 initial codes were identified, which were filtered to 116 unique open codes. These codes were further reduced to 32 subcategories and 16 main categories. In the process of selecting categories, the focus was on categories that provided the greatest conceptual saturation. Finally, in the axial coding stage, using a systematic approach associated with grounded theory (systematic approach), the obtained codes were placed into six key categories related to the main phenomenon of "artificial intelligence in school management in Iraq," including causal conditions, contextual conditions, intervening conditions, strategies, and consequences.

### Step 1: Open Coding

In the first stage, open coding, the transcribed interview texts were repeatedly studied to identify the embedded ideas. The interview texts were marked using live codes to recognize recurring ideas. In other words, the interview texts were examined line by line using constant comparative analysis and conceptualized. Concepts included words and phrases that reflected the key informants' experiences regarding artificial intelligence in school management. The concepts identified in the first stage of coding were then categorized into subcategories based on their relationship to similar concepts and were named with a title that expressed their meaning. In the final stage of open coding, the subcategories obtained from the previous stage were placed into more abstract categories or main categories based on similarities, conceptual relationships, and common characteristics among the open codes and concepts.

Table 3. Concepts, subcategories, and main categories extracted in the open coding stage

Main categories	Sub-categories	Concepts
Technology infrastructures	Hardware	Provision of smart devices such as tablets and laptops for students and teachers. Installation and maintenance of robust servers and databases for data storage and processing. Provision of smart attendance devices.
	Software	Development and maintenance of educational software AI-based management software. Updates of software security systems
Manpower	Teacher training	Organizing educational workshops for teachers to use artificial intelligence technologies in teaching Developing digital skills for teachers Teaching how to use management software
	Technical support	Provide continuous technical support for teachers and students Management of technological changes in schools Promoting the culture of accepting technology and innovation among teachers and students
Creating intelligent educational content	Smart content production	Using artificial intelligence to produce interactive educational content Continuous updating of educational content based on analytical data Using augmented and virtual reality technologies in educational content
	Optimizing educational content	Using students' academic data to optimize content Providing educational content according to the level of knowledge and individual needs of students Using adaptive systems to adjust content based on students' progress
Advanced technologies in education	Implementation of learning technologies	Using machine learning to analyze students' data Creating adaptive learning systems to improve educational methods Analysis of students' learning patterns to identify educational needs Using augmented reality technologies in classrooms
	Diagnosis and analysis technology	Using artificial intelligence to evaluate assignments and visual projects Monitoring the movements and behaviors of students to

		<p>improve classroom management and security</p> <p>Analysis and production of educational content using image data</p> <p>Using sensors to evaluate and improve student performance</p>
Cyber security	Development of network infrastructure	<p>Setting up optical fiber networks to increase the speed and stability of the internet in schools</p> <p>Providing access to 5G networks to improve communication</p> <p>Using artificial intelligence to manage and optimize school networks</p> <p>Improving the security of school communication networks</p>
	Strengthening cyber security	<p>Identifying and preventing cyber-attacks using artificial intelligence systems</p> <p>Using advanced encryption algorithms to protect students' personal and academic information</p> <p>Organizing educational programs to increase the awareness of teachers and students about cybersecurity</p> <p>Management and protection of sensitive school data</p>
Policies and regulations	Policies and regulations	<p>Formulation of rules for the use of artificial intelligence in education</p> <p>Regulations for data protection and privacy of students and teachers</p> <p>Setting quality standards for artificial intelligence systems</p> <p>Introducing and applying regulations related to cyber security in schools</p>
	Support programs	<p>Supporting research and innovative programs in the field of educational technologies</p> <p>Encouraging cooperation between government institutions, universities, and technology companies</p> <p>Allocation of government funds for the development and implementation of artificial intelligence systems</p> <p>Providing incentives and facilities for schools to use artificial intelligence technologies</p>
Organizational factors	Cultural attitudes	<p>Changing negative attitudes towards new technologies</p> <p>Promoting the culture of accepting technology and innovation among teachers and students</p> <p>Informing parents and society about the benefits of artificial intelligence in education</p> <p>Creating advertising campaigns for the cultural acceptance of artificial intelligence</p>

	Organizational structure	<p>Managing changes in educational and administrative processes to adapt to new technologies</p> <p>Creating appropriate organizational structures for the implementation of artificial intelligence</p> <p>Training and development of digital skills of teachers and administrators</p> <p>Using information technology consultants to help implement and maintain artificial intelligence systems</p>
Technological challenges	Defects of digital infrastructure	<p>Lack of access to high-speed and stable Internet</p> <p>Inability to provide and maintain appropriate hardware equipment</p> <p>Problems in implementing and maintaining complex software systems</p> <p>Lack of proper infrastructure to store and process data in the cloud</p>
	Lack of technological support	<p>Lack of necessary equipment and technologies for the implementation of artificial intelligence</p> <p>Lack of research centers for the development and use of artificial intelligence in education</p> <p>Weakness in developing and improving communication networks to access resources and information</p> <p>Lack of monitoring and evaluation systems to check the progress and effectiveness of projects</p>
Security and cultural barriers	Security challenges	<p>Concerns about data security and cyber attacks</p> <p>Problems in protecting the privacy of students and teachers</p> <p>Lack of security protocols to manage sensitive information</p> <p>Concerns about unauthorized access to educational data</p>
	Organizational limitations	<p>Lack of support and management support for the implementation of artificial intelligence</p> <p>Lack of training programs and skills development for teachers and staff</p> <p>Lack of coordination between different school departments in using new technologies</p> <p>Problems in managing changes and adapting to new processes</p>
Improving communication infrastructure	Improvement of Internet networks	<p>Improving network capacity to support artificial intelligence applications</p> <p>Increasing access to the Internet in remote and deprived areas</p> <p>Improving the quality and stability of the Internet</p>

		<p>connection</p> <p>Reducing Internet subscription costs for schools and students</p>
	Hardware and software updates	<p>Upgrading hardware equipment in schools</p> <p>Using advanced school management software</p> <p>Using high-capacity servers to support data and artificial intelligence programs</p> <p>Updating software security systems for data protection</p>
Enhancing educational skills	Empowering students	<p>Holding specialized courses for teaching digital skills</p> <p>Encouraging students to participate in innovative projects</p> <p>Organizing competitions and technological challenges</p> <p>Providing access to online educational resources</p>
	Improving teacher training	<p>Providing specialized workshops in the field of new technologies</p> <p>Development of virtual training courses for teachers</p> <p>Issuance of valid certificates after completing training courses</p> <p>Providing comprehensive and up-to-date educational resources for teachers</p>
Reducing skill gaps	Strengthening basic skills	<p>Holding basic skills training courses</p> <p>Designing educational programs based on job needs</p> <p>Providing internship opportunities for students</p>
	Improving advanced skills	<p>Providing specialized courses in various fields</p> <p>Cooperation with educational and research institutions to improve skills</p> <p>Organizing seminars and specialized workshops for students</p>
Improving educational quality	Personalization of education	<p>Creating curricula that suit the needs and abilities of each student</p> <p>Providing immediate and accurate feedback to students to improve the learning process</p> <p>Using data to predict the educational needs of students</p> <p>Continuous assessment and measurement of students' progress and adjusting programs based on it</p>
	Access to educational resources	<p>Access to diverse and extensive educational resources through digital libraries</p> <p>Using online platforms for teaching and learning at any time and place</p> <p>Using videos, podcasts, and multimedia content to</p>

		<p>improve the learning process</p> <p>Translation and localization of educational content to adapt to local needs</p>
Efficiency of school management	Data management	<p>Using artificial intelligence systems to collect accurate and up-to-date data</p> <p>Analyzing management data to improve decision-making processes</p> <p>Using artificial intelligence for more effective forecasting and planning</p> <p>Providing quick and easy access to management information</p>
	Resource optimization	<p>Using artificial intelligence tools for better time management and planning</p> <p>Reducing costs through optimization of processes and effective use of resources</p> <p>Using artificial intelligence for better management of educational spaces</p> <p>Effective use of human resources and equipment to increase efficiency</p>
Data-driven feedback for students	Data collection and analysis	<p>Using artificial intelligence systems to collect students' academic data</p> <p>Analyzing academic data to identify students' strengths and weaknesses</p> <p>Creating centralized databases to access students' academic information</p>
	Providing feedback and educational corrections	<p>Providing immediate and accurate feedback to students based on academic data</p> <p>Setting educational programs and lessons based on data-oriented feedback</p> <p>Using data to improve teaching and learning methods</p>
Integrity of educational assessment	Integrated assessment systems	<p>Creating comprehensive evaluation systems that cover all aspects of student performance</p> <p>Using artificial intelligence for continuous and accurate assessment of academic performance</p> <p>Combining quantitative and qualitative assessments to achieve more comprehensive views</p>
	Coordination of assessment and teaching	<p>Correspondence of curricula with the results of evaluations to improve teaching</p> <p>Using evaluation data to adjust teaching methods</p> <p>Creating educational feedback between teachers and students for continuous improvement</p>

## Step 2: Axial Coding

In this stage, the core category, which typically represents the phenomenon under investigation in the study, was identified and a logical and causal relationship between this category and other categories was established. In this stage of coding, conditional, interactive/processual, and consequential categories were determined. In the present study, the phenomenon under investigation was "artificial intelligence in school management." Therefore, it was considered as the core category, and other categories were examined as conditional categories (causal, contextual, and intervening), interactive/processual, and consequential, as shown in the table below.

Table 4. Forming the main classes of the theory

Paradigm model	Main classes	Categories
Main phenomenon or the central class	Advanced technologies in education	Implementation of learning technologies Diagnosis and analysis technology
	Cyber security	Development of network infrastructure Strengthening cyber security
Causal conditions	Technology infrastructures	Hardware Software
	Manpower	Software Teacher training
Background conditions	Policies and regulations	National and international laws Support programs
	Organizational factors	Cultural attitudes Organizational structure
Intervening conditions	Technological challenges	Defects of digital infrastructure Lack of technological support
	Security and cultural barriers	Security challenges Organizational limitations
Strategies	Improving communication infrastructure	Improvement of Internet networks Hardware and software updates
	Improving educational skills	Student empowerment Improving teacher training
	Reducing skill gaps	Strengthening basic skills Improving advanced skills
Outcomes	Improving educational quality	Personalization of education

		Access to educational resources
	Efficiency of school management	Data management Resource optimization
	Data-driven feedback for students	Data collection and analysis Provide feedback and educational corrections
	Integrity of educational assessment	Integrated assessment systems Coordination of assessment and teaching

### Step 3: Selective Coding

As previously mentioned, the goal of theorizing is to generate a theory, not merely to describe or explain the studied variable. To transform coding and analysis into theory, the various stages of coding must be systematically interconnected. Selective coding (based on the findings from the previous two coding stages) is the primary step in theorizing. It involves systematically linking the core category to other categories and presenting these relationships within a pattern or model, as well as refining stages that require further development (Danaifard& Eslami, 2009). In the present study, by following the core storyline within a paradigmatic model, a grounded theory has been developed. Using the concepts and categories described above, the model of artificial intelligence in school management in Iraq is presented in Figure 1.

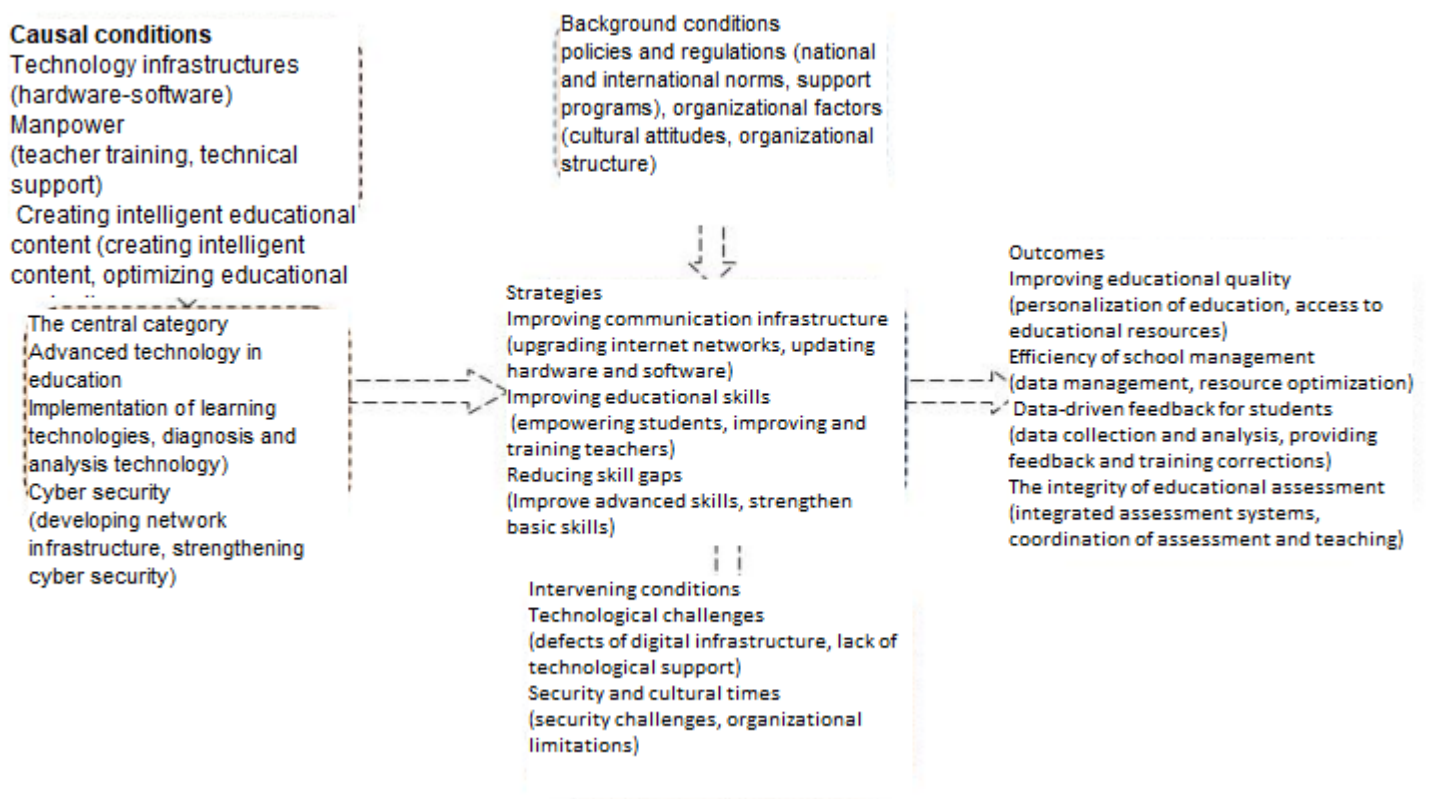


Figure 1. Axial coding based on the paradigm model (artificial intelligence model in Iraqi schools)

## Discussion and conclusion

The primary objective of this research was to develop an artificial intelligence model for school administration in Iraq. Grounded theory was employed as the methodological framework to construct the model, with the proposed framework emerging from the coding process of expert interviews. Based on the qualitative data analysis, the AI model for school management in Iraq encompasses 16 categories, structured into six dimensions: causal conditions (3 categories), central phenomenon (2 categories), strategies (3 categories), intervening conditions (2 categories), contextual conditions (2 categories), and consequences (4 categories).

The effective implementation of AI in school management necessitates a robust technological infrastructure. This requirement has been corroborated in numerous studies, including those by Eventalar et al. (2024), Dimitriev and Lanytis (2023), Crampton and Bricker (2023), and Chadri and Kazim (2021). AI systems are heavily reliant on large datasets, thus necessitating the installation and maintenance of powerful servers and databases for data storage and processing. Moreover, students and teachers require intelligent devices such as tablets and laptops to fully leverage the benefits of AI in teaching and learning. Additionally, hardware such as attendance systems, feedback tools, and grading systems may be considered essential for AI implementation.

Beyond the hardware infrastructure, the software underpinnings of AI in school management are equally crucial. This includes the development and maintenance of educational software, AI-driven management software, and regular updates to software security systems. By investing in appropriate technological infrastructure, both hardware and software, schools can fully harness the potential of AI to enhance educational outcomes and streamline administrative processes. Human resources represent another essential component of AI implementation in school management. Human capital is instrumental in ensuring the responsible, effective, and ethical use of AI technologies. While AI can significantly improve school management by automating tasks, enhancing efficiency, and providing data-driven insights, human involvement remains vital for various reasons, including monitoring, maintenance, troubleshooting AI systems, making decisions about AI-suggested solutions, and providing emotional and ethical support. Therefore, it is imperative to enhance the capabilities of teachers and administrative staff in utilizing AI systems through training workshops on AI in education, developing digital skills for teachers, and providing training on management software. Additionally, employing specialized IT and AI professionals for ongoing technical support is necessary. Aligned with these findings, Chi et al. (2023) have provided insights into how AI is reshaping human resource management practices and the critical role of human resources in ensuring the successful deployment of AI technologies. The final causal condition for AI implementation in school management is the creation of intelligent educational content. There is a need to produce and optimize intelligent educational content in schools. This can be achieved by leveraging AI for generating interactive educational content, utilizing augmented and virtual reality technologies in content delivery, optimizing content based on student data, employing adaptive systems to tailor content to individual student progress, and providing educational content that aligns with students' knowledge levels and individual needs.

Artificial intelligence in school management emerges as a central phenomenon involving the application of advanced technologies in education and school administration, as well as cybersecurity. The categories are organized around a paradigmatic model centered on this phenomenon. By integrating advanced technologies to enhance various aspects of education and management, AI plays a transformative role in school administration. Numerous school activities, including grading, feedback, data analysis, student behavior monitoring, question generation, and content analysis, are now conducted using AI under human supervision. A set of categories serve as contextual factors influencing the adoption of AI in school management. Policies and regulations are one such contextual factor. Aligned with research findings, studies by Selvaratnam and Venaroso (2023), Akayakalıcı and İldırım (2020), and Ali Karimi et al. (2023) have highlighted the significance of policies and regulations in the domain of AI in school management. Policies and regulations play a pivotal role in the adoption of AI in schools due to several reasons. Schools manage sensitive data of students, staff, and operations.

Policies ensure that AI systems comply with privacy laws and protect data. Regulations help address ethical concerns, such as bias in AI algorithms and ensure that AI tools are used fairly and do not disadvantage any group of students. Regulations guarantee that AI applications do not compromise student safety. This includes monitoring AI tools to prevent harmful content and ensuring their use in a manner that supports student well-being. Additionally, the existence of supportive regulations and policies for educational technology research and innovation, encouraging collaboration between government agencies, universities, and technology companies, allocating government funding for the development and implementation of AI systems, and providing incentives and facilities for schools to use AI technologies can contribute to the more effective implementation of AI in school management. Organizational factors, such as cultural attitudes and organizational structure, influence the use of AI in school management. A culture of acceptance of technology and innovation must be fostered among teachers and students before implementing AI in school management. Negative attitudes towards the use of AI, especially among parents, should be eliminated through educational programs and campaigns. A supportive organizational culture that values innovation and encourages experimentation creates an environment where the adoption of AI technology and the discovery of new methods are encouraged. Moreover, schools with flexible structures and adaptable processes can more easily accept the changes and disruptions caused by the implementation of AI technologies, leading to faster and smoother transitions. Studies by Kelly et al. (2023) and Bly et al. (2022) provide valuable insights into how organizational factors, such as culture and structure, influence the use of AI in school management.

According to the proposed model, some categories, such as technological challenges and security and cultural barriers, act as intervening variables in the use of AI in school management. The implementation of AI technologies requires specialized technical knowledge and skills, which may not be readily available in school management, hindering the deployment and maintenance of AI systems. Additionally, outdated hardware and network infrastructure in schools can limit the processing power and connectivity required for the effective operation of AI applications. The acquisition and implementation of AI technologies can also be costly, especially for budget-constrained educational institutions that are unable to afford and maintain appropriate hardware. The financial investment required for purchasing, training, and maintaining AI systems can be a barrier to adoption. Furthermore, within the realm of technological challenges, lack of access to high-speed and stable internet, difficulties in implementing and maintaining software systems, the absence of suitable infrastructure for storing and processing data in the cloud, a dearth of research centers for developing and utilizing AI in education, weaknesses in developing and improving communication networks for accessing resources and information, and the absence of monitoring and evaluation systems for assessing project progress and effectiveness can all hinder the use of AI in school management. By addressing these technological challenges through proper planning, training, and support, schools can successfully leverage AI to improve management processes and student outcomes. Security challenges pose a significant concern when implementing AI in educational settings. Security challenges, including difficulties in protecting the privacy of students and teachers, concerns about unauthorized access to educational data, worries about data security and cyberattacks, and more, have made the security aspect of using AI problematic. Consistent with the research findings, studies by Selvaratnam and Venaroso (2023), Akayakalıci and İldırım (2020), and Ali Karimi et al. (2023) have also highlighted this issue. To mitigate these security challenges, educational institutions should prioritize cybersecurity measures, conduct regular risk assessments, provide comprehensive training on data protection practices, and establish clear policies and procedures for AI use. Collaborating with cybersecurity experts can help ensure the safe and ethical deployment of AI in education. Organizational constraints, such as a lack of managerial support and backing for AI implementation, the absence of training and skill development programs for teachers and staff, and a lack of coordination among different school departments in the use of new technologies, can also hinder the effective use of AI in school management. Overcoming these limitations requires careful planning, collaboration among stakeholders, and a commitment to addressing the challenges that arise when implementing AI in school management. By addressing these organizational limitations, schools can leverage the benefits of AI technology to increase efficiency, improve decision-making, and enhance overall educational outcomes.

Based on the research findings, a set of strategies has been proposed for the utilization of AI in school management. Firstly, improving the communication infrastructure related to AI in school management, particularly in terms of hardware and software, can enhance the experience of using this technology. Numerous studies, including those by Eventalar et al. (2024), Dimitriev and Lanytis (2023), Crampton and Bricker (2023), and Chadri and Kazim (2021), have supported this component. It is essential to ensure that school hardware is suitable for supporting AI technologies and is up-to-date. Sufficient internet bandwidth and the creation of strong, stable networks can facilitate faster and better connections to AI systems and applications. The selection and implementation of software that effectively interacts with AI systems and has adequate support and training is crucial. By improving the communication infrastructure related to AI, schools will be able to make the most of this technology and reap its benefits. Secondly, enhancing students' abilities and improving the quality of teacher training are essential steps for the effective integration of AI in school management. In this regard, Chi et al. (2023) have highlighted the critical role of human resources in ensuring the successful deployment of AI technologies. Implementing programs and courses aimed at developing digital literacy, critical thinking, problem-solving, and data analysis skills in students is essential. These skills will help students better understand and utilize AI technology in their learning process.

Comprehensive training programs should also be provided for teachers to enhance their knowledge and skills in effectively utilizing AI tools and technologies in the classroom. This can include workshops, courses, and ongoing professional development opportunities. By focusing on improving students' abilities and increasing teacher training in AI, schools can create a more conducive environment for the successful integration of AI in school management. Ultimately, this will lead to better educational outcomes and prepare students for the future job market where AI plays a significant role.

Furthermore, the basic and advanced skills of both students and teachers must be improved to bridge the skills gap in this area. Implementing basic skills training courses, designing training programs based on job requirements, providing internship opportunities for students, offering specialized courses in various fields, collaborating with educational and research institutions to enhance skills, and organizing specialized seminars and workshops for students are some of the actions that can be taken in this regard.

In summary, the integration of AI in school management in Iraq offers a promising solution for improving teaching methods and student outcomes. AI technologies bring numerous benefits such as improved teaching quality, school management efficiency, data-driven feedback for students, and the integration of educational assessment, making the use of this technology in school management essential. Consistent with research findings, the implications of using AI in school management have been emphasized in studies by Kamalov et al. (2023), Smith (2021), Wang et al. (2022), Wolny et al. (2021), Huang and Chang (2021), Okunowo and Adadegbola (2021), Acker et al. (2018), and Sain and Sain (2021). By being aware of these implications, schools can actively address challenges and maximize the benefits of integrating AI into school management in Iraq. However, the use of AI in school management in Iraq can also present challenges that need to be carefully considered. Concerns related to privacy, equity issues, bias and fairness considerations, and potential teacher resistance should be acknowledged and mitigated through clear policies and ethical guidelines. By carefully navigating these challenges, teachers can leverage the power of AI to create more effective and inclusive learning environments that meet the diverse needs of all students. Adopting a balanced approach that prioritizes ethical considerations and human oversight alongside technological innovations is key to realizing the full potential of AI in classroom management.

## References

1. Ali Karami, Noushin; Ali Karami, Ghodrattollah; Shohan, Jamila (2023). School leadership and management in the era of artificial intelligence: recent developments and future prospects. Seventh international conference on knowledge and technology of the third millennium of Iran's economy, management and accounting, Tehran.
2. Danai Fard, Hassan; Emami, Seyed Mojtaba. (2016) Qualitative research strategies: a reflection on foundational data theorizing. *Management thought* 1 (2), 69-97.

3. Ferasatkhah, Maghsoud. (2015) research methods in social sciences. Tehran: Agah.
4. Nouri, Ali; Mehromhammadi, Mahmoud. (2013) A model for using the data-derived theory method in educational research. *Curriculum Studies*, 23(6) 8-35.
5. Akkaya-Kalayci, T., Yildirim, S. (2020). Ethics of artificial intelligence in education: A literature review. *Journal of Educational Technology & Society*, 23(3), 84-99.
6. Becker, S. A., Brown, M., Dahlstrom, E., Davis, A., DePaul, K., Diaz, V., Pomerantz, J. (2018). NMC Horizon Report: 2018 Higher Education Edition. Educause.
7. Bley, K., Fredriksen, S.F.B., Skjærvik, M.E., Pappas, I. (2022). The Role of Organizational Culture on Artificial Intelligence Capabilities and Organizational Performance. In book: *The Role of Digital Technologies in Shaping the Post-Pandemic World*, 13-24.
8. Chaudhry, M.A., Kazim, E. (2021). Artificial Intelligence in Education (AIEd): a highlevel academic and industry note 2021. *AI and Ethics*, 2, 157–165.
9. Crompton, H., Burke, D. (2023). Artificial intelligence in higher education: the state of the field. *International Journal of Educational Technology in Higher Education*, 20(22).
10. Dimitriadou, E., Lanitis, A. (2023). A critical evaluation, challenges, and future perspectives of using artificial intelligence and emerging technologies in smart classrooms. *Smart Learning Environments*, 10(12).
11. Eckerd, U. K. H., Langer, A. I., König, C. J., Schmitz, E. A. (2018). Automated essay grading in the sociology classroom: Finding common ground. *Teaching Sociology*, 46(4), 283-292.
12. Fullan, M., Azorín, C., Harris, A., Jones, M. (2023). Artificial intelligence and school leadership: challenges, opportunities and implications. *School Leadership and Management*.
13. Gocen, A., & Aydemir, F. (2020). Artificial Intelligence in Education and Schools. *Research on Education and Media*, 12(1), 13-21.
14. Hagag, A. M., Elnaggar, M. E., & Sharaf, R. S. (2023). A Proposed Artificial Intelligence-Based System for Developing E-management Skills in Saudi Primary Schools. *European Scientific Journal, ESJ*, 19(11), 111-136.
15. Holmes, W., Bialik, M., Fadel, C. (2019). *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Boston: The Center for Curriculum Redesign.
16. Hwang, G.J., Chang, C.Y. (2021). A review of opportunities and challenges of chatbots in education. *Interact. Learn. Environ*, 1952615.
17. Ifenthaler, D., Majumdar, R., Gorissen, P., Judge, M., Mishra, S., Raffaghelli, J., Shimada, A. (2024). *Artificial Intelligence in Education: Implications for Policymakers, Researchers, and Practitioners*. Tech Know Learn.
18. Igbokwe, I.C. (2023). Application of Artificial Intelligence (AI) in Educational Management. *International Journal of Scientific and Research Publications*, Volume, 13(3), 300-307.
19. Kamalov, F., Calonge, D.S., Gurrib, I. (2023). New Era of Artificial Intelligence in Education: Towards a Sustainable Multifaceted Revolution. *Sustainability*, 15(16), 12451.
20. Karsenti, T. (2019). Artificial intelligence in education: the urgent need to prepare teachers for tomorrow's schools. *Formation et profession*, 27(1), 112–116.
21. Kelly, S., Kaye, S., Oviedo-Trespalacios, O. (2023). What factors contribute to the acceptance of artificial intelligence? A systematic review. *Telematics and Informatics*, 77. DOI:10.1016/j.tele.2022.101925.

22. Labadze, L., Grigolia, M., & Machaidze, L. (2023). Role of AI chatbots in education: systematic literature review. *International Journal of Educational Technology in Higher Education*, 20(56).
23. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L.B. (2016). *Intelligence Unleashed: An argument for AI in Education*. Pearson.
24. Mason, M., Rennie, F. (2018). Ethics and privacy in the adoption of learning analytics: A guide for academic leaders. *EDUCAUSE Review*, 53(6), 36-48.
25. Mohammed, P.S., Watson, E.N. (2019). Towards inclusive education in the age of artificial intelligence: perspectives, challenges, and opportunities. In book: *Artificial Intelligence and Inclusive Education. Perspectives on Rethinking and Reforming Education*, 17-37.
26. Okonkwo, C.W., Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. *Comput. Educ. Artif. Intell*, 2, 100033.
27. Peters, M. A., Besley, T. (2020). AI, ethics and education: The governance of AI and the place of ethics in an age of intelligent machines. *Education Sciences*, 10(11), 313.
28. Qi, Z., Jia-yi, L., Lu, C., Jun, L. (2023). Human Resource Management Driving by Artificial Intelligence Technology: Theoretical Research and Practical Application. *Journal of University of Electronic Science and Technology of China*, 25(1): 77-84
29. Russell, S.J., Norvig, P. (2016). *Artificial Intelligence: A Modern Approach* (3rd ed.). Prentice Hall.
30. Selvaratnam, R., Venaruzzo, L. (2023). Governance of artificial intelligence and data in Australasian higher education: A snapshot of policy and practice. *Australasian Council on Open, Distance and eLearning*.
31. Singh, V., & Singh, A. (2021). Role of artificial intelligence in educational management. *Journal of Education and Practice*, 12(12), 78- 85.
32. Smith, J. (2021). Applications of AI in Educational Management. *International Journal of Educational Technology in Higher Education*, 18(1), 1-17.
33. Smith, J. (2022). Applications of artificial intelligence in educational management. *Educational Technology Research and Development*, 70(2), 457-478.
34. Veletsianos, G. (2019). A case study of machine learning in education: Shifting ontologies. *Educational Researcher*, 48(7), 397-405.
35. Wang, Y., Zhang, X., Li, H., & Wang, Z. (2020). The application of big data and artificial intelligence in educational management. In Z. Chen, S. Deng, & L. Wang (Eds.), *Advances in intelligent systems and computing* (Vol. 1107, pp. 221-227). Springer.
36. Wartman, S.A., Combs, C.D. (2018). Medical education must move from the information age to the age of artificial intelligence. *Academic Medicine*, 93(8), 1107–1109.
37. Wollny, S., Schneider, J., Di Mitri, D., Weidlich, J., Rittberger, M., Drachler, H. (2021). Are we there yet? - A systematic literature review. *Front. Artif. Intell*, 4, 654924.
38. Zawacki-Richter, O., Marín, V.I., Bond, M., Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education - where are the educators?. *International Journal of Educational Technology in Higher Education*, 16, 1-27.