The Current Status of Applying AI Technology in Organizing Physical Education Activities for Preschool Children in Kindergartens

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ABSTRACT: *In the context of digital transformation in education, the application of Artificial Intelligence (AI) in early childhood education has received increasing attention. This paper analyzes the current status of applying AI in organizing Physical Education (PE) activities for preschool children at several kindergartens in Nghe An and Ha Tinh provinces. The research uses methods including investigation by questionnaire, pedagogical observation, and data processing using mathematical statistics. The results show that teachers have a positive awareness of the role of AI in PE; however, the level of implementation remains limited, mainly stopping at the use of tools to support lesson design, music, and illustrative images, and has not yet exploited functions such as personalizing movements or automated assessment. Main barriers include limitations in equipment, teachers' technological capacity, and the lack of a professional guidance framework. The research results provide a practical basis for proposing solutions to promote the application of AI in preschool PE in accordance with current digital transformation requirements.*

Keywords: *Artificial Intelligence, physical education, 4–5-year-old preschoolers, digital transformation, early childhood education.*

I. Introduction

In the context of digital transformation in education and the powerful development of Artificial Intelligence (AI), integrating technology into educational activities at the preschool level is becoming an inevitable trend to improve the quality of childcare and education for children. Physical Education (PE) plays a foundational role in physical development, forming basic motor skills, and contributing to the personality development of preschool children; therefore, the requirement to innovate methods of organizing PE activities towards a modern, flexible, and personalized direction is becoming increasingly urgent. Globally, many studies have proven the potential of AI in supporting the design of movement programs, identifying and analyzing movements, personalizing exercises, as well as increasing children's interest in participating in physical activities. However, in Vietnam in general, and in Nghe An and Ha Tinh provinces in particular, the application of AI in organizing PE activities for preschool children is still a new issue, lacking practical surveys and scientific data as a basis for implementation. Stemming from that reality, researching the current status of applying AI technology in organizing physical education activities for preschool children in kindergartens carries great significance,

contributing to determining the level of awareness, implementation status, existing difficulties, and proposing appropriate orientations in the current digital transformation stage.

II.   Research Methods

1.1.   Survey subjects and scope

The research was conducted at several kindergartens in urban, rural, and mountainous areas of Nghe An and Ha Tinh provinces, including: Chau Quang Kindergarten, Chau Khe Kindergarten, Quang Trung 1 Kindergarten, Quynh Lam Kindergarten (Nghe An), and Dong Mon Kindergarten (Ha Tinh).

The survey subjects are preschool teachers directly organizing PE activities for preschool children.

1.2.   Research methods

The research was implemented based on a combination of theoretical and practical research methods to ensure the scientific nature and reliability of the results.

- Investigation method: Conducting an investigation via Google Forms to understand teachers' awareness of the application of AI technology in the process of organizing PE activities in kindergartens. The system of questions was designed to be diverse and suitable for each subject, including: closed-ended questions and open-ended questions; each question had multiple options and clear, easy-to-understand content, ensuring objectivity.

- Conversation and interview method: Direct or indirect conversations (via telephone, email) with teachers who have many years of experience in directly caring for and educating preschool children to collect information about the research problem.

- Observation method: Directly observing and recording the activities of teachers at kindergartens to evaluate the content and methods of applying AI technology in educational activities for 4-5-year-old children in kindergartens.

Data processing method according to the Likert scale

In the survey, the project used a number of questions designed according to 3-level and 4-level Likert scales. The 3-level Likert scale was used to evaluate the implementation of teachers. With the 3-level Likert scale, the interval between levels is:

$$K = \frac{n-1}{n} = \frac{3-1}{3} = 0,66$$

- Level 1 has a mean value ranging from: 1.00 to 1.66
- Level 2 has a mean value ranging from: 1.67 to 2.33
- Level 3 has a mean value ranging from: 2.34 to 3.00

III.   Research results

1.3.   Teachers' awareness of AI in physical education

The survey results show that preschool teachers have a positive awareness of the role of Physical Education (PE) in the comprehensive development of 4–5-year-old children. Specifically, the importance of PE was rated at a mean value of M = 2.617 (SD = 0.608) on a 3-level Likert scale, with 68.3% of teachers choosing the "very important" level.

This reflects a relatively solid foundation of professional awareness among teachers regarding the significance of PE in developing physical fitness, motor skills, and forming healthy lifestyle habits for preschool children.

Regarding the awareness of Artificial Intelligence (AI) in organizing PE activities, most teachers have initially accessed and understood the concept as well as the significance of applying AI in teaching. Survey results show that 73.3% of teachers selected the "all three purposes" option when asked about the significance of AI application (including: improving teaching efficiency, enhancing tracking and personalization of activities, and analyzing children's motor abilities).

At the same time, 90% of teachers evaluated the role of AI in PE as "important" or "very important" (M = 2.183; SD = 0.592). These figures show a high consensus on the potential of AI to increase children's interest, support the innovation of teaching methods, and enhance visual illustration of movements.

However, deeper analysis shows that teachers' awareness is currently limited to a theoretical and general level, not yet linked to specific PE organizational processes. Although teachers understand the purposes and potential benefits of AI, the transformation of this awareness into practical implementation capacity remains limited. This is evidenced by the fact that 100% of teachers have never applied AI in organizing PE activities.

Thus, it can be concluded that while positive awareness has been formed, it has not yet developed into practical competence. This represents the gap between "technological awareness" and "technological application capacity" in the current context of digital transformation in early childhood education.

Table 1: Teachers' awareness of the purposes and significance of applying AI technology in organizing physical education activities for preschool children.

No.	Purposes and significance of applying AI technology in organizing physical education activities for preschool children	Quantity (n)	Percentage (%)
1	Improving teaching efficiency and supporting teachers in classroom management	5	8.33%
2	Enhancing the ability to track, support, and personalize physical education activities	6	10%
3	Analyzing motor abilities and providing activities suitable for each child	5	8.33%
4	All three of the above options	44	73.3%

Table 2: Teachers' awareness of the role: Applying AI technology in organizing physical education activities for preschool children

No.	Role of applying AI technology in organizing PE activities for preschool children	Quantity (n)	Percentage (%)	Mean (M)	Standard Deviation (SD)
1	Very important	17	28.3%	2.183	0.592
2	Important	37	61.7%		
3	Not important	6	10%		

1.4.   The current status of AI application in organizing physical education activities

To survey the current status of teachers using methods to apply AI technology in the process of organizing physical education activities for preschool children, we collected opinions through a questionnaire regarding four specific methods. The results showed that all 60 teachers participating in the survey (100%) have not yet applied any methods to integrate AI technology into physical education activities. The obtained mean score was 1.0 (corresponding to the "not used" level) with a standard deviation of 0, indicating absolute consistency in the teachers' responses. This reality clearly reflects that the application of AI technology in the field of physical education for preschool children is currently very limited. At the same time, it establishes an urgent requirement for professional development and training for teachers to enhance their capacity to access and implement modern teaching methods, in line with technological development trends in education.

Table 3: The current status of teachers regarding the use of methods to apply AI technology in organizing PE activities for preschool children

No.	Methods	Level of Implementation						Mean	Standard Deviation
		Regularly		Regularly		Regularly			
		Quantity	%	Quantity	%	Quantity	%		
1	Using AI to compose themed music	0	0	0	0	60	100	1	0
2	Using AI to model movements as a substitute for teachers in physical education for preschoolers	0	0	0	0	60	100	1	0
3	Using AI virtual assistants to support teachers	0	0	0	0	60	100	1	0
4	Building a digital library of AI technology applications in physical education for children	0	0	0	0	60	100	1	0

The current status of teachers using forms of AI technology application in the process of organizing PE activities for preschool children

Table 4: The current status of teachers regarding forms of AI technology application in organizing PE activities for preschool children

No.	Forms	Level of Implementation						Mean	Standard Deviation
		Regularly		Regularly		Regularly			
		Quantity	%	Quantity	%	Quantity	%		
1	Structured learning activities	0	0	0	0	60	100	1	0
2	Organized movement games	0	0	0	0	60	100	1	0
3	Morning exercises	0	0	0	0	60	100	1	0

The survey results on the current status of applying AI technology in organizing physical education (PE) activities for preschool children at kindergartens show that all 60 participating teachers (100%) have never applied AI technology in any form. Specifically, AI has not been integrated into three popular organizational forms: learning activities, organized motor games, and morning exercises. The mean score obtained was 1.0 on the Likert scale (corresponding to the "not used" level), with a standard deviation of 0.

This status clearly reflects that the application of AI in physical education for preschool children has not yet been implemented at the surveyed kindergartens. This creates an urgent requirement for training, professional development, and capacity building in AI technology for preschool teachers.

Table 5: The current status of teachers organizing PE activities with AI technology application for preschool children

No.	Teachers' organization of AI-integrated physical education activities for preschool children	Quantity (n)	Percentage (%)	Mean (M)	Standard Deviation (SD)
1	Regularly	0	0%	1	0
2	Occasionally	0	0%		
3	Never	60	100%		

The survey results show that 100% of the participating teachers (60 people) chose the "Never" option for organizing physical education (PE) activities with AI technology application for preschool children. No teachers reported "Occasionally" or "Regularly" implementing this form of organization. The mean score of the survey group was 1.00, falling within Level 1 (1.00 – 1.66), representing a very low level of implementation of PE activities integrated with AI. The standard deviation was 0.00, proving that there is no difference or dispersion in the perspectives and actions of the teachers; all are at the level of never having performed it.

This reality clearly reflects that the organization of PE activities with AI application in preschool education institutions is currently almost non-existent in practice. Although AI technology is a strong developing trend in the field of education, it has not yet been truly applied to educational activities in general, and PE activities for preschool children in particular.

The results of the survey and practical observation show that the application of artificial intelligence (AI) in organizing physical education (PE) activities for preschool children is currently at a very limited level. Although the majority of teachers perceive the potential role of AI in improving teaching effectiveness, 100% of surveyed teachers reported that they have never implemented AI applications in classroom PE activities.

This reflects a clear gap between awareness and practice, while also showing that AI has not yet been integrated into the organizational process of motor activities such as warm-ups, basic movements, motor games, or cool-down activities.

Further analysis of the survey data shows that teachers mainly stop at using traditional information technology tools such as illustrative videos on YouTube, slideshow images, or background music to support movement, instead of AI tools capable of movement analysis, exercise personalization, or real-time feedback. Although 73.3% of teachers believe that AI can simultaneously support improving teaching efficiency, tracking and personalizing activities, and analyzing children's motor abilities, the concretization of these functions in PE lesson design has not been implemented. This indicates a shortage of specialized technological capacity as well as a lack of guidance on application processes suitable for the specific characteristics of the preschool age group. Additionally, the survey results regarding the assessment of AI's role in PE (M = 2.183; SD = 0.592) show that teachers have a positive attitude, but the implementation status is not yet proportional to their awareness. Through pedagogical observation, PE activities are still organized according to the traditional model, where the teacher plays the central role in guiding and adjusting movements; the assessment of children's motor completion is mainly based on visual observation and personal experience, without the support of data analysis tools or automated tracking systems.

In summary, the status of AI application in organizing PE activities at the surveyed kindergartens can be summarized by three main characteristics: (1) positive awareness but no practical implementation; (2) technology application remains at the level of slideshow support, not yet reaching the level of AI integration; (3) lack of technical foundation, professional training, and specific guidance processes. These are important grounds for proposing solutions to develop digital capacity for teachers and build an AI application model suitable for local preschool education conditions in the current digital transformation period.
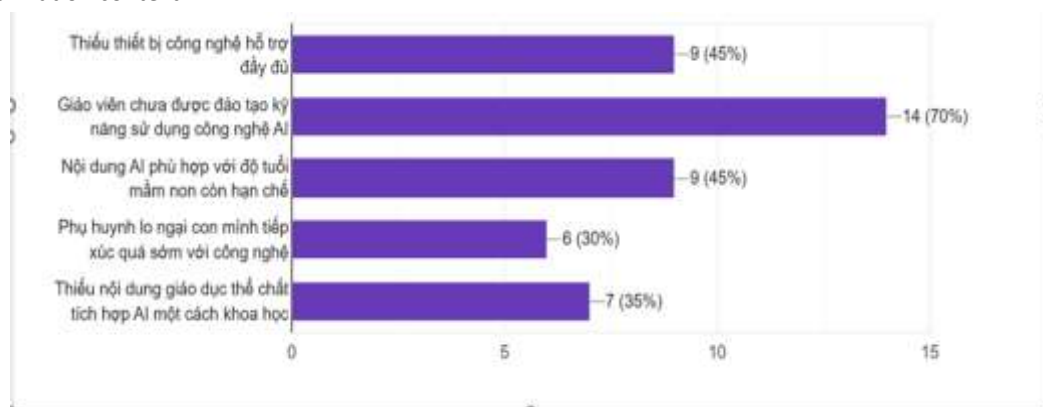
1.5. Difficulties and causes

The survey results show that difficulties in applying AI to organize physical education (PE) activities stem from both subjective and objective factors. First, although 90% of teachers rate AI's role as important or very important

in PE, and 73.3% believe AI can support multiple goals such as improving teaching efficiency, tracking/personalizing activities, and analyzing children's motor abilities, 100% of surveyed teachers have never applied AI in actual organizational activities. This discrepancy clearly reflects limitations in digital technology application capacity, especially the skills to exploit specialized AI tools for preschool education. Teachers' awareness of AI is generally limited to a general level (M = 2.183; SD = 0.592) and is not yet linked to the process of lesson design, organizing motor activities, and evaluating children's progress in PE.

In addition to personal capacity factors, objective causes also play a significant role. Reality shows that the facilities and technological infrastructure at kindergartens are still limited, lacking specialized software or equipment to support movement analysis via AI. Access to technological platforms is mainly spontaneous and lacks orientation from management levels. At the same time, there are no official instructional documents or intensive training programs on AI application in preschool PE, leading to a psychological state of hesitation and a lack of confidence when implementing it. Furthermore, the nature of PE activities requires open spaces, direct movement, and ensuring safety for children, causing teachers to prioritize traditional methods instead of experimenting with new technology.

The synthesis of analyses shows that difficulties in applying AI to PE are not only technical issues but also systemic issues, including: a lack of specialized digital capacity among teachers, limitations in infrastructure and equipment, the absence of an AI-integrated pedagogical guidance framework, and the lack of support and incentive mechanisms from management. These are the core causes that need to be resolved synchronously to promote AI application in organizing physical education activities in kindergartens in the current digital transformation context.

Through the survey, it is evident that teachers are facing many difficulties in applying AI technology to organize PE for preschool children in kindergartens:

+ Difficulties related to children:
- Children's ability to absorb technology is still limited.
- Lack of self-control and self-discipline skills.
- Ability to receive information from technology.

+ Difficulties related to the educational environment:
- Lack of equipment and facilities.
- Shortage of teaching staff with specialized training in AI technology.
- Instructional content and methods are still limited.

+ Difficulties related to parents:
- Concerns about the impact of technology on children's development.
- Lack of understanding of the benefits of AI in physical education.
- Psychological hesitation and overprotection of children.

Thus, the survey shows that: Most teachers have correctly perceived the importance of applying AI technology in the process of organizing PE activities for preschool children in kindergartens, and they perceive and understand quite clearly the concepts of PE for children, AI technology, and the application of AI in teaching.

However, teachers only grasp the theory but have not applied it in practice because they are still encountering many difficult issues and limitations.

IV.   Conclusions and Recommendations

1.6.   Conclusion

Based on the analysis of survey data and practical observations, it can be affirmed that preschool teachers have formed a relatively positive initial awareness of the role of Artificial Intelligence (AI) in organizing physical education (PE) activities. The rate of 90% of teachers evaluating AI's role as important or very important shows that the potential for technology acceptance is quite large. However, the fact that 100% of teachers have never implemented AI in PE activities clearly reflects the gap between awareness and practice. Current technology application mainly stops at supporting slideshows, using illustrative videos or background music, and has not yet reached the level of integrating AI to analyze movements, personalize exercises, or track children's physical development progress.

These limitations stem from many barriers: teachers' specialized digital capacity is still limited; facilities, equipment, and specialized software do not yet meet requirements; there is a lack of a specific pedagogical guidance framework to integrate AI into the PE organizational process; and there are no support mechanisms or incentive policies for implementation at the management level. Thus, the application of AI in PE at the surveyed kindergartens is still in the "pre-startup" stage, being more potential than practical implementation.

1.7.   Recommendations

From the above conclusions, the study proposes several systemic orientations. First, it is necessary to organize specialized training programs on AI for preschool teachers, focusing on skills to exploit AI tools in motor lesson design, data analysis, and assessing children's progress. Second, it is necessary to build a guidance framework for AI application in PE according to a specific process (from goal design and tool selection to activity organization and result evaluation), ensuring suitability for the specific characteristics of the preschool age group and safety requirements. Third, increase investment in facilities, technological infrastructure, and specialized software to serve digital transformation in physical education.

Additionally, it is necessary to build a digital library and model practice samples for integrating AI in PE for teachers to refer to and apply, thereby reducing psychological hesitation when implementing new technology. Finally, there is a need to promote large-scale and long-term experimental research to evaluate the true impact of AI on the physical development, motor skills, and interest in participating in activities of preschool children. Synchronously implementing the above solutions will contribute to transforming positive awareness into practical application capacity, gradually improving the quality of physical education activities in the current context of digital transformation in early childhood education.

V.   REFERENCES

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