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Emotional Connection and Communication in Teaching with Artificial Intelligence: Challenges and Solutions

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Abstract

The aim and focus of this paper is to examine the challenges and solutions of two-way communication and emotional communication in teaching with Artificial Intelligence (AI). This research used a qualitative approach and an analytical-interpretative method of data. The community of documents related to the topic of teaching challenges in cyberspace, AI, and research on two fundamental elements, emotional connection, which were purposefully selected from reputable domestic and foreign databases. The findings in the challenges section indicate two extraordinary elements in teaching and learning that are influenced by cyberspace and AI: motivation, strengthening social skills, and understanding students' real feelings after the event. In the solutions section, the use of blended learning, artificial platforms and software that allow for two-way interaction, the use of new tools and technologies in the field of AI, which will transfer feelings and emotions, motivate, strengthen social skills, and to some extent create various challenges and communication. The results of this study can help professors, teachers, administrators, and education activists to get the most productivity of cyberspace and AI in teaching by reducing risks and increasing opportunities.

Keywords: Teaching and learning, Artificial intelligence, Cyberspace, Two-way interaction, Emotional connection.

1|Introduction

In recent years, with the significant advances in Artificial Intelligence (AI) technology, this technology has become one of the most important and effective tools in the field of teaching and learning. Primary education, as one of the most sensitive stages of education, requires attention to the individual needs and learning of students. In this regard, AI can be used as an opportunity to improve the quality of education, personalize learning, and provide intelligent educational resources. For example, advanced learning systems can identify

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the strengths and weaknesses of each student and provide appropriate educational content. Also, AI can help teachers manage classrooms and assess students, freeing up more time to focus on actual teaching. However, using AI in elementary teaching also comes with challenges [1]. There are concerns about the privacy and security of students' data, the lack of equal access to advanced technologies, and the need to train teachers to use AI tools effectively. Also, there are criticisms regarding the reduction of human interactions and its effects on students' social skills. In the field of human interactions, the lack of two-way interaction (face-to-face) and emotional connection between teacher and student in the learning process is the concern of most experts and researchers in the field of education [1], [2]. Many studies show that two essential elements in effective teaching, especially in elementary school, are face-to-face interaction and emotional communication with students. It can be said that without these two basic factors, learning will not be realized correctly and completely [3-5]. These challenges became more apparent when elementary school students were forced to use virtual education and AI during the period from 2019 to 2021, with the arrival of the COVID-19 pandemic. Since the elementary level is the first entry of the student into the social environment and the school environment, two-way interaction and emotional relationships are much more sensitive and vulnerable than other educational levels [5] At that point in time, those students who have had virtual education are now facing many challenges and shortcomings, such as not understanding the material, not being able to read and write, not being able to count. It can be said that a large part of these shortcomings has occurred due to the lack of two-way interaction and emotional relationships between the teacher and the student.

According to what has been mentioned, this article examines the challenges and opportunities of AI in elementary teaching. It analyzes its effects on the learning and teaching process in this stage of education. Specifically, by focusing on two areas of two-way interaction and emotional connection between student and teacher, researchers are trying to draw a clear vision for the future of primary education by providing solutions for the optimal use of AI technologies. Finally, this article aims to create a new order in the learning process that can help to improve the quality of primary education by using the capabilities of AI. Therefore, this study aims to answer the following questions:

I. What are the challenges of using AI in elementary teaching in the field of two-way interaction and emotional communication?

II. What are the solutions to reduce the challenges of two-way interaction and emotional communication in primary education with AI?

This paper is organized as follows:

In Section 2, the research approach will be introduced. Then, Section 3 will first define AI and its classification, and then present in detail the applications and challenges of AI in teaching. At the end of this section, solutions for strengthening two-way interaction and emotional relationships in teaching with AI will be introduced. Also, the main findings of this research will be presented in detail in Section 4. Finally, Section 5 presents our conclusions.

2|Research Procedure

The research approach in this study is qualitative. The research method is analytical-interpretive, and the research population was documents related to the topic of teaching challenges in cyberspace, AI, focusing on two fundamental elements of interaction and emotional connection, which were selected purposefully from reputable domestic and foreign databases. In this phase, relevant foreign and domestic studies and works were selected purposefully and examined and analyzed. The selection of sources was done by searching for keywords related to the topic from related databases such as teaching with AI, challenges of teaching in cyberspace, two-way interaction in teaching, emotional relationships in education, face-to-face interaction, etc. The analysis and classification of the findings were done using an interpretive method. For analysis in qualitative research, there are various approaches; three of these approaches by Renata have been explained with interpretive, structural, and reflective titles of the researcher's thinking.

In interpretive analysis, which is the chosen method in this study, the researcher tries to analyze the qualitative studies related to the studied phenomenon based on findings and understanding from the texts, with an analytical and combined approach. This interpretative analysis led to the identification and enumeration of challenges and solutions for the lack of two-way interaction and emotional connection in the teaching method with AI. During the implementation of the research and in order to increase the credibility of the findings, expert consultations were held with experts and people who had done research in this field.

3 | Theory and Background of the Research

In this section, the definition of AI and its categories will first be presented, and then the applications and challenges of AI will be introduced.

3.1 | Artificial Intelligence

AI refers to a set of techniques and algorithms that enable systems and machines to perform tasks that would typically require human intelligence. These tasks can include machine learning, reasoning, problem solving, computer vision, natural language understanding, pattern recognition, and decision-making. AI is divided into two main categories:

I. Weak AI (narrow AI): This type of AI refers to systems that are designed to perform specific tasks, and their capabilities are limited to those tasks. For example, voice assistants such as Siri or Alexa are examples of weak AI [6].

II. Strong AI (general AI): This type of AI attempts to give machines intelligence similar to humans, so that they can learn and act in general. This type of intelligence is still in the theoretical and research stages and has not been fully realized. AI has wide applications in various fields, including teaching and learning, medicine, self-driving cars, video games, and financial services.

3.2 | Artificial Intelligence Applications and Challenges in Teaching

AI, as a new technology, offers many potential in the field of education, especially in primary education. Numerous studies have been conducted in the field of the application of AI in teaching and learning. These studies have examined how to improve the learning process, personalize education, and increase student motivation. Below are several reliable studies and sources:

I. Personalized learning: One of the main applications of AI in elementary education is to create customized learning experiences for students. AI software can analyze data on student performance and tailor instructional content to the specific needs of each individual [7].

II. Intelligent learning: AI can be used to design intelligent learning systems that are able to identify students' strengths and weaknesses. These systems can help teachers identify learning needs and determine appropriate approaches.

III. Instant assessment and feedback: AI systems can automatically assess assignments and tests and provide instant feedback to students. This can increase motivation and improve learning [8].

IV. Simulation and Virtual Reality: The use of simulation and virtual reality technologies with the help of AI can provide a more interactive learning experience for students. These technologies can present educational concepts more engagingly and understandably [6].

V. Access to educational resources: AI can help students find and access appropriate educational resources. This is especially important for students with special needs or in remote areas.

VI. Classroom management: The use of AI can help teachers manage classrooms. AI programs can analyze student behavior and help teachers identify potential problems [9].

Despite the applications of AI, challenges cannot be ignored and should be addressed by policymakers, experts, managers, and executives. Some of these challenges are as follows:

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I. Lack of proper understanding of technology: One of the main challenges is the lack of awareness and training of teachers about AI. Research shows that many teachers need special training to make optimal use of this technology [10].

II. Increasing educational inequalities: Some researchers have raised concerns about the possibility of educational inequalities worsening due to the use of AI technologies. These inequalities could be due to unequal access to resources and technological infrastructure [11].

III. Privacy and data issues: Concerns about privacy and ethical use of student data are also other challenges that need to be addressed [12].

3.2.1 | Two challenges in teaching with artificial intelligence

Among other essential challenges are two-way interaction and emotional relationships (human relationships) in elementary education. Given the purpose of this research, we will first introduce these two fundamental factors in teaching and then examine their challenges in teaching with AI.

Challenge1 is two-way interaction (face-to-face) in teaching

Face-to-face interaction is known as one of the key components in the teaching and learning process and can have a positive impact on students' learning and social communication. The face-to-face factor in teaching means direct, face-to-face communication between the teacher and students. This type of interaction includes the exchange of opinions, questions, and answers in a physical educational environment. The main characteristics of face-to-face interaction are as follows:

I. Nonverbal communication: Includes body language, facial expressions, and dominant gestures that can convey emotions and reactions [13].

II. Empathy and human connection: In this type of interaction, the teacher and students can easily understand each other's feelings and needs and enter into each other's emotions.

III. Immediate feedback: Teachers can respond immediately to students' questions and needs and change teaching methods if necessary [10].

IV. Small groups and discussions: This opportunity allows students to discuss in small groups and share their experiences.

V. Active participation: This type of interaction makes students more involved in the learning process and makes them feel more ownership over their learning [10]

VI. According to the definition and explanation of interaction, it is clear that this factor is possible only in the case of face-to-face teaching, and in other methods such as non-attendance training, virtual training, online or offline training, or training with AI, the possibility of realizing all these features in teaching will face fundamental challenges. Some of these challenges are as follows:

VII. Decrease in social skills: With the increasing use of AI and digital technologies, students may engage in fewer face-to-face interactions and lose their social skills [14].

VIII. Multiplicity and diversity of AI applications: The presence of different AI tools and systems in the teaching process can confuse teachers and students and marginalize human interactions [15].

IX. Multiplicity and diversity of AI applications: The presence of different AI tools and systems in the teaching process can confuse teachers and students and marginalize human interactions [15].

X. Insufficient interaction: Some AI systems cannot create enough interaction and emotional communication, and this issue can affect the quality of education [16].

XI. Fear of replacing teachers: Some teachers may believe that technology and AI will replace them, which can lead to a decrease in their motivation and participation [17].

Challenge 2: Emotional relationships in teaching

Emotional relationships in teaching refer to the emotional and social connections between teachers and students that can have a significant impact on the learning process and academic success. These relationships include trust, respect, empathy, and warm communication that can help create a positive and constructive classroom environment. The importance of emotional relationships in teaching is as follows:

I.   Increase motivation: Strong emotional relationships can increase students' motivation to learn. When students feel that the teacher cares about them, they are more willing to participate in class and learn [18].

II. Improving learning: A Positive emotional connection can help better transfer studies and materials. Students who have good relationships with their teachers can better benefit from their experiences and guidance [10].

III. Reducing anxiety: The presence of strong emotional relationships can reduce students' anxiety and stress and encourage them to participate in class activities and express their opinions [19].

IV. Developing social skills: These relationships help students strengthen their social skills and learn how to communicate with others [20].

V.   Creating a sense of belonging: Students gain a greater understanding of belonging and security when they feel they are part of a community and have good relationships with their teachers and classmates.

3.3|Strategies for Strengthening Two-Way Interaction and Emotional Relationships in Teaching With Artificial Intelligence

Research literature in the theoretical section indicates that interaction and emotional relationships for teaching and learning have been emphasized and confirmed in many theories of experts. Some of these theories include the social learning theories of Bandura and Vygotsky, which emphasize the importance of interpersonal interactions in the learning process. Also, in this theory, learning is formed in the context of social and cultural interactions. The social interaction theory of learning is another theory that considers the role of language through conversation and interaction as an essential learning tool. In addition, Vygotsky believes in the theory that learning is a social process that occurs in a cultural and social context.

The use of advanced AI technologies, such as interactive educational tools, video conferencing, and online educational platforms, the use of group activities, conducting online surveys, and increasing free conversation time can increase the intensity of emotional interactions. Theories supporting interaction and emotions in learning include the theory of emotions and recall, motivation theory, emotional intelligence theory, meaningful learning theory, constructivism theory, and communication theory [21-23]. All these theories show that emotions are not only part of human experience but also play a fundamental role in the learning process. In this section, considering the applications of AI in teaching, it is necessary to devise measures for the challenges of interaction and emotional connection in order to turn the challenge into an opportunity for students. Some of these solutions relate to the teacher, their teaching art, the classroom space and atmosphere, and some of these can be presented and implemented using AI facilities that can cover these problems. Some of the most essential things that can be applied to students, especially in elementary school, are introduced below:

I.   Active listening: Teachers should listen carefully to students' opinions and feelings and value them.

II. Creating a positive atmosphere: Teachers can encourage students to express themselves by creating a cheerful and supportive atmosphere.

III. Regular interaction: Establishing informal communication and having personal conversations with students can strengthen relationships [23].

IV. Respect for differences: Respecting the diversity and individual differences of students and creating an inclusive and accepting environment.

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V.   Development of personal and social skills: The role of AI in education has gone beyond scientific and technical scales and has also addressed the development of social and personal skills. Luckin and Holmes [4] have examined in their research how to use AI to support students' social skills.

VI.   Assessment and Feedback: AI can play an essential role in the process of assessing and providing feedback to students. Using machine learning algorithms, AI systems can quickly analyze results and provide helpful feedback to students and teachers. Heffernan and Heffernan [8] and Baker [9] studied the issue of data analysis in AI-influenced learning, which is effective in managing the learning process.

VII.   AI Systems as Virtual Teachers: Some research has focused on developing virtual teachers using AI. These teachers can guide students on their learning journeys and answer their questions.

VIII.   Strengthening social skills education: Conducting workshops and group activities that help students enhance social skills and human interactions [15].

IX.   Balancing technology and human interaction: Using AI as an adjunct to, not a replacement for, face-to-face training [24].

X.   Teacher training: Providing training courses for teachers to become familiar with the intelligent use of technology and AI tools, and to be able to benefit from these tools for the benefit of human communication [5].

XI.   Creating a space for feedback: Providing a space where students can express their opinions about the combination of AI and human interactions [4].

XII.   Facilitating group learning: AI can optimize group learning strategies and help researchers and teachers create conditions where students can best collaborate.

XIII.   Using AI in teaching basic concepts: AI can help students better understand fundamental concepts by providing exercises tailored to each student's learning level and providing instant feedback [10].

XIV.   Using programs and software: AI-powered programs and software can be used to create interactive educational content that increases students' motivation and interest in learning in elementary school.

4 | Results

A review and analysis of research literature and practical evidence shows that two-way interaction and emotional connection with strong theoretical support are effective in teaching and learning. On the other hand, the spread of AI in the field of education has threatened these two factors. According to Kayyali [25] and Hattie [26], face-to-face interaction includes the use of language, tone of voice, as well as non-verbal cues such as body movements and facial expressions. These cues can help to understand the message more deeply. In this type of interaction, teachers can immediately respond to students' questions and needs and adjust their teaching based on their reactions. According to Nass and Yen [27], face-to-face interaction helps students strengthen their social skills and experience a sense of belonging and cooperation in the classroom environment. In face-to-face interaction, teachers can easily identify and understand students' feelings and needs, which can help improve the learning experience. This type of interaction can increase motivation and interest in students because direct communication makes them feel important and valued.

Eliminating face-to-face interaction in teaching, especially in teaching children, can bring about several challenges, such as reduced social connections, isolation, social anxiety, reduced communication abilities, difficulty understanding concepts, decreased motivation and commitment, and the lack of a positive and supportive learning environment. Emotional connection with the student in teaching refers to the emotional bonds between the teacher and the student that can affect the quality of education and the learning experience. This type of connection includes empathy, emotional support, and creating a safe and positive environment for learning. The characteristics and importance of emotional connection in teaching include strengthening

motivation and interest, a sense of worth and self-esteem, and a sense of security and peace. Research has shown that students who have a positive emotional connection with their teachers perform and learn better. This connection can help facilitate the learning process and convey complex concepts. Through emotional connections, teachers can help students develop social and emotional skills and strengthen their communication abilities. In addition, effective emotional communication helps teachers create a more positive classroom environment, which can improve classroom management and reduce misbehavior. To enhance interaction and emotional connection with AI in teaching, the use of AI learning software and platforms can help create interactive learning environments. This software can help children feel like they are learning in a real educational environment by simulating human interactions [28]. Robots equipped with AI technology can assist teachers and students in the classroom. These robots can provide personalized interactions by recognizing emotions and reactions [29]. Actually, AI virtual learning programs can create a similar image to in-person teaching and provide more effective and emotional learning experiences by providing real-time feedback to students and identifying their strengths and weaknesses [29].

Virtual human agents can act as teachers or colleagues in virtual learning environments, improving the sense of companionship and interaction. These systems can identify students' emotions and interests and respond accordingly. Using human-machine emotional support, data on students' emotions can be collected and analyzed, and based on that, strategies can be developed to improve interactions and positive emotions. AI tools can automatically analyze students' behavior and emotions, letting teachers know which students may be struggling emotionally or need more attention.

This allows teachers to be more personalized in their interactions with students. AI technologies can create educational programs tailored to each child's emotional and learning needs. These programs can be adjusted based on data collected from previous interactions, students' reactions, and their emotional needs. AI software programs can act as emotional counselors and help students manage their emotions and understand their emotional problems. This type of support can help students build stronger emotional relationships. Interactive technologies, such as webinars, online chat rooms, and interactive learning platforms, can help increase engagement and interaction. These platforms allow teachers to conduct their sessions live and invite students to participate actively. Also, creating a positive and supportive learning environment can help strengthen emotional relationships. Teachers can maintain a sense of belonging in students by encouraging the exchange of ideas and the expression of emotions in online sessions.

5 | Conclusion

The main goal and concern of this study was to examine the challenges and solutions of two-way interaction and emotional connection in elementary teaching with AI. For this purpose, an analytical-interpretive method from the branches of the qualitative approach was used to examine and analyze AI with an emphasis on two elements of two-way interaction and emotional relationships in teaching. This study was conducted to answer the following two main questions:

1- What are the challenges of using AI in primary teaching in the area of two-way interaction and emotional connection?

2- What are the solutions to reduce the challenges of two-way interaction and emotional connection in primary teaching with AI?

Collecting, categorizing, introducing, and identifying the challenges and solutions showed that education is not only the transfer of knowledge, but also an opportunity to strengthen social and communication skills that are created through human interactions. Excessive use of AI systems in education may reduce these types of interactions. When students become more dependent on technology, they may be deprived of opportunities to interact directly with teachers and classmates, which can negatively affect the development of social and emotional skills. As a result, there is a need to use AI in the educational process alongside human teaching and social interactions to meet the cognitive and social needs of students fully.

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The use of AI should not replace human interaction. Instead, it should act as an auxiliary tool to enhance the educational process and facilitate learning. In this regard, it is essential to maintain human interactions, such as creative teaching and direct communication with students, alongside technology, so that the development of students' social and emotional skills can continue effectively. For this purpose, the best solution is to use blended learning and use face-to-face and non-face-to-face classes simultaneously for students. It is especially necessary to hold these face-to-face classes in order to create an emotional bond and effective communication between the student and the teacher in the first lesson sessions, so that the teaching and learning process can be facilitated thereafter.

AI, with its unparalleled potential, is ready to elevate education to a new level. This technology has already created tremendous changes in the education system; from online audio and video calling tools that have significantly transformed learning methods to intelligent systems that enable personalization of education, predict academic problems, and provide immediate feedback. But this is only the beginning. Although today we know only a part of the capabilities of AI in education, the future is still full of unknowns. This technology can transform traditional methods, but it is not intended to replace teachers.

In fact, AI is designed as a tool to help humans facilitate and simplify various processes, including in the field of education. In the future, teaching methods and education systems may be completely different from today, but teachers will still play a key role. Transmitting values, fostering creative thinking, and creating human connections are elements that no technology can replace. AI is meant to complement teachers, not replace them. If implemented in a principled manner and with ethical and social considerations in mind, AI can improve access to learning, improve interaction and emotional connection for everyone, and significantly transform the future of education. With the notable changes it has brought, AI not only helps improve learning outcomes but also provides more opportunities for learners and educational institutions.

The future of education, if accompanied by wisdom, can witness a harmonious fusion of advanced technology and human values. In response to the first research question, the use of AI in primary education is associated with numerous challenges, such as interaction and emotional relationships. This study, in line with the study of Liew et al. [20], showed that by using intelligent systems, teachers will be able to create personalized learning experiences for each student. In addition, in line with Hattie [26], this study showed that AI can identify students' strengths and weaknesses by analyzing their learning data and adjusting teaching methods to suit their individual needs. In addition, AI-based learning tools can effectively help facilitate game-based and interactive learning. This has a positive effect, especially at young ages, when play and interaction are an essential part of the learning process.

In line with Luckin [15], the results showed that for the effective use of AI in classrooms, there is a need for appropriate teacher training. They should be able to analyze and use the collected data, and they should also be familiar with new teaching methods based on technology. In general, AI has great potential to improve the quality of primary education. Still, this potential must be used in a responsible approach, taking into account its ethical and social dimensions, especially for children. This introduction can be used as a basis for further research on the challenges and opportunities of AI in primary education. AI is one of the emerging and rapidly growing fields that has been increasingly considered in various fields in recent years, especially in education and teaching.

In primary education, AI can help teachers and students to optimize the learning process and personalize the learning experience. Given the challenges and opportunities of advancing AI in primary education, policymakers, teachers, and researchers must work more coherently on the development of this technology and reduce the challenges in order to benefit from its benefits. Emphasis and attention to considerations of Humanity, creating interactive experiences, paying attention to individual differences, and students' needs can essentially cover the problem of interaction and emotional relationships.

Author Contribution

The author contributed to the study design, theoretical formulation, computational coding, testing of the algorithm, performance evaluation, and preparation of the manuscript.

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Data Availability

The datasets used and analyzed in this study are fully presented within the article.

Conflicts of Interest

The author reports no potential conflict of interest.

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