A Preliminary Exploration of Children's Reading Resource Development in the Digital-Intelligence Era: Problems, Characteristics, and Strategies (Postprint)

Authors: Song Yu

Date: 2025-07-09T00:00:00+00:00

Abstract

【目的】This paper identifies issues in the construction of digital reading resources for children, analyzes the characteristics and applications of digital reading resources, and reflects on corresponding construction strategies. 【方法】Based on relevant reports, research, and practical observations, it systematically examines the topic using embodied cognition theory as an analytical framework to summarize feasible strategies. 【结果】It proposes that digital reading resources should enhance children' s bodily perception, deepen the integration of knowledge and context, expand the reading ecological environment, and grasp the application direction in the digital-intelligence era. 【结论】Publishers should adhere to correct value orientation, adopt scientifically sound content design and technical means, engage in deep cooperation with education, family, and community, and collaborate with educational technology and academic research institutions for continuous innovation.

Full Text

Preamble

Exploring the Construction of Children' s Reading Resources in the Digital-Intelligent Era: Problems, Characteristics, and Strategies

Song Yu1,2
(1. Beijing Normal University Publishing Group, Beijing 100088;
2. Laboratory for the Development and Application of Children' s Graded Reading Standards, China Book Distribution Association, Beijing 100088)

Abstract

[**Purpose**] This paper identifies problems in the construction of children' s digital reading resources, analyzes the characteristics and applications of digital reading resources, and reflects on corresponding construction strategies. [**Method**] Based on relevant reports, research, and practical observations, this study employs embodied cognition theory as an analytical framework to systematically review and summarize feasible strategies. [**Results**] The study proposes that digital reading resources should enhance children' s physical perception, deepen the integration of knowledge and context, and expand the reading ecological environment, thereby grasping the application direction of the digital-intelligent era. [**Conclusion**] Publishers should adhere to correct conceptual guidance, adopt scientifically sound content design and technical methods, engage in deep cooperation with educational institutions, families, and communities, and collaborate continuously with educational technology and academic research institutions to drive innovation.

Keywords: digital reading; embodied cognition; digital resource construction; publishing digitization; graded reading
Classification: G201
Document Code: A
Article ID: 1671-0134(2025)02-114-05
DOI: 10.19483/j.cnki.11-4653/n.2025.02.022
Citation Format: Song Yu. Exploring the Construction of Children's Reading Resources in the Digital-Intelligent Era: Problems, Characteristics, and Strategies[J]. China Media Technology, 2025, 32(2): 114-118.

Digital reading has become the primary pathway for children' s reading, profoundly transforming the form and presentation of reading resources. According to the 21st National Reading Survey, the contact rate of digital reading methods among minors aged 0–17 in China reached 74.7% in 2023 [1]. This figure reflects children' s high acceptance of and reliance on digital reading resources, highlighting their importance in children' s knowledge acquisition and learning lives. As a new form in the digital-intelligent era, digital reading resources enable children to "perceive digital book fragrance in an embodied state" [2], presenting new development opportunities for publishers. This trend represents both an inevitable choice for promoting high-quality and intelligent transformation in publishing and a requirement for digital development strategies under the industry' s new productive forces [3]. However, current construction efforts face several problems, such as neglecting children' s physical experiences, insufficient alignment with real needs, and failure to form a digital reading ecological environment, which constrain practical applications. Embodied cognition theory and its characteristics provide a theoretical foundation for the bodily return in digital reading and offer a research paradigm for constructing digital reading resources.

This paper aims to explore current problems in publishers' construction of children' s digital resources, analyze the characteristics and applications of children' s digital reading resources based on embodied cognition theory, and propose construction strategies to provide references for the high-quality development of children' s digital reading resources.

1.1 Sensory Experience Deficiency: The Forgotten Body

Digital reading carriers today exhibit mobility, convenience, and intelligence, while physical reading spaces gradually shrink. Access to reading resources has become more diversified, as the popularization of digital media breaks the spatiotemporal limitations of traditional reading and reduces reliance on physical position and touch of paper books, enabling children to access rich digital reading resources anytime and anywhere. However, in the rapid process of symbolization, digital reading resources have overlooked the participation and experience of bodily senses.

Compared with paper books, screens occupy an important position in digital reading. Constrained by technical conditions and R&D capabilities, publishers have focused on one-way transmission of information and reading content, neglecting insights into the sensory experiences and physical feelings of children at different ages. The visual presentation of screens limits children' s ability to activate physical perception during reading, resulting in "the forgotten body." Many digital platforms lack appropriate rest reminders, and reading interface designs fail to fully consider the vision requirements and operational convenience of different age groups. These issues may reduce children' s interest and experience in digital reading and even affect their health.

Traditional reading perspectives view children' s reading merely as a mental activity of the brain, believing that children' s rational growth is achieved only through the brain while ignoring the body' s role in cognition. Current construction of children' s digital resources still exhibits a tendency to overemphasize the instrumental value of reading, focusing on the quantity of resources and test scores while prioritizing technical device presentation effects and neglecting children' s physical and mental development. However, reading facilities and activities in the digital-intelligent era should all point to human reading experiences. Publishers need to "transform from a book-centered to a human-centered approach" [4], returning digital reading to children' s bodily experiences.

1.2 Contextual Disconnection: Detachment from Real Needs

Currently, digital reading resources are disconnected from children's actual needs and real-life contexts in content design. Although many publishers have achieved print-digital integration and developed digital reading resources to accompany paper book products, they lack effective connection with children' s real contexts and existing experiences, resulting in low utilization rates and effectiveness of reading resources.

In terms of resource organization, digital reading resources typically follow the structure of paper books (e.g., book-chapter or unit-section), lacking systematic planning of the overall product knowledge framework. This leads to redundant topics, repeated resources, and chaotic content, which hinder children from building complete and clear knowledge systems and negatively affect the personalized recommendation functions of intelligent systems. Specifically, first, due to time, manpower, and technical constraints, digital reading resources fail to fully grasp children' s situations and conduct group segmentation, making it difficult to implement differentiated content layering and difficulty grading based on professional and scientific grading standards, and lacking professional and systematic reading guidance. Second, current personalized recommendation algorithms used by publishers heavily rely on keyword matching or collaborative filtering within paper product structures, lacking support from systematic knowledge system design and hierarchical systems for digital reading resources. Consequently, recommended content often deviates from children' s real needs, affecting their reading interest and effective experience.

However, as intelligent digital products, children' s digital reading resources provided by publishers should have a systematically clear structure, rich educational significance, and cultural value, significantly different from fragmented information with internet entertainment functions and consumer orientation. Compared with the brief, scattered, fragmented, and superficial characteristics of online information, digital reading resources should help children engage in deep reading, form good knowledge structures, and achieve knowledge transfer across different contexts.

1.3 Ecological Environment Fragmentation: Imbalanced Collaborative Construction

Imbalanced collaborative construction represents a bottleneck in publishers' development of children' s digital reading resources. Building children' s digital reading resources requires cooperation among families, schools, libraries, and other cultural institutions to jointly build an ecological environment supporting children' s digital reading. However, current stakeholders have failed to achieve organic coordination in content development, technical support, and resource allocation, making it difficult to make effective adjustments based on children' s actual situations or provide a unified support system to ensure children' s digital reading effectiveness across different environments.

Additionally, uneven technical infrastructure—such as insufficient network coverage, lack of electronic hardware, and smart reading facilities—also constrains the popularization of digital reading resources, limiting children' s access to and utilization of these resources. This not only affects some children's opportunities to access high-quality reading resources but also hinders the cultivation of their digital reading habits and the improvement of their digital reading literacy.

2. Characteristics of Children' s Digital Reading Resources from the Perspective of Embodied Cognition

Embodied cognition theory challenges the mind-body separation assumption of first-generation cognitive science, arguing that cognition is not an independent information processing process of the brain but an activity embedded in the body and environment, continuously generated and developed through interactions among the brain, body, and environment [5]. The essence of digital reading is a cognitive behavior that deeply participates in and influences the reading practice and meaning construction process. Today, with the advancement of intelligent devices and immersive perception technologies, digital reading resources are intervening in children' s reading in unprecedented ways, emphasizing the importance of enhanced bodily perception, deepened contextual integration, and expanded ecological environment in digital reading. This provides a feasible exploration direction for digital reading resource construction.

2.1 Embodiment: Sensory Involvement and Experience Enhancement

Embodied cognition theory holds that cognition is directly linked to bodily experience. The body is not merely a physiological "objective entity" but also a lived "phenomenal body"that experiences the world through touch, vision, smell, and hearing [6]. The physical properties of the body directly affect cognition, determining the movement processes of thinking and mind, and constitute the physiological foundation for children to understand the world.

Attention attraction is the prerequisite for digital reading [7]. Therefore, digital reading resources should actively adapt to mobile and intelligent reading trends, fully leverage the interactive advantages of digital platforms, and adopt multimodal design. By integrating multiple sensory experiences and bodily actions, reading content can be transformed from static text or images into a series of dynamic sensory experiences, "forming a reading field with multi-channel perception" [8]. This allows children to gain immersive feelings during reading, transforming reading from a pure text cognitive activity into a whole-body experience that influences their cognitive development through bodily experiences.

With the help of intelligent recommendation technology, digital reading resources can integrate children' s reading interaction data (such as reading speed and dwell time) to identify and judge their emotional states and cognitive needs, and accordingly change real environmental factors or simulate real contexts, such as adjusting font size, screen brightness, or creating scenarios, thereby influencing children' s bodily feelings and action experiences and strengthening the bodily connection between children and reading content. Children' s bodily behaviors and sensory experiences thus become key bases for personalized digital reading and important references for macro-level decision-making. Digital reading resources are not merely media for knowledge transmission but also participants and promoters of children' s bodily experiences and cognitive development.

2.2 Situatedness: Knowledge Construction and Emotional Integration

Embodied cognition theory posits that perceptual experiences generated through body-environment interaction are the initiators and arenas of cognition [9]. Situatedness, as one of the core features of embodied cognition theory, encompasses not only physical environments and bodily structures but also broad aspects such as socio-historical-cultural backgrounds, language, and knowledge products [10]. Therefore, individuals gradually absorb and internalize rules and cultures in specific contexts as they grow, continuously forming part of their own cognitive systems, thereby tightly integrating cognition and action to achieve "unity of knowledge and action."

Digital reading resources organically integrate contextual elements such as children' s life situations, natural phenomena in the physical world, social environments, and cultural customs through multimodal technology and virtual reality technology. Based on children' s physical and mental development and reading abilities, they "take large themes, big concepts, and related key situations as the framework"[11] to construct knowledge frameworks and socio-cultural references that facilitate cognitive development. This knowledge system framework serves as the support system and external presentation of knowledge contexts, containing socio-historical-cultural concepts, knowledge technologies, and scientific achievements under the era' s development, providing rich materials and manifestations for contextual representation. Children can then understand reading content in more intuitive and vivid ways, combining abstract concepts with existing experiences and specific contexts to better achieve knowledge transfer.

The essence of digital reading resources is reading content that embodies people' s cultural-historical experiences and social values, conveying aesthetic implications and artistic sentiments while reflecting and inheriting social culture [12]. Children grow up immersed in social culture, and through reading specific information and knowledge, they can establish deep emotional connections with cultural traditions at the emotional level, stimulate bodily experiences, trigger deep emotional resonance, and deepen their perception and identity of Chinese culture. Digital reading resources thus cover extensive fields from basic language knowledge and common sense to complex scientific principles and humanistic thoughts, involving not only the improvement of reading skills and thinking abilities but also the gradual shaping of positive values. By creating knowledge contexts that dynamically match children' s needs and growth requirements, digital reading resources provide children with a spiral ascending path of reading development.

2.3 Generativity: Dynamic Construction and Ecological Integration

Embodied cognition theory views cognitive activity as a dynamically generated process. The generativity of cognition is rooted in contexts and continuously emerges through dynamic communication and collision among the brain, body, and context [13], constantly changing and developing as new experiences are

generated between individuals and contexts.

Through human-computer collaborative dialogue mechanisms supported by generative artificial intelligence, digital reading resources assist in answering children' s questions during reading comprehension, achieving real-time feedback and dynamic adjustment of their cognitive processes. In this process, children are not merely recipients of knowledge but active participants in knowledge construction. Through interaction with digital reading resources, children can continuously generate new experiences through bodily movement, sensory experiences, and emotional investment, forming personalized cognitive structures highly integrated with systematic knowledge. While integrating new information in contexts, children can engage in active construction and reflection, reevaluate and adjust existing cognitive frameworks, form more flexible and profound knowledge understanding, and ultimately apply knowledge flexibly across different contexts to achieve knowledge transfer.

The generativity of digital reading resources not only affects individual children' s reading but also manifests in the processes of interaction, sharing, and joint participation among children. Digital reading resources support children in sharing reading experiences, provide teachers and parents with objective data and analysis reports on children' s reading processes and results, and offer highly targeted reading plans and guidance schemes. This assists important others in children' s lives—teachers and parents—in systematically carrying out reading education in real-life contexts, helping children achieve co-construction of knowledge within their "zone of proximal development." Beijing Normal University' s "Jingshi Reading" digital platform, relying on book and curriculum resources combined with comprehensive supervision and data management mechanisms, enables teachers and parents to comprehensively understand children' s complete reading behaviors, reading effectiveness, and their own growth and change data, achieving home-school co-education, and cooperates with a professional and comprehensive training system to provide all-round reading services integrating home and school.

3. Paths for Constructing Children' s Digital Reading Resources

Embodied cognition theory emphasizes that cognition depends not only on brain thinking but also on sensory experiences, bodily movements, and contextual interactions. Therefore, digital reading resource construction should start from the fundamental task of fostering virtue through education, based on the core competency requirements of basic education, center on children, emphasize the principles of "bodily return - contextual diversity - interactive generation," adhere to correct conceptual guidance, respect children' s physical and mental development laws, scientifically grade reading resources, collaborate with multiple stakeholders, jointly build a sound digital reading ecological environment, and promote the effective improvement of children' s reading abilities and core competencies.

3.1 Returning to the Body: Adhering to Correct Conceptual Guidance

Regardless of how reading forms and scenarios change, the essence of reading remains content. Children' s digital reading resources should start from the fundamental task of fostering virtue through education, follow the requirements of textbook construction, ensure resources promote children' s comprehensive development in ideological understanding, knowledge skills, and emotional values, uphold Marxism as the guiding ideology, reflect the sinicization and modernization of Marxism, embody Chinese and national styles, represent the basic requirements of the Party and state for education, reflect national and ethnic basic values, reflect the accumulation and innovation of human cultural knowledge, deeply explore content that fully embodies excellent traditional Chinese culture and advanced socialist culture, and cultivate children' s patriotic feelings and profound identification with Chinese culture [14].

In terms of content, digital reading resources should respect children' s physical and mental development conditions and cognitive needs, comprehensively cover various subject themes, grasp basic education curriculum standards, rationally configure text types and presentation modalities, achieve organic integration and connection across disciplines, conform to objective facts and scientific principles, and incorporate morality, aesthetics, labor consciousness, and social responsibility to guide children in establishing correct values.

After more than a decade of development, the print-digital integration in the publishing industry is no longer a simple superposition of technology and content but represents innovation and upgrading in contemporary reading education concepts. It is an important path that conforms to children' s physical and mental development laws and adapts to digital reading education trends. Research shows that paper reading can promote neural connection and regeneration to better consolidate memory, while digital reading activates neural connection and generation to improve learning and output capabilities [15]. Therefore, publishers should actively promote integrated print-digital design, give full play to the respective advantages of print and digital resources, achieve their synergistic complementarity and deep integration, and continuously promote high-quality digital, networked, and intelligent development of publishers. On this basis, digital reading resources should fully leverage the advantages of digital resources being unitized, specialized, and clustered, presenting a three-dimensional, systematic, and scientific organizational form; adopt multimodal design to link and reorganize static knowledge content with dynamic and diverse digital resources such as music, graphics, videos, and touch sensations, enhancing interactive functions and feedback mechanisms; and timely update content in combination with China' s new scientific and technological achievements and social hot issues to ensure digital reading resources always keep pace with the times and meet children' s thirst for new knowledge.

3.2 Designing Contexts: Creating a Dynamic Grading System

The digital-intelligent era demands "cultivating comprehensive innovative talents with digital literacy and complex problem-solving abilities needed in the digital society" [16], pointing to the cultivation of children' s core competencies. Digital reading resources should adhere to the child-centered principle, respect children' s physical and mental development laws, fully recognize their differences in cognitive development, sensory experiences, reading abilities, and cultural backgrounds; follow the graded reading concept, design resource content and forms that meet the needs of different child groups, establish a reasonable and scientific digital reading grading system, and ensure the effectiveness and appropriateness of reading resources.

Graded reading is an important pathway to realize the child-centered concept, a key basis for planning and goal-setting in children' s digital reading resources, the foundation for enabling children to independently choose reading resources and obtain dynamic reading resource services through big data analysis, and its essence is "the dynamic matching of children's book grading and children's reading ability grading" [17]. Publishers should combine social concepts, knowledge technologies, and scientific achievements with the educational goal of "what kind of people to cultivate," construct a scientific grading, layering, and classification system based on children' s cognitive characteristics, reading abilities, cultural environments, and interest preferences, focusing on the dynamic matching degree between reading text difficulty and children's cognitive ability development, adopt modular and systematic design principles, create a differentiated characteristic content matching mechanism, meet children' s personalized dynamic needs, and enable them to gradually master required knowledge, skills, and values.

Children are unique reading subjects with different reading interests, abilities, and needs. Children in the same age group have different reading levels and preferences; the same child' s reading ability, interest, and needs also change with age, reading preferences, and external contexts. The widespread application of big data technology and intelligent reading devices can accurately perceive and analyze information such as children' s cognitive abilities, interests, reading needs, and cultural backgrounds. Digital reading resources should combine the graded reading concept, utilize technology to collect and analyze children' s reading behaviors, facial expressions, eye movement data, and action feedback, apply intelligent recommendation algorithms to dynamically adjust reading resource content themes, language difficulty, presentation forms, and resource recommendation services, establish effective and timely feedback mechanisms, ensure content timeliness and relevance, and achieve intelligent supply of reading resources and precise matching with children' s reading needs.

3.3 Cooperative Symbiosis: Building a Sound Ecological Environment

Children' s digital reading resource construction should focus on building a complete online-offline hybrid digital reading ecological environment, achieve positive interaction and feedback mechanisms among different subjects through resource sharing and technological innovation, and realize interactive synergistic effects. Publishers need to recognize their role in promoting the development of educational technology and cultural industries, serve the overall interests of education and publishing, actively fulfill social responsibilities, and continuously enhance the influence of knowledge services; deeply understand the needs of children, parents, teachers, and other groups for high-quality reading resources, create collaborative mechanisms that combine online digital resources with offline reading activities, provide children with continuous reading environments and systematic guidance, expand the boundaries of reading education, and cultivate a positive reading ecology; develop customized digital reading resources according to local cultures and specific educational needs, provide corresponding reading teaching guidance services.

In practice, Beijing Normal University Publishing Group has established a close cooperative relationship with Anhui Xinhua Media Co., Ltd., successfully promoting the "Beautiful Reading" series of products and services to multiple cities and counties across the province, and successfully creating a distinctive brand image.

Big data, intelligent knowledge graphs, intelligent search of reading resources, and personalized information flow push technologies have brought new opportunities and challenges to digital reading resource construction. Publishers should establish partnerships with educational institutions, technology companies, universities, and research institutions to deeply explore the integration and innovation of children' s digital reading resources, promote the combination of digital reading theory and practice, and inject high-quality innovative momentum into reading resource construction and digital transformation; simultaneously improve the management mechanisms of digital reading resources to ensure that resource content and forms are legally compliant and safely and accurately delivered to children. Additionally, when planning digital resources, publishers should consider children' s access to digital reading resources under different regional and economic backgrounds. Through policy support and local cooperation projects, publishers can lower resource access barriers and contribute to improving the popularization rate of digital resources, allowing more children to benefit from high-quality digital reading resources.

Children' s digital reading resource construction is a complex systematic project that requires comprehensive consideration of children' s physical and mental development laws, knowledge content design, and intelligent technology application. From the perspective of embodied cognition, publishers should deeply understand children's cognitive needs and bodily experiences, emphasize the embodiment, situatedness, and generativity of digital reading resources, adhere to

correct conceptual guidance, adopt scientifically sound content design and technical methods, engage in deep cooperation with education, families, and communities, collaborate continuously with educational technology and academic research institutions to provide suitable digital reading resources for children, create a sound digital reading ecological environment, promote the development of their digital reading abilities and core competencies, and advance the deep digital transformation and upgrading of publishers.

References: [1] Results of the 21st National Reading Survey Released [EB/OL]. (2024-04-23)[2024-11-22]. https://www.nationalreading.gov.cn/wzzt/2024qmyddh/cgfb/desycqggmyddccg/202
[2] Li Jidong, Liu Yuefei. The Future of Digital Book Fragrance: Infrastructure, Sensory Experience, and Interaction Interface[J]. Publishing Research, 2024(10): 83-88.
[3] Zhuang Hongquan. The Connotation, Driving Force, Value Implication, and Practical Path of New Quality Productive Forces Empowering High-Quality Development of the Publishing Industry[J]. Chinese Editors, 2024(11): 4-10.
[4] Xu Shengguo. Trends in Reading Digitization and Intelligence from National Reading Survey Data[J]. Editing Friends, 2024(9): 5-9.
[5] Zhao Libing. Moving Toward the "Margins" : The Practical Phenomenology of the Reading Process[J]. International Press, 2023(4): 116-137.
[6] Wu Yingying, Xu Jianhua. The Bodily Turn in Reading Experience Research[J]. Library Construction, 2024(2): 145-154.
[7] Liu Yeping, Yuan Xiaoqun. Research Progress on Digital Reading Cognitive Mechanisms from a Cognitive Neuroscience Perspective[J]. Library and Information Knowledge, 2023(6): 129-139.
[8] Yang Lijiao, Xu Huidan, Song Peiyan. Research on the Path and Trends of Digital Technology and Resource Construction Empowering Youth Reading Education[J]. China Educational Technology, 2024(6): 23-31.
[9] Han Xiaoling, Liu Xinyang, Liu Yuxi. Design of Learning Scaffolds in Science and Technology Venues from the Perspective of Embodied Cognition[J]. Modern Educational Technology, 2021(3): 64-71.
[10] Wang Shuyan, Li Jiang. Situated Cognition: The Situatedness of Cognition and Its Contextualization[J]. Studies in Philosophy of Science and Technology, 2016(6): 7-11.
[11] Zhang Wenlong. The Application Value and Selection Boundaries of Digital Textbook Resources for Teaching[J]. China Media Technology, 2024(7): 23-28.
[12] Yin Guoqiang. Internet-Assisted Childhood: Transformation and Reflection on Children' s Reading in the Digital Media Era[M]. Guilin: Guangxi Normal University Press, 2023: 141-162.
[13] [Chile] F. Varela, [Canada] E. Thompson, [USA] E. Rosch. The Embodied Mind: Cognitive Science and Human Experience[M]. Translated by Li Hengwei, Li Hengxi, Wang Qiu, et al. Hangzhou: Zhejiang University Press, 2010: 118-144.
[14] Ministry of Education. Notice on Issuing the "Management Measures for Primary and Secondary School Textbooks," "Management Measures for

Vocational School Textbooks," and "Management Measures for Regular Higher Education Institution Textbooks" [Z]. Jiaocai 〔2019〕 3, 2019-12-19.
[15] Kevin K. Reading in a Whole New Way[EB/OL]. (2010-08-01)[2024-11-22]. https://www.smithsonianmag.com/arts-culture/reading-in-a-whole-new-way-1144822/.
[16] Liu Xinwei, Jiang Yu. The Integrated Development of Educational Publishing from the Perspective of Educational Digitization: Value Turn and Practice Direction[J]. China Media Technology, 2024(10): 5-9.
[17] Li Yanhui, Hu Miao. Exploration of Industry-University-Research Integration under the Guidance of Graded Reading Standards—A Brief Analysis of the Strategic Project Practice of "Children' s Graded Reading Standards" by Beijing Normal University Publishing Group[J]. Publishing Wide Angle, 2023(9): 44-48.

Author Introduction: Song Yu (1988—), female, Beijing, master' s degree, intermediate publishing professional, research direction: editing and publishing.
(Responsible Editor: Li Jing)

Note: Figure translations are in progress. See original paper for figures.