

ORIGINAL ARTICLE

The Role of Technical and Managerial Artificial Intelligence Skills Training in Enhancing Organizational Innovation among Teachers and Educational Administrators

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ABSTRACT

The present study aimed to examine the role of AI skills training in technical and managerial dimensions in enhancing organizational innovation among teachers and administrators of the Manoojan Department of Education. This study was applied in terms of purpose and descriptive–correlational in terms of methodology. The statistical population consisted of all employees of the Minujan Department of Education in 2024 (N = 1,300). Based on the Krejcie and Morgan table (1970), a sample of 297 participants was selected using simple random sampling. Data were collected using the Artificial Intelligence Skills Questionnaire developed by Mikalf and Gupta (2021), consisting of 14 items, and the Organizational Innovation Questionnaire by Buzik and Dimozfski (2019), consisting of 12 items. Data analysis was conducted using structural equation modeling. The results indicated that technical AI skills training has a direct, positive, and statistically significant effect on organizational innovation. In contrast, managerial AI skills training did not show a statistically significant direct effect on organizational innovation; however, it played a supportive and facilitating role in enabling effective utilization of technical AI capabilities and institutionalizing innovation within the organization. Overall, the findings suggest that the highest level of organizational innovation is achieved when technical and managerial AI skills are applied in a complementary and synergistic manner. Based on the findings, targeted investment in technical AI skills training, along with managerial capacity building, the provision of appropriate infrastructure, and the development of ethical and strategic frameworks, can significantly enhance organizational innovation in departments of education. This approach creates a positive cycle in which technical AI acts as a driver of innovation, while managerial AI functions as a guiding and sustaining mechanism, thereby providing the foundation for sustainable innovation in the educational system.

KEYWORDS

Technical Artificial Intelligence Skills Training, Managerial Artificial Intelligence Skills Training, Organizational Innovation, Teachers and Educational Administrators.



Introduction

Recent studies emphasize that early childhood education must increasingly focus on developing higher-order cognitive skills such as critical thinking and problem-solving to prepare children for complex and uncertain future learning environments (Thornhill-Miller et al., 2023; Toomaj et al., 2024; Hu & Shu, 2025). Contemporary educational research highlights that these skills are not innate but can be systematically fostered through active, participatory, and creative instructional approaches, particularly during the preschool years when cognitive flexibility and imagination are rapidly developing (Soroosh et al., 2024; Golzar & Hemmati, 2024).

In the context of rapid global change, children must prepare themselves for life in a fast-paced and ever-changing environment, where technologies, jobs, and living conditions are rapidly evolving (Jadidi Mohammadabadi & Jabbari Zahirabadi, 2014). Individuals constantly face changes throughout their lives and learn new things. Therefore, it is essential that children are prepared for these changes from an early age and equipped with the knowledge and experiences they need for life (Jadidi Mohammadabadi, Farajollahi & Masoumi Fard, 2020). Creating learning environments based on children's real needs and interests can effectively enrich their personal knowledge and experiences (Rojo-Ramos et al, 2022).

Despite the growing literature on drama-based learning, few studies have simultaneously examined critical thinking and problem-solving skills in preschool children using a quasi-experimental design, particularly within Iranian educational contexts. Accordingly, the present study seeks to answer the following research question: Does creative drama training have a significant effect on preschool children's critical thinking and problem-solving skills?

Method

This study was applied in terms of purpose and quasi-experimental in terms of research design, employing a pre-test–post-test control group design. Due to practical and ethical constraints in preschool settings, random assignment at the institutional level was not feasible. Therefore, a quasi-experimental design with intact groups was adopted, and baseline differences were statistically controlled in subsequent analyses. The research was conducted during the 2023–2024 academic year among preschool children in Anar city. According to official statistics obtained from the Education Department and the Welfare Organization, the total population of preschool children in this city was approximately 450.

Initially, one class from each preschool was selected, and all children in these classes were assessed using the research instruments. Based on the pre-test results, 30 children who obtained the lowest scores in critical thinking and problem-solving skills were identified. These children were then randomly assigned to either the experimental group ($n = 15$) or the control group ($n = 15$). All participants were within the preschool age range and had no reported cognitive or developmental disorders, based on school records. Data analysis was conducted using descriptive statistics (mean and variance) and inferential statistics (Analysis of Covariance – ANCOVA) in SPSS-22. ANCOVA was employed to control for pretest differences and to reduce potential regression-to-the-mean effects resulting from selecting participants with lower baseline scores.

The Shabani Critical Thinking Questionnaire, developed by Shabani in 1999, aims to measure critical thinking skills in children and adolescents, focusing on their ability to analyze, evaluate, and draw logical conclusions from information. The questionnaire comprises 25 items rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), with some items reverse-scored (items 3, 7, 14, and 22). Total scores range from 25 to 125. It assesses three components: (1) analysis and evaluation of information, (2) logical reasoning and conclusion-making, and (3) creative and flexible thinking. Content validity was confirmed by experts, and reliability in the original study was reported as Cronbach's alpha $\alpha = 0.89$. In Iranian applications, Cronbach's alpha has ranged from 0.84 to 0.90, with content validity similarly confirmed through expert review (Soroosh et al. 2024; Golzar & Hemmati, 2024). Although some subscales of the questionnaire have shown moderate reliability in previous studies, the total scale reliability has been reported as acceptable in Iranian samples and was therefore used as a composite measure in the present study. Given the young age of participants, the questionnaire was administered with teacher assistance following standardized instructions. Although some subscales have shown moderate reliability in previous research, the present study used the total score to reduce measurement error and enhance reliability. This approach has been adopted in prior Iranian studies involving young children.

Janssen Problem-Solving Skills Questionnaire (2000)

The Janssen Problem-Solving Skills Questionnaire, developed by Janssen in 2000, was designed to assess children's problem-solving abilities, specifically their capacity to identify problems, generate solutions, evaluate options, and select appropriate responses. The instrument consists of 20 multiple-choice items, each scored 1 for a correct answer and 0 for an incorrect answer, yielding a total score range of 0–20. It includes two main components: (1) problem identification and definition, and (2) solution generation and evaluation, with no reverse-scored items. Content validity was confirmed by experts, and the original reliability was reported as Cronbach's alpha $\alpha = 0.87$. In Iranian contexts, the questionnaire has demonstrated acceptable reliability with Cronbach's alpha values ranging from 0.82 to 0.88, and its content validity has been verified through expert review (Soroosh et al. 2024; Ahghaghi, 2022). To reduce observer bias, teachers received standardized instructions prior to administration and were asked to read items neutrally without interpretation or prompting. All children were assessed under similar conditions across both groups.

Description of Creative Drama Instruction

The Creative Drama Program package was designed by Dodge, Diane, and Trister, and its first version was published in 1978. Over time, this program has evolved, and newer versions have been provided with updated resources and supplementary tools for teachers and instructors.

Creative drama is a comprehensive educational program for preschool children, designed based on scientific research and practical experience, which provides a structured framework for implementing drama-based activities in preschool settings, children develop their cognitive, social, and emotional skills through play and hands-on projects. The program also provides tools for assessing and monitoring children's progress.

The main stages of the Creative Drama Program package include the following:

1. **Preparing the Learning Environment**
Arranging the classroom in a way that allows children easy access to educational resources.
Creating different areas for various activities such as art, science, construction play, and reading.
2. **Planning and Implementing Activities**
Designing daily activities, including creative games, group projects, and individual tasks. Using a variety of themes to capture children's attention and encourage learning.
3. **Assessing and Monitoring Children's Progress**
Using assessment tools to monitor children's progress in various areas. Recording observations and assessment results to better plan future activities.
4. **Developing Socio-Emotional Skills**
Encouraging children to cooperate and interact with one another. Teaching problem-solving skills and emotion management.
5. **Parental Involvement**
Maintaining continuous communication with parents and informing them about children's progress. Inviting parents to participate in classroom activities and group projects.

Results

These stages help teachers create a dynamic and creative learning environment where children can develop their skills optimally and be prepared for future learning.

Table 1. Dayan Trister Dodge creative drama curriculum

Row	Sessions
1	Introduction and Familiarization
2	Storytelling and Imagination
3	Role Playing
4	Using Tools and Equipment
5	Practice of Performance
6	Creativity in Performance
7	Preparation for Performance
8	Performance and Feedback

Assumptions analysis

1. Normality of the distribution of variables

Table 2. Distribution indices of scores of subjects in the experimental and control groups in the dependent variable

Group	Dependent Variable	Skewness	kurtosis	Z Kolmogorov-Smirnov	Sig Level
Experimental Group	Critical thinking pre-test	-0.6	-0.54	1.05	0.22
	Critical thinking post-test	-0.65	-0.63	0.79	0.55
Control Group	Critical thinking pre-	-0.55	-0.63	0.72	0.67

	test				
	Critical thinking post-test	0.77	0.25	0.54	0.92
Experimental Group	Problem solving pre-test	0.84	1.32	0.91	0.36
	Problem solving post-test	0.71	-0.68	0.74	0.63
Control Group	Problem solving pre-test	0.36	-0.31	0.58	0.88
	Problem solving post-test	0.17	-0.72	0.9	0.38

Table 2 shows the indicators of normality of critical thinking and problem-solving skills variables in the two pre-test and post-test stages according to the skewness, kurtosis, and Kolmogorov-Smirnov normality test. The results showed that the dependent variable of the study was normal in terms of both skewness and kurtosis indices and the Kolmogorov-Smirnov normality test in both pre-test and post-test stages in the experimental and control groups. Preliminary assumption testing indicated that the data met the assumptions required for ANCOVA. Normality of distributions and homogeneity of variances were examined and found acceptable. In addition, no meaningful interaction was observed between the covariate (pretest scores) and group membership, supporting the assumption of homogeneity of regression slopes.

Discussion

The present study examined the effect of creative drama training on critical thinking and problem-solving skills among preschool children. The findings suggest short-term improvements in selected cognitive aspects of critical thinking and problem solving following the creative drama intervention. These results align with recent educational research highlighting the importance of structured creative and play-based activities in fostering cognitive development during early childhood (Arias et al. 2025; Alghufali, 2024). These results should be interpreted cautiously, as the study focused exclusively on cognitive outcomes and did not include direct measures of social interaction processes supporting cognitive engagement.

From the perspective of socio-cultural theory, learning is a socially mediated process in which cognitive development occurs through interaction with others (Vygotsky, 1978). In creative drama, children engage in role-play, dialogue, and collaborative tasks, which provide opportunities for guided participation and shared problem-solving. Through social interaction, children internalize cognitive strategies such as perspective-taking, hypothesis testing, and reflective decision-making. These processes enhance both critical evaluation and strategic solution generation, supporting the significant improvements observed in the experimental group.

The supportive social context of creative drama also plays a crucial role. According to social learning theory (Bandura, 1977), children learn through observation, imitation, and reinforcement within social environments. In drama activities, positive peer interactions, collaborative role assignments, and constructive feedback likely increased children's confidence, intrinsic motivation, and willingness to

engage cognitively with challenging tasks. These social dynamics help explain why participants in the creative drama group showed greater improvements compared with the control group. This study has several limitations. The use of intact preschool centers and the absence of random assignment at the institutional level may limit internal validity. Additionally, selecting children with lower pretest scores may introduce regression-to-the-mean effects, although statistical controls were applied to minimize this risk. The absence of follow-up measurements limits conclusions regarding the sustainability of observed effects.

Conclusion

Overall, the findings indicate that creative drama instruction significantly enhances critical thinking and problem-solving skills in preschool children. By providing an engaging, safe, and flexible learning environment, creative drama enables children to explore ideas from multiple angles, experiment with alternative solutions, and develop reflective and analytical thinking processes. These results underscore the theoretical and practical value of integrating creative, experiential pedagogies in early childhood education to support holistic development across cognitive, social, and emotional domains.

Given these findings, may be an effective strategy for promoting higher-order thinking skills. Future research should continue to explore how specific components of drama-based instruction (e.g., narrative complexity, peer collaboration) contribute to cognitive development in diverse educational contexts.

Keywords

Virtual Social Networks, Aggression, Creative Thinking.