



The philosophy of artificial intelligence and its role in the educational learning system

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Abstract

Teaching artificial intelligence to teachers increases their knowledge and awareness about the applications of artificial intelligence in teaching and learning. Its use can have benefits such as personalization, improved participation, immediate feedback, easy access, productivity, and data analysis. The problem is that artificial intelligence is a type of personalized education, and this type of education can be a machine-driven issue that helps students work together in a classroom at various levels. It also helps the teacher in facilitating education and students in learning. Education plays an important role in educating the future generation and the process of socializing students, which has allocated large amounts of financial and human resources. The use of new technology in the field of education creates important changes in student learning, and the optimal use of the capacities of these technologies gives learning a certain breadth and richness. The main goal of artificial intelligence is to optimize routine processes and improve their speed and efficiency. The global adoption of artificial intelligence technology in education will transform the way of learning. The research method is qualitative. An interview with managers, experts specializing in the field of artificial intelligence and educational management was conducted to identify the components and dimensions of the application of artificial intelligence and the contribution of each of these dimensions and components. The findings of the present study are that eight factors: RIF learning, interactive learning CLTP, adaptive blended learning ALBM, problem-based and collaborative learning PC-CEL, INFUSE educational technologies, intelligent monitoring LIRAM, interactive learning cultural monitoring CCFM, and educational policies PEPT can be effective in the use of artificial intelligence in the education and learning system.

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Introduction:

Today, the world of science and technology is changing at an increasing pace. If educational systems do not keep pace with this change, they will be left out of the competition in the global competition arena. Therefore, in a world where education is recognized as an important pillar in professional development, the need to keep pace with modern educational technology and equipment for progress in the field of education and establishing a connection between technology and the educational field is inevitable.

The purpose of teaching artificial intelligence to teachers is to increase their knowledge and awareness about the applications of artificial intelligence in education and learning. With the increasing attention to the use of technology in education, teachers need to know about new and advanced technologies so that they can use them in the teaching and learning process of students. In general, artificial intelligence in education has advantages such as better educational results and increasing the quality and scalability of teacher education, personalized learning, intelligent private tutoring systems, forming adaptive groups, learning using virtual reality. (Ghorbani, and Ghahramani, 1402, pp. 33-35).

Problem Statement:

The application of artificial intelligence in education includes providing new methods and technologies to improve educational processes, enhance students' learning experience, provide more accurate feedback to teachers and students, identify individual educational needs, and create personalized educational content for each student. These innovations can significantly improve the quality and efficiency of education and enable students to learn better and more effectively. However, the research gap in this field may be related to the lack of access to sufficient research and studies in the field of applying artificial intelligence in education, the lack of focus on traditional education, and the lack of sufficient attention to this area in research and educational programs. This gap can prevent the development of more effective and efficient innovations in the field of applying artificial intelligence in education. (Salehnejad Bahrestaghi, et al. 1403) Given that there are many increasing changes in the field of science and learning and that these changes also affect learning, teaching methods, and student progress in schools. In order to keep up with the changes, the conditions,

facilities, equipment and education in schools and education should be considered by policymakers. Today, the field of education is faced with a traditional and postmodern duality. On the one hand, the traditional methods that previously existed have provided resistance for teachers, students and their families, which can have an unpleasant effect on the education system. The problem is that artificial intelligence is a type of personalized education, and this type of personalized education can be a machine-driven issue that helps students work together in a class at various levels. It also helps the teacher in facilitating education and helps whenever students need help. Adaptive learning also has a significant impact on learning at the national level, because artificial intelligence programs are advancing and expanding day by day. Adaptive learning can identify areas that need improvement in education courses. AI can not only help teachers and students but also tailor courses to their needs, it can also provide general feedback for both on the success of the course. Research conducted in AI has not addressed the educational (learning) system, and this can be considered as an issue. Another issue that exists is the impact of the use of AI in the educational (learning) system.

Importance and Necessity of Research Education is considered one of the important and fundamental institutions in society due to the important and serious role it plays in educating the future generation and the process of socialization of students. It has allocated large amounts of financial and human resources. The use of new technology in the field of education creates important changes in the nature of student learning, and the optimal use of the capacities of these technologies gives learning a special breadth and richness. The education system in every era must be able to meet the educational needs of learners and teachers of its era. In an era where everything is constantly changing, educational needs also change in the same proportion. (Khayami, p. 372. 1402)

First, AI frees education from the constraints of time and space, meaning that more lessons can be accessed almost anywhere and at any time. Second, education can be adapted to individual differences and learning activities can be changed as desired based on the individual progress of learners. Virtual education has provided a context in which many educational ideals, such as independent learning, self-directed learning, learner autonomy in learning, the right to choose content according to interests, the possibility of

presenting examples in more tangible formats using computer facilities, collaborative teaching and learning, and rapid assessment and feedback of learning, appear more achievable. This new educational system injects reinforcing stimuli into the teaching and learning process to improve the quality of education and thus increase the motivation of learners to learn lessons. Artificial intelligence has many capacities in the field of teaching and learning; Including saving money and time. Also, with this method, one can experience individual education alongside collaborative learning. The use of artificial intelligence systems opens up new horizons for students with special needs. The learning process of students is facilitated by using these technologies and it is possible for them to easily touch and learn the most complex and inaccessible concepts (Khayami, p. 387. 1402).

Research Objective:

The main goal of artificial intelligence is to optimize routine processes and improve their speed and efficiency, so the global adoption of artificial intelligence technology in education will transform the way we learn. This can facilitate the learning process for teachers and students in achieving their goals.

The main goal of learning in artificial intelligence (AI) is to enable computer systems to learn from data, identify patterns, and make intelligent decisions without explicit and detailed programming. In other words, the goal is for machines to be able to gain knowledge and improve their performance with experience and information, just like humans.

Research Methodology Questions:

1- What are the dimensions and components of the application of artificial intelligence in the educational (learning) system?

2- What is the contribution of each of the dimensions and components of artificial intelligence in the educational (learning) system?

History of Artificial Intelligence in Education

- 1950s and 1960s: During this period, early research into artificial intelligence and its relationship to learning was conducted. Projects such as rule-based systems and early educational programs were the first steps towards the application of artificial intelligence technologies.

- 1970s and 1980s: The emergence of intelligent tutoring systems (ITS), which analyzed learner behavior and provided educational content tailored to it. These systems gradually contributed greatly to personalized learning.

History of Artificial Intelligence Developments

After an introductory introduction to the general approach and method of Dreyfus in the philosophy of mind, we can now turn to the history of artificial intelligence developments and Dreyfus's criticisms of it in various periods. Although only six decades have passed since the history of artificial intelligence and the boundaries between its various periods are still not completely clear, in the most general view, at least three paradigms in artificial intelligence can be distinguished (Clark, 1996: 3) and the history of artificial intelligence can be divided into the following three periods:

1. The period of dominance of symbolic artificial intelligence (AI symbolic); 2. The period of recovery of connectionist artificial intelligence (AI connectionist); 3. The period of emergence of artificial life (life artificial).

The emergence of artificial life

In the last two decades, a set of trends in artificial intelligence have emerged that have come to be known as artificial life. In this paradigm, human intelligence is not considered isolated from its environment, but rather humans and their environment together form an intelligent system. Three main trends can be identified in artificial life. The first trend pursues research to implement intelligent behavior on living tissues of organisms. This trend is more dependent on biochemistry than any other science. But the second trend seeks to create robots with biological capabilities. This trend seeks to realize the flow of life in an organism at the hardware level. In this approach, the robot and its environment are considered a single system, and the robot is always considered in an environmental context. However, the third trend studies and simulates the behavior of living organisms across the entire environment and the length of evolution, and considers intelligent behavior to be the product of the integration and interaction of living organisms with this evolving environment. This trend conducts research within the scope of software. The first trend is called the wet approach, the second trend is called the hard approach (hardware), and the third

trend is called the soft approach (software). (Khalaj, Mohammad Ali and colleagues, 2014).

Key Benefits:

Personalization: AI systems can customize the learning path for each student. This allows students to learn at the pace and in the way that works best for them.

Improved Engagement: AI-powered platforms can increase student engagement by providing interactive and engaging learning experiences.

Instant Feedback: AI can provide immediate and accurate feedback on student performance, helping them understand and correct their mistakes.

Easy Access: AI-powered educational resources are typically accessible across devices, enabling learning anytime, anywhere.

Productivity: AI can automate administrative and instructional tasks, allowing teachers to spend more time engaging with students and providing individualized support.

Data Analysis: AI can analyze educational data to identify learning patterns and help improve curricula and teaching methods.

A learning paradigm in AI refers to a set of methods and techniques that allow an AI system (such as a machine learning model) to learn from data and improve its performance on a particular task. These patterns determine how the system receives, processes, and uses information. Here are some of the most important learning paradigms in AI:

1. Supervised Learning:

In this model, the system is trained using labeled data. This data consists of correct inputs and outputs (labels). The goal of supervised learning is to learn a function that transforms inputs into correct outputs.

2. Unsupervised Learning:

In this model, the system is trained using unlabeled data. The goal of unsupervised learning is to discover patterns, structures, and relationships in the data.

3. Reinforcement Learning:

- **Description:** In this model, an agent operates in an environment and, by receiving rewards or penalties, learns what actions to take to earn the highest reward.

4. Semi-Supervised Learning:

This model uses a combination of labeled and unlabeled data. In many cases, it is expensive to acquire labeled data, so semi-supervised learning can provide good performance using a small amount of labeled data and a large amount of unlabeled data.

5. Transfer learning:

In this pattern, knowledge gained from one task (source) is used to solve another task (target). This approach is especially useful in cases where the target data is sparse.

6. Federated learning:

A distributed machine learning approach that allows multiple devices (such as mobile phones) to train a common model without sharing their data.

Artificial Intelligence-Based Environment

Today, artificial intelligence as a technology has become a part of human life and has gained deep influence in all areas of human life, including education, and has become an important topic in this field (Zafari et al., 1400). Technology has always been a hot topic for discussion, because since the twenty-first century it has been used in almost all aspects of life (Mondal, 2019). Technology has a profound and significant impact on the cultural, economic, social and educational development of societies, and given this impact and attraction for humans, the educational system should consider measures to use it (Karsenti, 2019).

This technology can change the way educational environments function in different disciplines and at different levels and improve learner learning (Sultana and Tamanna, 2022) and creates interactive environments for learning. This interaction is in the form of interaction between individuals and types of artificial intelligence and individuals with peers. This environment brings experiential learning to learners and generally improves learning (Xu et al., 2020). Experiential learning, which is a key and fundamental component in contemporary theories and technologies, is obtained from social interactions and the surrounding environment, which in the artificial intelligence environment can be physical at any time and in any place (Moradi Mukhles; Sadegh Pourmahabadi, 1403).

If we look at the history of artificial intelligence, one of the important points is that with the advancement of this science, its ideas and applications have increased dramatically. Therefore, it can be said that the future of artificial intelligence will have a special contribution in facilitating the process of human life, increasing the accuracy and safety of systems, automation and intelligent life management. For this reason, many jobs that currently exist in society may be gradually eliminated due to the advancement of this science and the replacement of machines. In this regard, we can refer to statistics from the World Economic Forum, which estimates that 85 million jobs will be replaced by 2025. Although this science is still an emerging phenomenon in some countries, you can still see its applications in the products of large companies such as Tesla, Google, iPhone, etc. It is

predicted that by eliminating the shortcomings that artificial intelligence has at the present stage, the potential for using this science will increase greatly. This field of technology is currently the main driver of emerging technologies such as big data, robotics and the Internet of Things and will play a role as an innovative technological phenomenon in the future. (Sadeghi Zarini, et al. 1402).

The main components of artificial intelligence

Intelligence has a broader meaning, which means a deeper ability to understand the surrounding environment. However, for it to be considered artificial intelligence, all its components must be connected to each other.

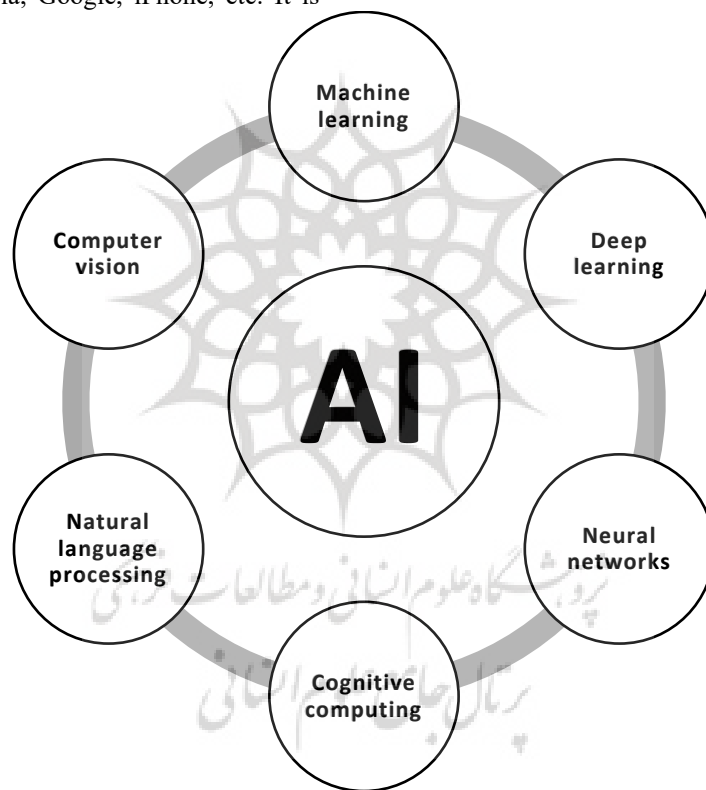


Diagram of the main components of artificial intelligence

Let's get acquainted with these key components of artificial intelligence.

1. Machine learning: Machine learning is an artificial intelligence application that automatically learns and improves from a set of previous experiences without the need for special programming.

2. Deep learning: Deep learning is a subset of machine learning that learns by processing data with the help of artificial neural networks.

3. Neural networks: Neural networks are computer systems that are modeled based on neural connections in the human brain and enable deep learning.

4. Cognitive computing: The goal of cognitive computing is to recreate the human thought process in a computer model. It seeks to imitate and improve human-machine interaction by understanding human language and the meaning of images.

5. Natural language processing: It is a tool that allows computers to understand, recognize, interpret, and produce human language and speech.

6. Computer Vision: Computer vision uses deep learning and pattern recognition to interpret image content (charts, tables, PDF images, and videos). (Sadeghi Zarini, et al. 1402).

Adaptive and Personalized Learning Models

- **Adaptive learning:** These models operate on real-world student learning data and, by analyzing this data, adjust educational content and activities based on individual needs.

- **Recommender systems:** Using machine learning algorithms, these systems provide students with suggestions for educational resources and materials.

- **Intelligent virtual assistants:** Providing personalized support to students and teachers.

- Learning analytics

- **Leveraging big data:** In recent years, researchers have been using data analytics to identify learning trends, predict problems, and improve the performance of educational systems. These analyses can help identify behavioral patterns and learner needs.

- Development of AI-based education systems

- **Apps and applications:** The emergence of educational applications and platforms that use AI to provide educational content, assess, and monitor learner performance. For example, online learning systems such as Coursera, Khan Academy, and EdX.

Ethical Challenges and Considerations

- **Privacy and Security Issues:** With regard to the collection and analysis of educational data, concerns about the privacy and security of student information arise that need to be addressed in the design of systems.

- **Educational Inequalities:** The debate over how algorithms can reduce or increase educational inequalities is also currently of interest to researchers.

- **Measures to Reduce Inequalities:** Another challenge is ensuring equal access to these technologies for all students.

Research and Future Prospects

- **Recent Studies:** Research that examines the impact of AI on learning and teaching in different contexts and seeks to obtain new data and its effects on learning progress.

- **Future Developments:** It is expected that with the advancement of AI technologies, these tools will play a more important role in personalizing learning and developing educational components.

Considering this background, it can be concluded that AI, despite the existing challenges and considerations, has a high potential to change and improve educational systems, and continued research in this field can help design more effective AI models. (Arbabi, Khadija; 1403)

Solutions

Artificial Intelligence (AI) can create widespread changes in the educational system. Here are some of the potential uses and impacts of AI in education:

1. Personalized learning:

• **Identifying individual needs:** AI can analyze data on student performance to identify their strengths and weaknesses.

• **Tailored learning content:** Based on this analysis, AI systems can tailor learning content, assignments, and exercises to fit each student's level of knowledge and learning style.

• **Learning pace:** Students can progress at their own pace, without being forced to move faster or slower than their abilities.

2. Improving the teaching process:

• **Providing immediate feedback:** AI can provide teachers with immediate feedback on student performance, so that they can quickly identify problems and offer solutions.

• **Task Automation:** AI can automate repetitive and time-consuming tasks such as grading assignments

and answering frequently asked questions, so that teachers can spend more time interacting with students and providing specialized instruction.

- **Educational Resources:** AI can help teachers find and use quality educational resources.

3. Easier Access to Education:

- **Distance Learning:** AI can enable distance learning for people who cannot attend in-person classes due to geographical location or other issues.

- **Access to Education for People with Special Needs:** AI can provide tools to assist people with special needs, such as text-to-speech and vice versa software, or sign language translation systems.

4. Analytics and Prediction:

- **Performance Prediction:** AI can predict future student performance based on past data, so that preventive measures can be taken to help them.

- **Problem identification:** AI can identify potential problems in the education system, such as lack of resources or inefficient teaching methods.

5. Machine translation:

- AI can help translate educational content into different languages, facilitating access to education for students of different nationalities and languages.

6. Teacher assistance tools:

- Intelligent virtual assistants can help teachers provide personalized support to students, answer questions, and provide additional information.

7. Developing 21st century skills:

- **Teaching critical thinking and problem-solving skills:** AI can be used to design learning activities that require critical thinking and problem-solving.

- **Promoting creativity and innovation:** AI tools can help students express their ideas creatively and develop innovative projects.

- **Teaching collaboration and communication skills:** AI can be used to design group and collaborative activities that require collaboration and effective communication between students. (Arbabi; 1403)

Research Background

Machine learning-based AI is more powerful because machines can actually learn and get better over time, especially when dealing with large, multi-layered datasets. In the case of education, machine learning-based AI tools can be used for a variety of tasks, such as monitoring student activity and creating models that accurately predict student outcomes. While machine learning-based AI is still in its infancy, this approach has already shown impressive results on complex solutions that are not governed by rules, such as scoring students' written responses or analyzing large, complex datasets (Saffari et al., 1400).

Given this background, it can be concluded that despite the challenges and considerations, AI has great potential to change and improve educational systems, and continued research in this area can help design more effective AI models. (Arbabi, Khadija; 1403)

Hamidzadeh, Fatemeh, and colleagues conducted a study titled "Investigating Global Trends and the Role of Artificial Intelligence in Future Education" and concluded: Countries that are currently leading in the development and use of artificial intelligence (AI) will shape the future of world technologies. Over time, economic competition in the world will be significantly affected by artificial intelligence, and countries that lag behind in this area will lose their economic and industrial position. With access to big data and advanced technological capabilities, China is rapidly becoming one of the main powers of artificial intelligence in the world. Iran can choose cooperation with China as a fundamental strategy for the development of artificial intelligence. One of the important steps for the development of artificial intelligence in Iran is investing in data infrastructure. Investing in research and development is another fundamental pillar for progress in the field of artificial intelligence. Along with these investments, the development of specialized human resources should be one of Iran's main priorities. Finally, Iran should use the capacities of technological diplomacy to expand international cooperation.

Arbabi, Khadija 1403, conducted a study titled "Transforming Education with Artificial Intelligence" and concluded: A revolution in the way of teaching and learning has been created. This transformation promises a brighter future for education by providing unparalleled opportunities for personalizing education, increasing access to quality educational resources, and improving teacher efficiency. Adaptive learning systems enable education tailored to the pace

and learning style of each student, increasing motivation and improving academic outcomes. Artificial intelligence also enables access to quality education for students in disadvantaged and underserved areas. Automation of administrative tasks provides more time for teachers to focus on interacting with students and providing higher-quality education. Educational data analysis helps to identify the strengths and weaknesses of curricula and improve them. However, there are also important challenges in this direction that must be carefully considered. Ethical issues, such as data privacy and algorithmic biases, must be carefully managed. The high cost of implementation and the need for robust infrastructure hinder equitable access to this technology for all. Educating teachers on the effective use of AI tools is also essential. Ultimately, the success of the AI-enabled education transformation depends on close collaboration between education professionals, AI developers, policymakers, and other stakeholders to fully reap its benefits and avoid its risks and side effects. With the right management of challenges and smart investments, we can envision a future in which AI serves as a powerful tool for improving quality and equity in education. This transformation will not only improve academic outcomes, but also better prepare students to face the complex challenges of the 21st century.

Khafi et al. (1402) concluded in a study titled "Integrating Artificial Intelligence into Language Learning" that: In explaining the antecedents of using artificial intelligence in the country's education system, it can be said that providing specialized and up-to-date training to teachers in the field of artificial intelligence and related technologies increases their knowledge and skills in using artificial intelligence tools and methods in the education process. Improving teachers' teaching skills in using artificial intelligence technologies makes it possible to improve teaching methods and content presentation, diversify

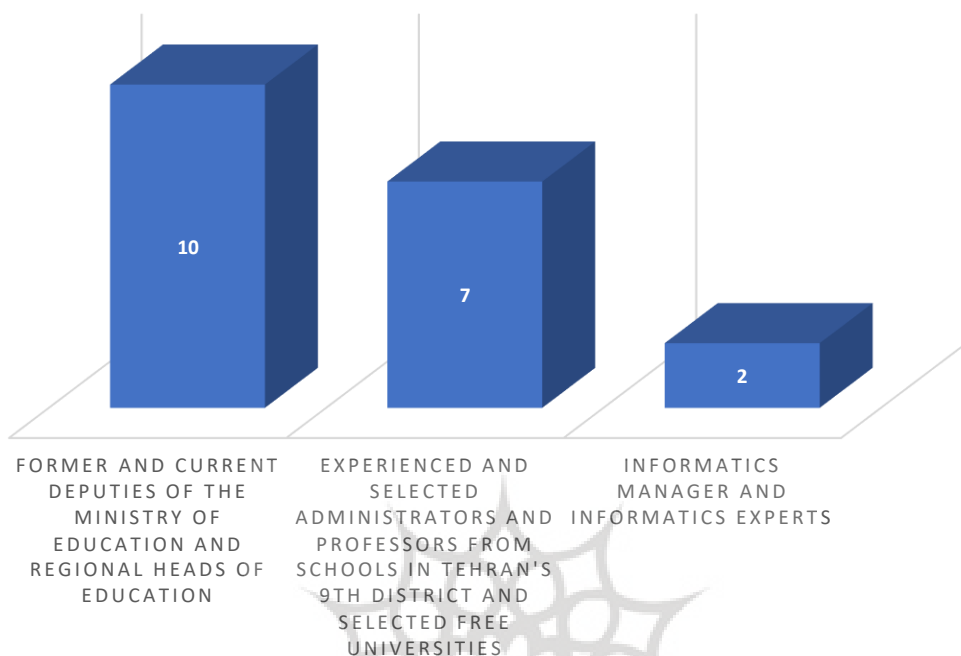
educational activities, and increase active interactions with students. Bayrami's research (2019) concluded in a study titled "The Impact of Educational Technology and Artificial Intelligence on the Education and Learning Process" that: Most teachers and instructors believe that in education and teaching, many issues and topics cannot be conveyed well to students and learners in the traditional and old-fashioned way.

Research Method:

In terms of purpose, this research is applied; and the research method is qualitative. An interview with managers, experts specializing in the field of artificial intelligence and educational management was conducted to identify the components and dimensions of the application of artificial intelligence and the contribution of each of these dimensions and components. In this type of research, the researcher seeks to find the background about an uncertain situation. For this purpose, he first collects qualitative data. This stage is guided by describing numerous aspects of the phenomenon. Using this initial identification, it is possible to formulate research questions about the occurrence of the phenomenon under study. In order to identify the dimensions and components of the application of artificial intelligence and the contribution of each in artificial intelligence, interviews were conducted with experts, managers and teachers with the following questions:

- 1- In your opinion, how can artificial intelligence affect student learning?
- 2- What are the opportunities and threats of using artificial intelligence on student learning?
- 3- What measures can be taken to adapt and apply artificial intelligence in the field of learning under the current conditions?
- 4- Write down your general views on using artificial intelligence to facilitate learning.

**CHARTABLE 1: STATUS OF INTERVIEWEES
BY TITLE**



Then, each interview that was conducted was coded (open, axial, and selective) using NVivo software, so that dimensions and components could be identified.

A) Open coding:

In the first stage, all interviews were collected and 241 categories were extracted, and then those responses that were similar were aggregated and coded into 98 categories.

1- How do you think artificial intelligence can affect student learning?

- Answering students' questions using reliable sources - Accelerating the transfer of teaching and learning.

- Helping to consolidate student learning - Using abstract thinking to better understand the material.

- Personalized learning - Equal learning opportunities according to the needs and academic level of students.

- Facilitating learning - Creating interactive learning
- Improving teaching methods.

- Instant feedback on the teaching method - Converting speech to text.

- Presenting materials - Adapting learning according to the individual needs and academic level of students
- Creating creativity.

- Using platforms and designing educational games and simulators - Increasing and accelerating learning.

- Student evaluation - Using standard question design.

- Designing appropriate educational programs according to the individual needs and academic level of students.

2- What are the opportunities and threats of using artificial intelligence on student learning?

Threats	Opportunities
1- Loss of privacy - negative impact on human communication 2- Adjustment of freedom of expression - improper use of artificial intelligence 3- Less attention to student creativity - lack of attention to research 4- Cost of education in developing infrastructure and software according to the income level of individuals 5- Excessive dependence on technology - reduced interactions and role of teachers 6- Increased fraud - system security 7- Lack of emotions - reduced social interactions 8- Inaccessible for people with low income levels 9- Incompatibility with textbooks - students becoming lazy	1- Validation of question answers 2- Designing appropriate educational programs - learning model. 3- Personalized learning - Interactive learning according to individual needs and academic levels of students 4- Increasing awareness and learning 5- Solving problems using reliable sources - Accurate feedback 6- Designing standard questions 7- Creating equal learning opportunities - Educational justice - Lifelong learning 8- Adaptive learning - Quick access - Acceleration in learning 9- Understandability of content - Creating a culture of using artificial intelligence

3- What measures can be taken in the current situation to adapt and apply artificial intelligence in the field of learning?

- Updating educational equipment and technology - Free internet for deprived areas
- Management - Monitoring - Intelligent control.
- Empowering teachers - Developing infrastructure - Increasing network security.
- Creating creative models - Personalized learning - Transforming education.
- Preparing and compiling rules and regulations - Educational policy-making - Compliance with legal frameworks - Detailed planning according to the individual needs and academic level of students.

4- Please describe your overall views on using artificial intelligence to facilitate learning?

- Updating and empowering teachers - Equipping schools with up-to-date technology.
- Empowering students according to their individual needs and academic level..
- Using students' potential - Making them responsible.
- Providing intelligent content based on students' individual needs and academic levels - Increasing students' creativity.
- Making paper corrections intelligent - Smart student evaluation - Designing standard questions.

- Transformation of the educational system and its implementation - Attention to preserving human dignity.

- Providing a platform for the use of artificial intelligence - Creating the right culture of using artificial intelligence.

B) Hierarchical (axial) coding

In this stage, similar categories were aggregated again and divided into 16 categories.

1- Facilitating and accelerating student learning- Answering student questions using reliable sources- Helping to consolidate student learning- Personalized learning- Increasing awareness and learning. Categories of review and immediate feedback- Differentiated teaching

2- Intelligent interactive learning according to the individual needs and academic level of students- Making students responsible and empowered- Using the potential of students- Student involvement in teaching. Increasing creativity. Categories of interactive learning- Student participation in teaching.

3- Equal learning opportunity according to the needs and academic level of students- Educational justice- Improving teaching methods- Adaptive learning- Presenting materials. Categories: Adaptive learning and traditional modern blended learning.

4- Using abstract thinking- Better understanding of materials- Lifelong learning- Comprehensibility of materials. Categories: Problem-based learning and collaborative learning

5- Using platforms and designing educational games and simulators - Designing appropriate educational programs - Providing intelligent content according to the individual needs and academic level of students - Learning model - Using artificial intelligence as a teaching aid tool - Updating educational equipment and technology - Free internet for disadvantaged areas - Developing infrastructure - Increasing network security - Converting speech to text - Equipping schools with up-to-date technology - Reducing the digital divide - Creating creative models - Excessive dependence on technology - System security - The cost of education in developing infrastructure and software according to the income level of individuals. Categories: Innovation in education - Developing educational technology infrastructure.

6- Student evaluation - Using standard question design - Validating question answers - Smart correction of papers - Smart student evaluation - Instant feedback on teaching methods - Smart monitoring and evaluation of student assignments - Smart monitoring - Increasing cheating. Categories of evaluation of live reactions - Smart interactive monitoring.

7- Creating a culture of using artificial intelligence - Providing a platform for using artificial intelligence - Management - Supervision - Intelligent control - Teaching the correct use of artificial intelligence - Attention to preserving human dignity - Creating an emotional dimension - Family participation - Lack of emotions - Reducing social interactions and the role of teachers - Improper use of artificial intelligence - Loss of privacy - Negative impact of human communication - Family participation. Categories of education - Cultural interaction - Cultural supervision.

8- Empowering and updating teachers - Transformation in the education system and its implementation - Preparing and compiling rules and regulations - Educational policy - Compliance with legal frameworks - Accurate planning according to the individual needs and academic level of students - Non-compliance with textbooks - Laziness of students -

Use in research - Inaccessible for people with low income levels - Less attention to student creativity - Lack of attention to research. Categories of educational policy - Professional development of teachers

C) Selective coding

Selective coding, which is the third stage of coding, continues the axial coding at a more abstract level.

In this stage, 8 main factors were categorized as follows.

- Categories of “Review and Immediate Feedback” and “Discrete Learning” under the “RIF Learning” component.

- Categories of “Interactive Learning” and “Student Participation in Teaching” under the “CLTP Interactive Learning” component.

- Categories of “Adaptive Learning” and “Modern Traditional Blended Learning” under the “ALBM Adaptive Blended Learning” component.

- Categories of “Problem-Based Learning” and “Collaborative Learning” under the “PC-CEL Problem-Based Learning and Collaboration” component.

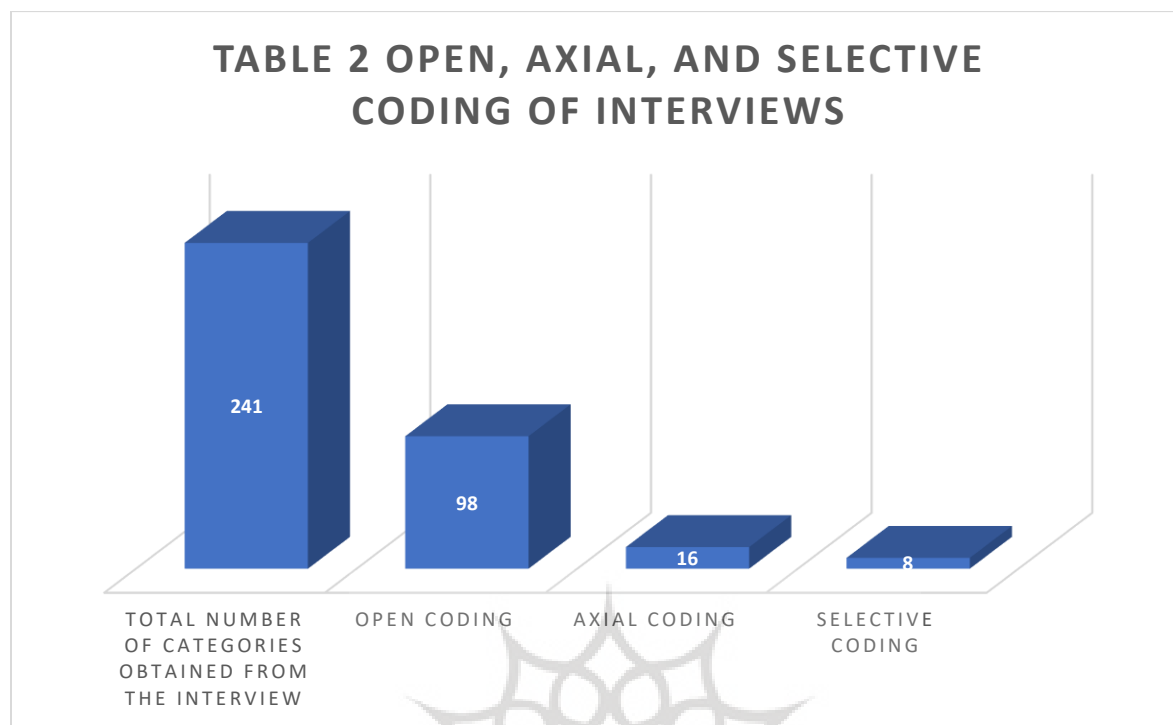
- Categories of “Innovation in Education” and “Development of Educational Technology Infrastructure” under the “INFUSE Educational Technologies” component.

- Categories of “Live Response Assessment” and “Intelligent Interactive Monitoring” under the “LIRAM Intelligent Monitoring” component.

- Categories of “Cultural Interaction Training” and “Cultural Monitoring” under the “CCFM Cultural Monitoring Interaction Training” component.

- The categories of “Educational Policy Making” and “Teacher Professional Development” under the title of “Educational Policy Making PEPT” component.

(Table 2):

**Table 3: Example of codings**

Selective coding	Axial coding	Initial open coding
Learning RIF	Review and immediate feedback - differentiated instruction	Facilitating and accelerating student learning - Answering student questions using reliable sources - Helping to consolidate student learning - Personalized learning - Increasing awareness and learning
CLTP Interactive Learning	Interactive learning - student participation in teaching	Intelligent interactive learning according to the individual needs and academic level of students - Making students responsible and empowered - Using students' potential - Involving students - in teaching. Increasing creativity
ALBM Hybrid Adaptive Learning	Adaptive learning and traditional and modern blended learning	Equal learning opportunity according to the needs and academic level of students - Educational justice - Improving teaching - methods - Adaptive learning - Presentation of materials
Problem-based learning and PC-CEL collaboration	Problem-based learning - collaborative learning	Using abstract thinking - Better understanding of the material - Lifelong learning - Comprehensibility of the material
INFUSE Educational Technologies	Innovation in Education - Development of Educational Technology Infrastructure	Using platforms and designing educational games and simulators - Designing appropriate educational programs - Providing intelligent content according to the individual needs and academic level of students - Learning model - Using artificial intelligence as a teaching aid tool - Updating educational equipment and technology - Free internet for deprived areas - Developing infrastructure - Increasing network security - Converting speech to text - Equipping schools with modern technology - Reducing the digital divide - Creating creative models - Excessive dependence on technology - System security - Cost of education in developing infrastructure and software according to people's income level
LIRAM Intelligent Monitoring	Live Reaction Evaluation - Intelligent Interactive Monitoring	Student evaluation - Using standard question design - Validating question answers - Smart paper correction - Smart student evaluation - Instant feedback on teaching methods -

		Smart monitoring and evaluation of student assignments - Smart monitoring - Increasing cheating
CCFM Cultural Monitoring Interaction Training	Cultural Interaction Training - Cultural Supervision	Creating a culture of using artificial intelligence - Providing a platform for using artificial intelligence - Management - Monitoring - Intelligent control - Training in the correct use of artificial intelligence - Attention to preserving human dignity - Creating an emotional dimension - Family participation - Lack of emotions - Reducing social interactions and the role of teachers - Improper use of artificial intelligence - Loss of privacy - Negative impact of human communication - Family participation
PEPT Educational Policies	Educational policies - Teacher professional development	Empowering and updating teachers - Transformation in the education system and its implementation - Preparing and compiling rules and regulations - Educational policy-making - Compliance with legal frameworks - Precise planning according to the individual needs and academic level of students - Non-compliance with textbooks - Students becoming lazy - Use in research - Inaccessible to people with low income levels - Less attention to students' creativity - Lack of attention to research

Discussion and Conclusion:

According to the research and interviews conducted, the following findings have been obtained in this study, and eight factors as components and their contribution can be effective in the use of artificial intelligence in the teaching and learning system. These eight factors will be explained below:

- The categories of “Review and Immediate Feedback” and “Discrete Learning” under the title of “RIF Learning” component.

- The categories of “Interactive Learning” and “Student Participation in Teaching” under the title of “CLTP Interactive Learning” component.

- The categories of “Comparative Learning” and “Modern Traditional Blended Learning” under the title of “ALBM Adaptive Blended Learning” component.

- The categories of “Problem-Based Learning” and “Collaborative Learning” under the title of “PC-CEL Problem-Based Learning and Collaboration” component.

- The categories of “Innovation in Education” and “Development of Educational Technology Infrastructure” under the title of “INFUSE Educational Technologies” component.

- The categories of “Live Response Assessment” and “Smart Interactive Supervision” under the “LIRAM Smart Supervision” component.

- The categories of “Cultural Interaction Training” and “Cultural Supervision” under the “CCFM Cultural Monitoring Interaction Training” component.

- The categories of “Educational Policy Making” and “Teacher Professional Development” under the “PEPT Educational Policy Making” component.

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