

# Research on the Teaching Model of Interactive Narrative Picture Books Based on Digital Intelligence Technology

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## ABSTRACT

With the advancement of digital intelligence technology and its penetration into the field of education, the digital transformation of picture book teaching has become a research hotspot. This study constructs a new interactive narrative picture book teaching model based on digital intelligence technology: preschool teachers, relying on digital intelligence tools and platforms, select animated picture books with interactive narrative functions and design a three-tier question chain containing factual, analytical, and creative questions. This guides children to ascend the cognitive ladder from information acquisition, logical reasoning, to creative imagination. Through the synergy of technological empowerment and instructional design, this model improves children's learning interest and attention span, promotes deeper understanding of the core story content, enhances aesthetic experience, and nurtures emotional cognitive abilities.

## KEYWORDS

Digital intelligence technology; Interactive narrative; Picture book teaching; Immersive scenarios; Early childhood development

## 1 Introduction

As a key medium for young children to perceive the world, develop language, and cultivate emotions, the form and function of picture book teaching are undergoing profound digital transformation. Survey data show that early reading behavior among preschool children is increasingly prevalent, with picture books occupying the highest priority in their reading choices. The selection rate of audio reading and digital media-based reading (such as tablets) has significantly increased, and children's exposure to digital reading methods shows a continuous growth trend across age groups. This reflects the profound impact of digital intelligence technology on children's reading habits and poses a practical proposition for the innovation of picture book teaching models. Traditional picture book teaching faces significant contradictions under the digital wave. On the one hand, traditional paper picture books, with their warm texture and artistic static images, hold irreplaceable value in cultivating children's tactile perception and aesthetic enlightenment. On the other hand, their one-way information transmission and fixed narrative structure constitute inherent limitations, making it difficult to meet the experiential and cognitive development needs of "digital native" children. In essence, this contradiction stems from the mismatch between traditional teaching models and the cognitive characteristics and needs of children in the digital era, highlighting the urgency of transforming picture book teaching.

Against this backdrop, the trend toward the digital-intelligent evolution of picture book teaching has become increasingly clear. To keep pace with the times and meet children's diversified and high-order cognitive needs, picture book teaching must transform toward digital intelligence, interactivity, and personalization. This trend is not only an inevitable result of technological innovation but also an intrinsic requirement for the coordinated evolution of educational concepts and children's developmental needs, laying a practical foundation for constructing interactive narrative picture book teaching models.

## 2 Challenges and bottlenecks: the real-world difficulties of picture book teaching in early childhood institutions

Although the digital wave has arrived, early childhood institutions still face severe challenges in implementing picture book reading instruction, stemming from the limitations of traditional modes, insufficient teacher competencies, and disorder in the digital product market. These intertwined difficulties form the "triple barrier" that hinders the digital transformation of picture book teaching.

### 2.1 Limitations of traditional picture book teaching lack of content adaptability

Teachers commonly rely on market popularity or personal preference to select picture books, without fully adhering to the Guidelines for Learning and Development of Children Aged 3–6, which emphasize developmental stages and without accounting for individual differences such as gender and interest. For example, younger children in the small class often encounter picture books with excessive textual density and narrative complexity beyond their cognitive capacity, directly leading to comprehension difficulties and diminished interest. Moreover, the lack of targeted reading guidance strategies results in reading activities remaining at a superficial cognitive level, hindering children from engaging in deep processing and meaning construction.

## 2.2 Insufficient immersive contexts

Static text-image media struggle to provide immersive learning experiences or multisensory stimulation, making it difficult for children to emotionally connect with story characters. This turns reading into a passive task. The monotony of the teaching scene further exacerbates attention dispersion, while the lack of situational scaffolding fails to concretize the transmission of story plots and abstract emotional concepts (e.g., courage, friendship), limiting imagination and leaving complex emotional and social concepts in a state of abstract difficulty.

## 2.3 Lack of deep interaction

In teacher-centered models, one-way interaction severely restricts children's agency. Most teachers rely on single interaction modes such as reading aloud and textual analysis, without dynamic adjustment based on children's feedback, which keeps children in a passive-reception state and greatly reduces opportunities for active thinking and social interaction. The lack of collaborative learning scenarios deepens the superficial nature of interaction, lowering activity engagement and systematically limiting the development of flexible thinking and creativity.

## 3 Core advantages: technological empowerment and educational added value

### 3.1 Technological empowerment

The Transformation from Static Text and Images to Dynamic Interactive Narratives.

Traditional paper-based picture books are limited by a single mode of static textual and visual presentation. In the reading process, young children can usually only perform simple page-turning actions, making it difficult to achieve deep understanding or meaningful interaction with the content. The intervention of digital intelligence technology breaks through this limitation and, through the logical chain of "multi-modal reconstruction of narrative – non-linear storytelling to stimulate thinking – intelligent guidance to deepen content", promotes a fundamental shift from static carriers to dynamic interactive systems.

Multi-modal integration reconstructs the narrative experience:

By integrating multiple elements such as text, images, audio, and animation, an immersive reading environment is built for children, transforming abstract storylines into perceivable, concrete experiences. For example, in the picture book *You Look Delicious*, the application of touch-interactive technology enables environmental sound cues: when children touch the volcanic scene on the screen, the system instantly plays the sound effect of an erupting volcano; when they click the dinosaur egg image, the sound of the egg breaking is triggered. This kind of multi-sensory stimulation — combining auditory, visual, and tactile channels — constructs an immersive reading environment, transforms abstract stories into tangible experiences, and significantly enhances the emotional impact and comprehensibility of the narrative.

Non-linear storytelling stimulates cognitive vitality:

By embedding interactive choice points at key plot junctures and constructing a dynamic cause-and-effect chain of "choice – outcome", the storytelling logic upgrades from linear to non-linear. For example, the intelligent picture book *Zootopia* provides branching choices at critical plot nodes. Different choices trigger divergent story paths. This structure not only increases enjoyment and immersion but also guides children to think about the relationship between choices and consequences, thereby enhancing their logical reasoning and decision-making abilities. In the process of actively participating in plot construction, children transform from passive recipients into active narrators, and their thinking vitality is noticeably stimulated.

Intelligent guidance deepens comprehension:

Through functions such as voice explanations and hidden plot reveals, an adaptive reading support system is built, effectively compensating for the lack of teacher guidance in traditional reading.

When children click on certain characters or objects in an image, the system can automatically play background narration audio or trigger hidden story segments, helping them link visual information with semantic content and making complex or abstract plots concrete and comprehensible. Such intelligent guidance not only reduces literacy barriers but also sustains attention via personalized content delivery, addressing attention dispersion problems common in traditional picture book reading.

In sum, digital intelligence technology enables the paradigm shift of picture books from "static object" to "intelligent companion." Through breakthroughs in multi-modal integration, non-linear storytelling, and intelligent guidance, picture books are no longer static text-image carriers but become intelligent systems capable of dynamic interaction and co-narration with children. Ultimately, this realizes a comprehensive upgrade in the reading paradigm — from passive reception to active participation, from single-sensory to multi-sensory coordination, and from teacher-dependence to self-directed exploration.

### 3.2 Educational added value: a platform for coordinated multi-dimensional development

As a platform for coordinated development of multiple abilities, interactive narrative picture books generate educational added value that can be systematically explained through the "understanding – processing – expression"

three-stage competence model.

**Hierarchical narrative comprehension system:** By coordinating auditory, visual, and interactive channels, interactive narrative picture books address the core barrier of literacy challenges and the disconnection between text and image comprehension among young children.

The auditory channel, relying on professional voice acting, directly performs the “story conveyed by words,” enabling non-literate children to accurately grasp the narrative through oral language. The visual channel, via dynamic images, strengthens “the story suggested by illustrations”; for instance, in *Kai Can Do It*, close-up shots of the discouraged elf’s micro-expressions help children intuitively capture the hidden emotions and plot cues in illustrations.

The interactive channel, through gamified tasks such as “lollipop word – meaning matching,” guides children to actively construct “the integrated story of images and words,” enabling verbal and visual information to merge organically during interaction — shifting from “fragmented text-image cognition” to “coordinated text-image comprehension.”

**Cognitive-processing support system:** Through meaning-inquiry mechanisms and plot-reconstruction design, children’s logical thinking and awareness of narrative structure are significantly enhanced. The meaning-inquiry mechanism uses interaction sessions such as find it to continuously guide children to decode symbols and explore meanings. For example, embedding a target-search task at key plot points prompts children to actively connect textual and visual clues to complete meaning-making. The plot-reconstruction design, through task forms such as “story-sequencing games,” requires children to logically reorganize scrambled plots. This process not only strengthens their understanding of narrative components (beginning, development, climax, ending) but also nurtures reasoning about cause-effect relationships. Additionally, the synchronous stimulation of dynamic images and audio can evoke emotional engagement, providing affective support for cognitive processing and deepening comprehension of narrative content.

**Closed loop for language development:**

Through the synergy of reinforced input, encouraged output, and metacognitive cultivation, children’s expressive and reflective linguistic abilities are systematically enhanced.

Multi-modal input — such as speech, images, and interactive feedback — broadens children’s linguistic exposure and provides rich resources for expression.

The “Tell it” stage creates a safe environment for language output, encouraging children to actively apply existing language knowledge when retelling or creatively rewriting stories.

Metacognitive cultivation, via questions like “Why did you put it in this order?” and “What do you think will happen next in the story?” guides children to reflect on their reading strategies and thinking processes, promoting a shift from “unconscious reading” to “conscious reflection”.

#### 4 Teaching model of interactive narrative picture books based on digital intelligence technology

This study constructs a three-tier teaching model framework comprising the “Technology Selection Layer,” “Teaching Strategy Layer,” and “Implementation Process Layer” (see Figure 1).

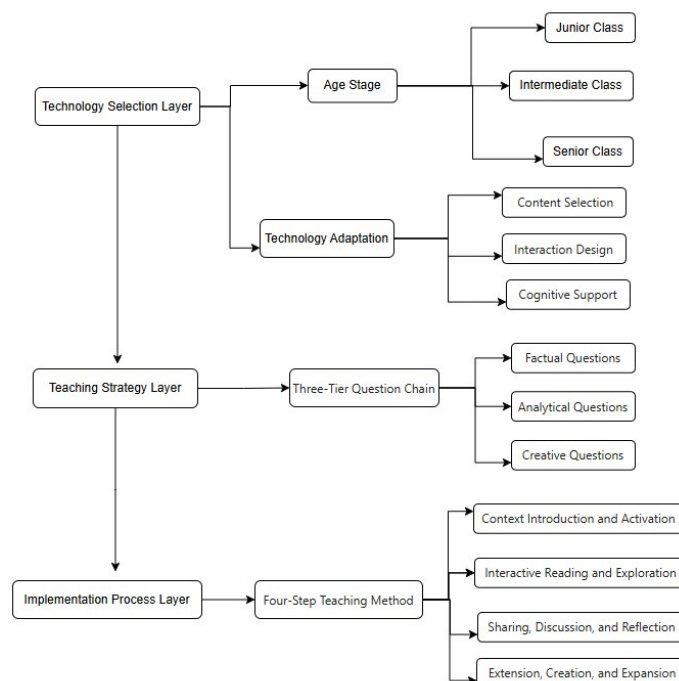


Figure 1 Digital intelligence-based interactive narrative picture book teaching model

#### 4.1 Technology selection layer: matching age stages with appropriate technologies

Based on early childhood cognitive development theory, an “Age – Ability – Technology” matching model is constructed:

**Small Class (ages 3–4):** Focus on basic touch functions and single-line narrative structures, with a limited number of interactive points to match their cognitive characteristics.

Basic touch functions align with the motor development level of this age group.

Single-line narrative reduces cognitive load.

Limited interaction points help avoid distraction and ensure effective delivery of educational content.

**Middle Class (ages 4–5):** Introduce simple branching narratives and situational simulation functions, with moderate interaction frequency.

Simple branching narratives provide limited choices, fostering initiative and exploration awareness.

Situational simulation creates realistic learning contexts connected to daily life, promoting early logical reasoning.

Moderate interaction sustains interest while avoiding cognitive overload.

**Large Class (ages 5–6):** Emphasize multi-thread narrative systems, in-depth analytic tools, and metacognitive support functions.

Multi-thread narratives cultivate information integration skills.

Analytic tools foster initial problem-solving strategies.

Metacognitive support prompts reflection on the learning process, advancing abstract thinking.

#### 4.2 Teaching strategy layer: guided inquiry through the “three-tier question chain”

Through progressive question design combined with digital intelligence support, this model promotes a step-by-step enhancement of children’s thinking abilities:

**Factual Questions:** Focus on basic information from the picture book, with immediate interactive feedback reinforcing memory of fundamental story details.

Example: “What’s the name of the little rabbit in the story?” “Who did it meet?”

Children respond via clicking or voice interaction. Correct answers trigger positive animation feedback, effectively consolidating shallow cognition through technological reinforcement.

**Analytical Questions:** Guide children to think about the motives and emotions behind character behaviors, supported by technologies such as eye-tracking to analyze attention focus and emotional cognition.

Example: “Why do you think the big bad wolf pretended to be Grandma?” “How do you think the little rabbit was feeling at that moment?”

Eye-tracking hotspots on characters’ facial expressions quantify the depth of emotional recognition, providing a basis for evaluating and guiding emotional development.

**Creative Questions:** Stimulate divergent thinking and moral/value judgment; digital platforms support co-creation of new story branches by children and teachers.

Example: “If you were the little rabbit, what would you do?” “Can we come up with a different ending together?”

Digital editing functions transform abstract imagination into concrete narrative content, pushing forward high-level creative capacities.

#### 4.3 Implementation process layer: the four-step practice method for classroom teaching

Interactive narrative picture book teaching based on digital intelligence technology follows a “Prepare–Implement–Reflect–Extend” closed-loop process:

**Contextual Introduction & Activation:** Use related pictures, videos, or open-ended questions to link the story content with children’s prior life experiences.

Example: For a friendship-themed book, show photos of children playing with peers or relevant animation clips. This activates emotional involvement and creates a natural transition into story exploration.

**Interactive Reading & Inquiry:** Guide children within the digital interactive narrative picture book system, posing the “three-tier question chain” at key plot points.

Factual: “Who met difficulties in the story?”

Logical reasoning: “If the character chose another path, what might happen?”

Value judgment: “Do you agree with the main character’s choice? Why?”

Multi-modal interaction provides immersion, while the structured question chain ensures deep synchronization of reading and thinking.

**Sharing, Discussion & Reflection:** Organize children to share their reading paths, reasoning, and emotional experiences.

Comparing alternative story outcomes lets children recognize diversity in choices and promotes viewing events from multiple perspectives, enhancing empathy and critical thinking.

This social negotiation transforms personal understanding into collective insight.

**Extension & Creative Application:** Encourage children to recreate stories through drawing, role play, or digital

composition tools.

Example: When drawing a new story ending, children integrate their understanding of characters with imaginative thinking, consolidating thematic understanding while fostering creativity and expressive skills.

In sum, the four-step method's progressive design—from situational activation, deep inquiry, social reflection, to creative transfer—enables children to complete a full learning cycle from experience to cognition to expression under the support of digital intelligence technology. This substantially enhances the systematicity and effectiveness of interactive narrative picture book teaching.

## 5 Conclusion and Future Prospects

The interactive narrative picture book teaching model proposed in this study represents a dual breakthrough through the synergy of technological empowerment and instructional coordination.

**Technological empowerment:** This model transforms traditional static picture books into dynamic, participatory, and personalized learning environments, effectively overcoming limitations in interactivity, contextualization, and personalization.

**Instructional coordination:** It not only enhances children's interest and cognitive depth but also promotes the integrated development of core competencies such as language expression, emotional cognition, and creative thinking — meeting the holistic education requirements of the digital intelligence era.

However, two prominent problems remain to be addressed:

The fragmented digital picture book market ecosystem lacks unified technical standards and resource-sharing mechanisms, resulting in scattered development and application.

The insufficient teacher training system for digital intelligence literacy hampers teachers' ability to integrate technology with pedagogy, limiting the model's large-scale implementation.

Future research could optimize the model via a "Technology–Content–Teacher–Ecosystem" four-dimensional path:

Improving technology compatibility standards;

Ensuring high-quality educational content;

Enhancing teacher digital pedagogical training;

Creating integrated, shareable ecosystems for early childhood education.

In conclusion, digital intelligence technology injects new vitality into the ancient art of storytelling. When technology and education truly embrace each other, interactive narrative picture books will play an increasingly important role in early childhood education — writing ever more vivid and engaging chapters for the growth of every child.

## Funding

Chongqing Youth Vocational & Technical College 2025 College-Level Teaching Reform Research Project: "AI-Empowered Development of Teaching Materials and Action Research for Enhancing Digital Literacy in Early Childhood Educators" (NO: 14069JG2025001)

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