

Article

Research on the Teaching Mechanism of Generative Artificial Intelligence in Promoting Young Children's Imitative Poetry Composition

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Abstract: In this work we examine pedagogical role and underlying mechanisms of generative AI in helping young children with imitative poetry composition because it is complex task that can be difficult for students in classroom. Also I analyze how AI intervention affects language expression and classroom interaction, and creative performance in classroom and it is worth noting that these are important factors for the study. I use a quasi-experimental design with mixed methods. Through the use of the Imitative Poetry Ability Scale assessment, classroom observations, analysis of student works, and interviews, combined with independent samples t-tests and thematic coding, the following findings were obtained that generative AI can improve language completeness in children's imitative poetry, and the imagery creativity and classroom engagement are also enhanced. AI generated images and interactive feedback can stimulate imaginative expressions. It is worth noting that they also help support collaborative multimodal learning.

Keywords: Generative artificial intelligence; early childhood language education; imitative poetry composition; creative expression; multimodal learning

1. Introduction

Generative artificial intelligence (AIGC) can change education field. The new AI technology - including large language models, multimodal generation, and also intelligent interaction - is moving beyond the "tool-assisted" stage for digital education and enters new era that can provide context generation, interactive support, and personalised expression. In fact, previous studies have shown generative AI has advantages like creating context, providing instant feedback, and multimodal expression with personalised support and this can help improve learners' engagement and their ability to express creatively [1]. Also, we can see that the use of generative AI in poetry teaching, contextualised learning, and also multimodal instruction has received more attention from researchers and it can show positive value in promoting learning interest, stimulating imaginative expression, and reinforcement of the interaction in classroom.

Most previous studies focus on primary and secondary education, and higher education is also well studied by many researchers, but early childhood education receives less attention and it is worth noting that research on the children's literature activities is especially limited. When we teach young children to imitate poems, traditional methods can emphasize language transfer and imagery association, however, these methods lack enough contextual support. The activation of expressive ability is insufficient and deep interaction is not promoted [2]. Generative AI has image generation and language prompting functions. Also, it has real-time interactive capability. These functions can offer visual scaffolds with multimodal support that is personalised for young learners which can help them learn better and in principle this can bring new opportunities for imitative poetry activities from educational perspective.

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Based on this background, we choose senior kindergarten language activity "Cradle" as our case. We use a quasi-experiment method. It can help us study how generative AI affects young children's imitative poetry composition. In fact, we focus on language expression and classroom interaction, at the same time creative performance is analyzed because these three aspects are important for understanding mechanism of how AI intervention works in classroom setting. The results should provide some reference for theory and practice in early childhood language education using AI, and it can show a practical path for teachers who want to use this technology.

2. Literature Review

2.1. Research on the Application of Generative Artificial Intelligence in Education

With the fast development of generative artificial intelligence technologies, AIGC is now becoming key driver for the digital transformation of education. Unlike traditional artificial intelligence focusing on data recognition and outcome judgement, generative AI pays attention to content creation and contextual construction, and it also provides interactive feedback so it has good performance in helping the personalised learning. In fact, Kasneci et al. showed that generative AI tools like ChatGPT can improve learning efficiency by generating knowledge and providing learning support, and they can also give teaching feedback. This changes the nature of classroom interaction [3]. Also, UNESCO pointed out that generative AI has potential to help the creative expression of learners and multimodal learning, and it can support educational equity; however, it also noted that their educational applications should address problems about ethics and safety, and also teacher agency [4].

Now researchers study generative AI in education in China and abroad. In fact, they look at higher education and primary and secondary schooling. This includes intelligent tutoring, automated feedback, writing support, and personalised learning. For example, Zhai pointed out that AIGC can help learners engage cognitively and express creativity through content generation and interaction with context [5]. Domestic research focuses on using generative AI in smart education, classroom innovation, and digital learning environment [6], but most studies target cognitive learning tasks and we can find little research on using generative AI for language creativity activities in early childhood.

2.2. Research on Early Childhood Language Education and Poetry Imitation

Early childhood language education should help children develop expressiveness and imagination, and we can use authentic context as well as interactive experiences to reach this goal in the actual teaching practice because these elements are very important for young learners. Poetic activities have aesthetic quality with good rhythm and context. So they can be used in kindergarten language teaching. Studies show that imitating poetry composition can help children acquire vocabulary. Also, it can help syntactic transfer among young children, and their creative expression and emotional experience can be improved too [7]. But traditional poetry teaching focuses on teacher narration and collective imitation, which makes it hard to give children autonomy in creativity, especially for imagery association and linguistic transfer, so this approach has limitations in the actual classroom application when we consider children's needs. Also, because children's abstract thinking is still underdeveloped, relying solely on oral instructions can hardly keep their interest in imaginative language expression. This problem is common in many kindergarten classrooms. It is worth noting that research shows that multimodal contexts and visual support can enhance young children's participation and expression during language activities [8], so we can use digital technologies to build an environment with greater openness and interactivity, as well as immersion, and this becomes an important research direction in early childhood language education that we should pay attention to in our future work.

2.3. Gaps in Existing Research

Current research shows several gaps. Most studies on generative AI in education mainly focus on the primary and secondary education, and they also cover higher education extensively, while the early childhood education receives less attention and it is worth noting that language activities for young children are especially lacking in the current literature. Also, existing research often looks at technological functions and educational outcomes and the analysis of how AI helps children's creative expression is not deep. In fact, empirical studies about generative AI and imitative poetry composition in the early childhood are still few and systematic pedagogical models or theoretical frameworks have not been established, which makes it hard to guide practice. We take the senior kindergarten language activity "Cradle" as a case. It can explore teaching mechanisms where generative AI helps young children do imitative poetry composition, and this can show how the technology supports language development. The results can provide new research perspectives for the empowerment of early childhood language education through AIGC.

3. Materials and Methods

3.1. Theoretical Foundation

We base this study on social constructivist theory, scaffolding theory, and multimodal learning theory. According to social constructivism, children's knowledge can develop through social interaction and contextual engagement, and language learning is viewed as a process of meaning-making within sociocultural contexts [9]. In early childhood poetry activities, children can develop language expression and the creative cognition through teacher guidance and peer interaction in experiential contexts. Also, introduction of generative artificial intelligence can transform the traditional "teacher-child" interaction into a collaborative "teacher-child-AI" model, and this can provide new forms of social support for children's language learning.

Scaffolding theory says teachers can give support in zone of proximal development of children, helping learners finish tasks they cannot do alone [10]. In fact, we believe that in imitative poetry activities, generative AI can provide scaffolding through visual generation, language prompts, and also instant feedback, so it reduces cognitive load in language organisation and imagery creation and can help creative expression.

Also, it is worth noting that multimodal learning theory shows knowledge can be constructed by learners through multiple semiotic systems, and these systems include language, images, movement, and sound, so we can say that learners use different ways to understand knowledge [8] [11]. In fact, AI-generated images can make abstract poetic content become concrete. It can help children form linguistic associations and contextual experiences. So we regard AI-supported imitative poetry composition as typical multimodal language learning process with immersive features that can provide good learning experiences for students and help them understand the poetry content better, and this approach can be seen as a useful method in language education.

Based on these theories, we build teaching mechanism framework. It includes generative AI, context generation, interactive support and enhanced expression. Then we analyse the pathways. In fact, we examine how generative AI can influence young children's imitative poetry composition skills.

3.2. Participants

We use a quasi-experimental design in this research, and in fact we include 40 kindergarten children aged 5–6 from one kindergarten in Quanzhou, Fujian Province, because this age group is suitable for our study and the school can provide stable support. We divide them into experimental group (n=20) and control group (n=20). The two groups are matched for age and language development level, and class size is also considered. So they can be compared.

Experimental group used the generative AI tool "Doubao\" for imitative poetry activities, and this tool can generate images and can support interactive expression, while at the same time control group received traditional language instruction where teacher

organised activities through picture observation and oral demonstration, also there was collective imitation. It is worth noting that the study was conducted over two weeks. We designed four imitative poetry teaching sessions in total.

3.3. Research Design

We use a "pre-test and teaching intervention and post-test" experimental design. The language activity "Cradle" is the core teaching case. We focus on poetic sentence pattern transfer and creative expression.

In experimental group sessions, teachers helped children to create contextual images by typing language descriptions, which means children can use words to tell AI what picture they want, and this process is expected to build a connection between language and visual thinking. For example, they enter phrases like "a cradle in the sea" or "the moon rocking little stars", and AI generates images at the same time. These images work as materials for expression. Also, they can be used as media in classroom interaction, and we find this dual function can support children's associative expansion. It is worth noting that creative expression is improved through this method.

In control group, we used traditional instruction. The teacher showed fixed images and explained sentence patterns to children, and then they can do imitative composition based on teacher's demonstration. It is worth noting that no AI-assisted tools were used in this setting, which means the learning process completely relied on manual teaching and student imitation without any intelligent technology support or automated feedback system.

3.4. Instruments

3.4.1. Poetry Adaptation Ability Scale

We want to assess young children's imitative poetry composition ability. So we developed the scale called 'Imitative Poetry Composition Ability Scale for Young Children' based on previous research about the early childhood language development assessment and we think it can be used in many kindergartens to help teachers evaluate the poetry ability. It includes four main dimensions: (As shown in Table 1).

Table 1. Imitative Poetry Composition Ability Scale for Young Children

Dimension	Evaluation Content
Language Integrity	Completeness of sentence structure
Imagery Creativity	Richness of imaginative expression
Expression Fluency	Coherence of language expression
Emotional Expression	Emotional and situational performance

The scale adopts a five-point rating system (1–5 points) and is jointly scored by three teachers with experience in early childhood language education to enhance the consistency of the assessments.

3.4.2. Classroom Observation Scale

Classroom interaction behaviours were primarily observed with reference to the Flanders Interaction Analysis System (FIAC)[12], focusing on:

- Frequency of voluntary verbal contributions
- Frequency of peer collaboration
- Teacher interactive feedback
- Emotional engagement status

Classroom video recordings and event coding were employed to conduct a statistical analysis of interactive behaviours.

3.4.3. Semi-Structured Interview

In order to examine young children's language learning experiences with AI support, we conducted semi-structured interviews with teachers from experimental group and selected children and the interview data can help us analyse the final results. Teacher

interviews can address instructional support functions of AI. Also, we discussed changes in classroom organisation and how children participate. For children, the interviews can focus on their subjective perceptions of AI-generated images and interest in language expression were collected. It is worth noting that classroom experiences were discussed.

3.5. Data Collection and Analysis

We use mixed methods in this study [13]. Quantitative data come from pre- and post-tests of children's imitative poetry composition ability. Also we collect the statistics on classroom interaction frequency. For qualitative materials, we use classroom video recordings and children's written work. Interview transcripts are also used.

Quantitative data were statistically analysed using SPSS 27.0, including descriptive statistics and independent samples t-tests, in order to compare differences in imitative poetry composition ability between the experimental and control groups. The main statistical methods are as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Here, $\bar{X}_1$ and $\bar{X}_2$ represent the mean values of the experimental and control groups, respectively, while s_1^2 and s_2^2 denote the inter-group variances. The level of statistical significance was set at $q < 0.05$.

We analysed qualitative data using thematic analysis. It is worth noting that themes were identified through inductive coding of classroom interactions and language expression, and interview content, and this approach can help extract underlying teaching mechanisms by which generative artificial intelligence helps young children compose imitative poetry.

3.6. Ethical Considerations

Informed consent was obtained from both the kindergarten and the parents prior to conducting the study. Throughout the research process, strict adherence to ethical standards in early childhood education was maintained, with all children's personal information anonymised and used solely for academic research purposes. Additionally, teachers retained primary responsibility for classroom management during the use of AI, in order to prevent children from developing an excessive reliance on technology.

4. Result and Discussion

4.1. The Impact of Generative Artificial Intelligence on Young Children's Imitative Poetry Composition Ability

To examine the effect of generative artificial intelligence on young children's imitative poetry composition ability, pre- and post-tests were conducted for both the experimental and control groups. The results indicated that there was little difference between the two groups at the pre-test stage, suggesting that the children's baseline language abilities were comparable prior to the intervention. After two weeks of teaching intervention, the experimental group demonstrated notable improvements across dimensions such as language completeness, imagery creativity, fluency of expression, and emotional expressiveness.

As shown in Table 2, the post-test mean score for the experimental group was significantly higher than that of the control group, with the most pronounced gains observed in imagery creativity and fluency of expression. Independent samples t-test results revealed that the difference in post-test scores between the two groups reached statistical significance ($q < 0.05$), indicating that generative artificial intelligence can effectively enhance young children's ability in imitative poetry composition.

Table 2. Comparison of Imitative Poetry Composition Ability between Experimental and Control Groups (M±SD)

Group	Pre-test Mean	Post-test Mean	t	p
Experimental Group(n=20)	3.14±0.42	4.47±0.36	5.82	0.001
Control Group(n=20)	3.09±0.39	3.56±0.41	1.94	0.067

We find that AI-generated images and language prompts can reduce the expressive difficulty during imitative poetry composition and they can help children develop richer linguistic associations. It is worth noting that in activity themed 'The Forest is a Cradle', children in the experimental group used imagery like 'the leaves sway' and 'the little birds have fallen asleep' to extend their expressions. But control group just imitated sentences from their teacher.

4.2. Changes in Young Children's Classroom Interaction Behaviours with AI Support

We observed the classroom activities. The results show that children in experimental group can demonstrate higher participation level and more interaction frequency compared to the control group, and this difference can be seen clearly in observation data. Then we use Flanders Interaction Analysis System (FIAC) to analyze the data. It is worth noting that experimental group can make more voluntary contributions with higher rates of group collaboration, and besides this, their emotional engagement is stronger during activities.

We observed that when children in experimental group see AI-generated images, they can discuss about these pictures and try to add new content to the poems. For example, when AI generates a "moon cradle" scene, children can think of other poetic imagery such as "star babies" and "clouds gently floating by", and it is worth noting that their expressions become more open and interactive. But children in control group depend on teacher questions and they respond passively.

These results suggest that generative artificial intelligence not only enhances young children's interest in language expression, but also promotes peer collaboration and the co-construction of learning. Previous research has indicated that digital interactive environments, through instant feedback, can improve learners' sense of classroom participation and emotional engagement [14]; the findings of this study are broadly consistent with this view (As shown in Table 3).

Table 3. Comparison of Classroom Interaction Behaviours between the Two Groups of Children

Indicator	Experimental Group	Control Group
Number of Voluntary Contributions	86	49
Group Collaboration and Interaction	41	18
Number of Voluntary Questions	23	9
Positive Emotional Responses	92%	65%

4.3. Creative Performance in Children's Poetry Compositions

Textual analysis of the children's imitative compositions revealed that those in the experimental group demonstrated greater richness of imagery and syntactic transfer ability. On average, each poem by children in the experimental group contained three to five new imagery elements, whereas the control group's work was mainly characterised by repeated use of the original poem's sentence structures.

For example, children in the experimental group produced expressions such as "the waves are a cradle, rocking the baby fish, the shells sing softly, and the baby fish falls asleep", which exhibited strong contextual awareness and imagination. By contrast, the control group's poems more frequently included content highly similar in structure to the original, such as "the sky is a cradle, rocking the star babies".

The research indicates that AI-generated visual contexts can effectively stimulate children's associative abilities and creative expression. This is consistent with Mayer's multimedia learning theory, which posits that dual-channel input of images and language enhances learners' cognitive processing and creative construction.

4.4. Results of Teacher and Child Interviews

We find interview results can confirm positive role of generative artificial intelligence in early childhood poetry teaching. In fact, AI-generated images are thought to improve interest of classroom. They can make the learning environment more open. This can stimulate children's enthusiasm for expression because when children see the images they become more interested in the poetry and they want to express their own ideas about what they see in the pictures. Also, one teacher said, "Previously, many children did not know how to compose, but after seeing the AI-generated images, they can come up with many new sentences."

We talked with children and found that when they use AI generated images for poetry writing, most of them can show strong interest because the visual content helps them create new ideas, which means we observed this can be very helpful for their creative process in the actual classroom setting and the students can give positive feedback. They said the pictures help them think of new lines for poem and this is similar to telling a story. Also, some children asked for new scene images. It is worth noting that this behavior can help them extend the poem content.

In fact, the quantitative and qualitative results show that generative artificial intelligence can provide knowledge support in the young children's imitative poetry activities. It can activate context and help interaction, and creative expression is supported. This offers a new digital pathway for early childhood language learning.

5. Conclusion

5.1. Mechanism of Generative AI in Promoting Poetry Adaptation

The results indicate that generative artificial intelligence can significantly enhance language completeness, imagery creativity, and classroom engagement in young children's imitative poetry composition. The core mechanism lies in AI's reconstruction of contextual support for language learning. Compared with the traditional teacher-led oral demonstration model, generative AI establishes a dynamic learning pathway of "multimodal context – interactive support – expressive generation" through image creation, language prompts, and instant feedback.

AI-generated visual contexts can activate children's linguistic associations and imagery construction. In fact, young children's cognition can depend on concrete images to support their thinking process, and this characteristic should be considered in teaching design. Visualised expression can reduce cognitive load in the language organisation and it helps transform abstract language into tangible experience, which means children can grasp abstract concepts more easily. Children in experimental group supported by AI-generated images showed richer poetic imagery and greater syntactic transfer ability and this can highlight the value of multimodal stimulation for creative language expression because the system can provide good support for children's learning process in the classroom.

Also, generative AI can help improve classroom interaction and group work. The study found that children in experimental group tended to discuss and express ideas around AI-generated content, and we can see the interaction frequency is higher than the control group, so we can say the AI has good performance in promoting student participation. AI works as auxiliary tool. It is also an important medium for classroom communication. In fact, this can change the classroom from teacher-centred to human-machine collaboration.

Also, generative AI can act as a dynamic support in language learning for young children. Visual prompts and language feedback generated by AI can help children to overcome barriers in expression in areas like imagery association and syntactic construction, and it is worth noting that AI support is expected to give timely and personalised assistance inside children's "zone of proximal development". We find that this can help generate creative expression.

5.2. Educational Implications of AI-Supported Language Learning

We show that generative AI is more than a technical tool. In fact, it can exert structural impact on early childhood language education, which means the traditional teaching mode that relies on human teachers is expected to change and new opportunities can be created for language development in young children. AI can expand the expressive space of poetry activities. Then language learning is changed from oral process into a multimodal experience, and it includes language, imagery, and also interaction between different elements, so children can use multiple channels to learn and express themselves in flexible way. With AI support, children can engage in immersive and open process of creative expression.

Also, AI can help change teacher's role. In environment with AI support, teachers are no longer just knowledge transmitters and they become learning facilitators and they also need to organise the interaction. Teachers should mediate between children's interests and content from AI and it is worth noting that the technological support should be aligned with the developmental goals of children's language learning in principle so that we can make sure the education purpose can be achieved.

Also, our research shows we need reasonable view about application boundaries of generative AI in early childhood education. Children's language development should be based on authentic life experiences and emotional interactions, and it is worth noting that if we rely too much on AI-generated content, it can in principle undermine children's capacity for independent imagination and also their real-world perception. So future integration of AIGC in kindergartens should follow 'teacher-led, technology-assisted' principle, and we should also pay attention to AI ethics and children's data security.

5.3. Research Conclusions and Future Prospects

We use "Cradle" as a case study. It is a senior kindergarten language activity, and we examine teaching mechanisms by which generative artificial intelligence helps young children compose imitative poetry and how teachers can use this technology in actual classroom practice to improve teaching quality. Results show that generative AI can improve children's language expression. Also, classroom interaction and creative performance can be improved. We use multimodal context generation and dynamic scaffolding, and at the same time collaborative co-construction is used and children can in principle develop poetry adaptation skills through these teaching methods which can provide good support for their learning.

At the theoretical level, the study establishes a framework of "generative AI – context generation – interactive support – expressive enhancement", expanding the research perspective on generative AI in early childhood language education. At the practical level, it provides an operable pathway for implementing AIGC-supported language activities in kindergartens and offers valuable insights for the digital transformation of early childhood education.

Due to limitations in sample size and the duration of the intervention, this study has certain constraints. Future research could further expand the sample, extend the observation period, and integrate technologies such as virtual reality and intelligent interaction, in order to explore in greater depth the application models and developmental boundaries of generative artificial intelligence in creative and personalised early childhood learning.

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