

Current Status and Improvement Strategies for Utilizing Science Picture Books in Kindergarten Early Reading Activities

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Abstract: Science picture books serve the dual functions of transmitting scientific knowledge and constructing reading experiences, making them indispensable high-quality educational resources in kindergarten early reading activities. Compared to narrative story picture books, science picture books possess unique characteristics in content organization, text-image integration, and knowledge construction, imposing higher demands on teachers' book selection and instructional guidance capabilities. Taking 54 teachers from three kindergartens in Changsha City as the research sample, this study systematically investigates the current application status of science picture books in collective teaching and reading corner activities through a combination of questionnaire surveys, in-depth interviews, and field observations. The findings reveal an overall underutilization of science picture books in kindergartens, primarily reflected in small quantities and low replacement frequencies in reading corners, low usage rates in collective teaching, as well as practical dilemmas faced by teachers in setting educational goals, identifying key instructional points, and implementing reading intervention strategies. To address these issues, kindergartens should optimize the allocation of science picture book resources, establish a comprehensive teacher professional training system, and promote the deep integration of scientific reading with children's daily life experiences, thematic activities, and home-kindergarten collaboration to fully realize their educational value.

Keywords: Science picture books; Kindergarten; Early reading; Reading corner; Reading guidance

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1. Introduction

Picture books construct meaning through the complementary interaction of images and text, providing young children with a multi-channel reading experience^[1]. In preschool education, early reading is not merely rote literacy or simple text decoding; rather, it is a process wherein young children, supported by adults, utilize illustrations and expository language to foster reading interest, accumulate experience, and develop

foundational comprehension skills ^[2,3]. As an important subgenre of picture books, science picture books generally focus on life sciences, physical phenomena, and natural laws. They present scientific concepts and rules through realistic or expository expressions, which significantly promotes the synergistic development of children's language skills and scientific literacy while broadening their reading horizons ^[4-7].

However, in kindergarten practice, the frequency of using science picture books is far lower than that of story or language picture books. On the one hand, such books contain numerous professional concepts and expository terms, requiring strong pedagogical conversion capabilities from teachers. On the other hand, if scientific knowledge is disconnected from children's daily life experiences, instruction can easily degenerate into mechanical rote learning. Currently, teachers universally face confusion regarding the selection, goal setting, and reading guidance of science picture books. Based on this, the present study explores the application status and underlying causes of science picture books in kindergarten early reading activities, aiming to provide an empirical reference for enhancing kindergarten book resources and teachers' professional guidance capabilities.

2. Research design

2.1. Research subjects

This study selected 54 teachers from three kindergartens in Changsha City as questionnaire respondents, combined with in-depth interviews with 12 teachers and field activity observations. The sample covered 21 teachers in junior classes (ages 3–4), 15 in middle classes (ages 4–5), 14 in senior classes (ages 5–6), and 4 in toddler classes (ages 2–3). In terms of teaching experience, novice teachers with less than 3 years of experience accounted for 87.04%, 3–6 years accounted for 5.56%, 6–9 years accounted for 3.70%, and over 9 years accounted for 3.70%. The sample predominantly reflects the authentic state of young/novice teachers in utilizing science picture books.

2.2. Research methods and tools

This study adopted a combined approach of questionnaire surveys, interviews, and observations. A self-designed Survey Questionnaire on the Application Status of Science Picture Books in Kindergarten Early Reading Activities was used, comprising 25 items covering dimensions such as book placement and replacement in reading corners, children's reading performance, teacher intervention strategies, as well as material selection, goal setting, and instructional methods in collective teaching. A total of 54 questionnaires were distributed and 54 valid questionnaires were recovered (valid response rate: 100%).

Based on the survey, 12 teachers were randomly selected for semi-structured interviews to gain deeper insight into their authentic thoughts during instructional design and reading guidance. Field observations were simultaneously conducted in reading corners and collective teaching sessions to supplement and triangulate the questionnaire and interview data. Quantitative data were analyzed using statistical software, while interview and observation materials were categorized using qualitative textual induction.

3. Results and analysis

3.1. Application status of science picture books in collective early reading instruction

3.1.1. Significant teacher selection bias for picture book types

Surveys show a significant preference among teachers when choosing book genres for collective early

reading instruction. As shown in **Figure 1(a)**, 63% of teachers preferred story/language picture books, 48% chose prose picture books, while the proportion selecting science picture books was noticeably lower (31%). This phenomenon aligns with international research conclusions regarding the underutilization of informational/knowledge-based picture books in classroom reading instruction ^[8,9].

Interviews revealed that this phenomenon mainly stems from the numerous professional terms and scientific phenomena in science picture books, which make pedagogical conversion difficult. Teachers struggle to translate abstract scientific concepts into activities suited to young children's cognitive development, and therefore tend to prefer easier-to-manage story materials ^[10,11].

3.1.2. Recognition of comprehensive educational value vs. vague goal design

Regarding instructional goal setting, as shown in **Figure 1(b)**, most teachers recognize the multifaceted educational value of science picture books. Specifically, 77.78% of teachers identified "developing children's reading ability" as a core goal, 81.48% focused on "cultivating reading habits," 75.93% on "knowledge acquisition," and 61.11% on "emotional experience."

In an interview, a middle-class teacher mentioned: "When setting goals, I integrate them with our class thematic activities. For example, during our recent food education course, children observed wild vegetables in the greenhouse and asked, 'Why don't wild vegetables grow where there's no sunlight?' We used this question as the entry point for our science reading goal." This demonstrates that teachers are not unaware of the value of science picture books, but rather lack clear criteria and conversion strategies on how to balance "scientific inquiry," "reading ability development," and "emotional experience."

3.1.3. Instructional materials and methods remain predominantly traditional lecture-based

Regarding instructional material preparation, as shown in **Figure 1(c)**, 78% of teachers relied on "physical books" as the primary medium, 65% used "projectors," 52% used "computers," 57% combined "tape recorders/audio," and 50% used "printed pictures."

Regarding instructional strategies, as shown in **Figure 1(d)**, questioning (72%) and telling/explanation (67%) were the most frequently used methods, followed by discussion (63%), gaming (61%), and reading aloud (57%). In junior classes, one-way telling predominated; in senior classes, the proportions of discussion and hypothesis/inference increased. Overall, however, some instructional activities still tilted toward "teacher explanation," leaving room for improvement in children's autonomous observation, guessing, and active construction based on image details.

3.2. Application status of science picture books in reading corners

3.2.1. Limited quantities and long replacement cycles

The reading corner is the primary location where children independently interact with science picture books. As shown in **Figure 2(a)**, 72.22% of class reading corners contained fewer than 25 science picture books, 18.52% had 25–30 books, and only 3.70% had more than 35 books. Regarding book replacement frequency, as shown in **Figure 2(b)**, 37.04% of classes replaced books monthly, 33.33% every two months, while biweekly (16.67%) and weekly (12.96%) replacements were less common.

Interviews revealed that high single-book purchasing costs and limited kindergarten budget investments are key constraints. Most classes relied on books left by previous cohorts or encouraged children to bring their own, resulting in scarce and outdated science reading resources.

3.2.2. Low active selection and usage frequency by children

Influenced by both material placement and teacher preferences, children's initiative to select science picture books in reading corners was generally low. As shown in **Figure 2(c)**, out of 10 early reading activities conducted, 59.26% of teachers selected science picture books 3 times or fewer, 31.48% selected them 3–5 times, and only 9.26% selected them 5–8 times.

In reading corners, except for some senior class children who showed sustained interest, junior and middle class children generally preferred storybooks with strong narrative plots. This negative feedback loop of “low teacher usage–low resource placement–low child engagement” further diminished the practical application value of science picture books.

3.2.3. Passive teacher intervention and insufficient active support

Regarding reading corner guidance strategies, as shown in **Figure 2(d)**, 62.96% of teachers tended to use parallel intervention, 59.26% used vertical intervention, and 46.30% used cross intervention. In terms of intervention timing, the vast majority viewed “children actively seeking help” or “encountering difficulties and wanting to give up” as the best opportunities.

Field observations showed that teacher intervention mostly occurred after behavioral deviations or active questions from children. Active tracking observation and in-depth guidance regarding whether children could comprehend expository language in illustrations or build scientific inferences through observation were lacking^[12,13].

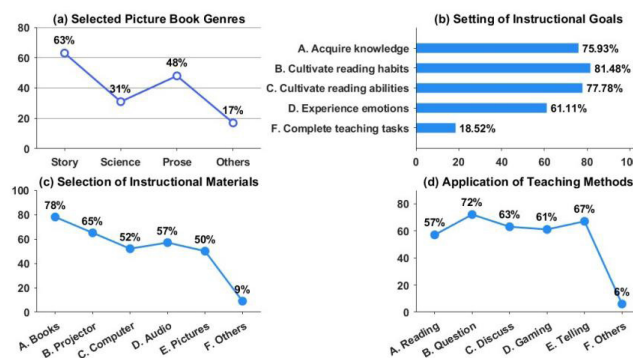


Figure 1. Overview of science picture book utilization in collective early reading instruction: (a) Selection of picture book genres by teachers; (b) Formulation of instructional goals; (c) Choice of instructional media and materials; (d) Application of teaching methods.

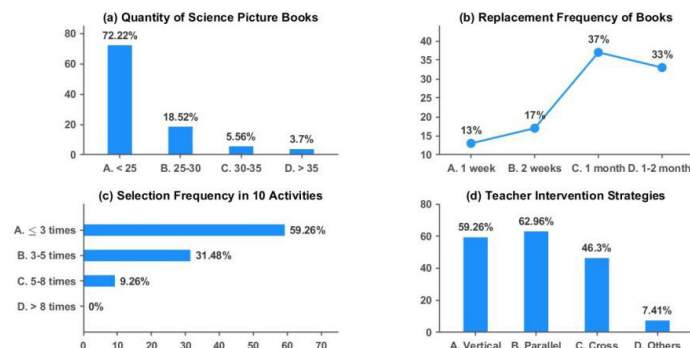


Figure 2. Environmental creation and instructional implementation of science picture book reading: (a) Quantity of science picture books placed in classrooms; (b) Replacement frequency of science picture books; (c) Frequency of selecting science picture books across 10 reading activities; (d) Intervention guidance strategies used during reading.

3.3. Dilemmas facing science picture books in kindergarten early reading activities

Synthesizing the survey, interview, and observation results, the dilemmas facing science picture books in kindergarten early reading activities are not caused by a single factor, but rather by the combined effects of resource limitations, teacher selection preferences, and insufficient professional capacity.

3.3.1. Restricted resource construction failing to build an immersive reading environment

Science picture books demand high precision in illustrations and printing quality, leading to higher publication and purchasing costs that exceed kindergarten procurement budgets. Furthermore, without regular replacement mechanisms, books in reading corners become worn and outdated, failing to sustain children's exploratory interest.

3.3.2. Vague teacher perception and inaccurate grasp of key/difficult instructional points

As shown in **Figure 3**, when discussing key and difficult instructional points of science picture books, 52% of teachers regarded “white space” as an instructional difficulty, and 48% identified “details”; regarding content structure, 68.63% selected “plot” as the key instructional focus. This indicates that many teachers still apply the appreciation framework of story picture books to science picture books, failing to accurately grasp the specific image-text explanatory relationship and scientific construction logic. Consequently, instruction easily falls into the extremes of either “pure story narration” or “dry knowledge lecturing”^[14].

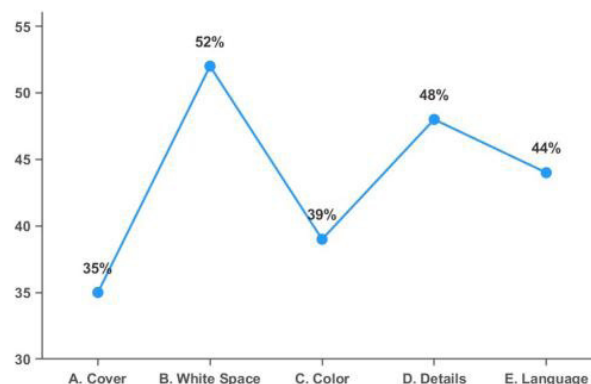


Figure 3. Key and difficult teaching points of science picture books

3.3.3. Single guidance strategy and lack of active observation and deep support

Due to a lack of specialized training in science reading guidance, teachers often act as “supervisors” rather than “guides” in reading corners. Teachers generally lack techniques to guide children's scientific reading thinking (e.g., hypothesis, verification, comparative observation) and struggle to prompt deep thinking through open-ended questions at appropriate moments.

4. Educational suggestions and countermeasures

4.1. Optimizing resource allocation for an immersive environment

Kindergartens should set dedicated budgets for high-quality science picture books, establish a dynamic

rotation system (“weekly minor rotations, monthly major adjustments”), and promote cross-class sharing. Reading corners should link with science and nature areas using tools like magnifiers and specimens to enable hands-on reading.

4.2. Enhancing teacher training in goal-setting and pedagogy

School-based workshops should guide teachers to differentiate narrative from informational structures and analyze expository image-text relationships ^[15]. Lecturing should be replaced with inquiry-driven methods, such as hypothesis verification, comparative observation, and chart sorting.

4.3. Integrating science reading with daily routines and themes

Science reading should connect with thematic projects (e.g., science festivals) and daily observations (e.g., plant growth), positioning books as tools for children to explore real-world questions rather than isolated reading tasks.

4.4. Extending science reading through home-kindergarten collaboration

Parenting workshops and reading guides should empower families to conduct joint reading, outdoor explorations, and simple household experiments, creating a collaborative learning environment.

5. Conclusion

Science picture books possess irreplaceable value in cultivating young children’s scientific literacy, expanding expository language experience, and establishing early reading interest. This study indicates that the current application of science picture books in kindergartens faces practical dilemmas such as insufficient placement quantity, slow replacement, low usage rates, and lack of teacher guidance capabilities. To break through this status quo, dual efforts must be made in “improving hardware resources” and “enhancing teachers’ professional capabilities.” By optimizing resource supply, strengthening professional training, advancing domain integration, and deepening home-kindergarten co-education, the unique educational value of science picture books can be fully realized to support children’s holistic development.

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Disclosure statement

The author declares no conflict of interest.

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