Jiang, B. et al. (Eds.) (2025). Proceedings of the 33rd International Conference on Computers in Education. Asia-Pacific Society for Computers in Education

Designing an AI Reading Assistant to Support Home–School Engagement

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Abstract: This study proposes an AI reading assistant system grounded in the Interest-Driven Creator (IDC) theory to enhance parental engagement in literacy-oriented education. The system integrates students' reading records, grade-level data, and a thematic book map, enabling parents to receive personalized, real-time responses via natural language queries. It consists of three modules: (1) a thematic book map covering three domains and twelve subcategories, each with multidimensional tags for semantic matching; (2) a reading data integration mechanism that consolidates parent-entered book titles, dates, reflections, and optional media into personalized reading histories; and (3) an AI recommendation engine that analyzes reading history, preferences, and curriculum topics to generate relevant, age-appropriate suggestions. A preliminary test with six parents found most valued the assistant's timely, clear feedback for understanding their child's reading habits, while one suggested more specific follow-up recommendations. A six-week trial at an experimental elementary school in Taoyuan, Taiwan, will involve 30–40 families with students in Grades 2–6 to evaluate system usability, its impact on parents' thematic awareness, and its potential to foster richer parent–child reading interactions, informing optimization of the recommendation and thematic extension features.

Keywords: AI Reading Assistant, Thematic Reading, Family Engagement, Semantic Response System

1. Introduction

"Reading behavior" refers to the set of activities and strategies that students display when engaging with a text, including book selection, reading methods, comprehension processes, reflection, and extended application. Ideally, reading behavior should be closely connected with curriculum knowledge so that students can transform the information gained from reading into subject knowledge and interdisciplinary understanding. However, in the current educational context, there is often a disconnection between students' reading behavior and the curriculum. Many reading activities lack integration with subject knowledge, which not only limits the potential of reading as a learning strategy but also diminishes the sustainability of students' reading motivation(Schmoker, 2018). On the other hand, while parents generally value their children's reading development, the lack of timely curriculum information and personalized book recommendations often makes it difficult for them to effectively participate in home-based reading interactions, thereby reducing the potential role of the family in learning support.

Recent studies have emphasized the importance of parental involvement in primary school students' reading development. Çalışkan and Ulaş (2022), through a quasi-experimental design, found that parental involvement in reading activities significantly improves students' reading comprehension, reading motivation, and overall attitudes toward reading, including both leisure reading and academic reading. Bonanati and Rubach (2022)further pointed out that reciprocal involvement from both home and school creates a positive feedback loop for students' reading performance. Villiger et al. (2012) demonstrated that a school–home-based reading intervention could sustain improvements in students' reading motivation several months after the intervention, highlighting the medium- to long-term impact of family involvement on reading learning.

The design of the present system is grounded in the Interest-Driven Creator Theory(Chan et al., 2018), which emphasizes three interrelated processes: (1) linking thematic book tags with learning contexts to stimulate students' reading interest (*Interest*); (2) facilitating students' linguistic and cognitive expression and creation (*Creation*) through storytelling records and interactions with the AI assistant; and (3) guiding students to develop stable reading habits (*Habit*) through daily reading feedback and thematic exploration, where parents or teachers pose conversational questions after a student reads a book. In this study, "reading feedback" refers to direct responses provided by parents or teachers after a student engages in reading activities at home or school, or to the interactive feedback generated during "book talk" sessions between teachers and students. These inputs form an essential basis for the AI assistant's analysis and recommendations.

To address the above challenges and align with the theoretical foundation, this study proposes an AI reading assistant system designed to help parents actively pose questions during daily home interactions and receive personalized book recommendations or thematic summaries aligned with the student's reading status and curriculum topics. The system integrates students' reading records and grade-level information, constructs a thematic book map designed by the research team, and applies semantic tagging, semantic matching, and thematic expansion techniques to generate response content. Through this intelligent support framework, parents can participate more effectively in guiding and conversing about the reading process, thus strengthening the family's role and potential in literacy-oriented reading education.

2. System introdution

The AI reading assistant system developed in this study is designed to help parents promptly understand their child's reading status in daily contexts and provide personalized responses relevant to the reading content, thereby promoting literacy-oriented parent–child reading. The system architecture consists of three core modules: the Thematic Book Map, the Reading Data Integration Mechanism, and the AI Recommendation Engine.

2.1 Thematic Book Map Design

The thematic book map was designed by the research team based on book classification methods, covering three major domains and subdivided into twelve subcategories. Each book is labeled with 4–6 multidimensional tags—such as thematic attributes, reading difficulty, learning stage, interest domain, and interdisciplinary connections—to support precise searches and semantic matching. This design helps students extend reading themes, build intertextual connections, and provides the semantic foundation for the AI assistant's summaries and responses.

2.2 Reading Data Integration Mechanism

The system integrates students' reading records and grade-level information to build personalized reading histories and map them to the book categories for accurate thematic matching. Parents can input the book title, reading date, and brief observational notes, and may also upload photos of reading activities or provide feedback. The AI assistant analyzes these data to generate reading summaries, assess thematic coverage and reading frequency, and produce an initial score to support subsequent recommendations and learning assistance. This integration also provides teachers with a reference for adjusting instructional strategies.

2.3 *AI Recommendation Engine*

Parents can use natural language queries (e.g., "Please recommend books related to my child's recent reading topics"), and the system will analyze reading history, preferences,

and curriculum topics to recommend books with high semantic relevance and appropriate difficulty, along with reasons for the recommendation (e.g., “Matches past reading themes,” “Expands reading perspective”). Unlike commercial systems that operate primarily based on sales data (e.g., Amazon), this system combines students’ reading records, parent/teacher feedback, and the book map to perform semantic analysis and generate recommendations. In the future, a thematic extension mechanism will be added to explore co-occurrence relationships and semantic distances between tags, enabling the discovery of new topics and books to broaden the breadth and depth of students’ reading.

3. Preliminary Evaluation (Planned)

This study is in the system design and early development phase. A six-week trial will be conducted at an experimental elementary school in Taoyuan, Taiwan, with 30–40 families of students in Grades 2–6. Parents will input their child’s reading records (e.g., book title, date, brief reflection) into the platform, and teachers will provide curriculum topics at the start of the semester. The AI assistant will then analyze the data to generate reading summaries and thematic associations in response to parents’ natural language queries.

The preliminary trial focused on the Reading Data Integration Mechanism, testing whether the system could effectively consolidate parent-entered reading records and produce accurate, useful summaries. Six parents participated in a small-scale usability test; most reported that the AI assistant provided timely and clear feedback that helped them understand their child’s reading habits, while one suggested adding more specific follow-up recommendations.

The full evaluation will examine: (1) System usability and interaction quality – ease of use, response accuracy, and perceived value; (2) Enhancement of thematic awareness – whether summaries improve parents’ understanding of reading themes and trends; (3) Promotion of parent–child interaction – whether AI responses encourage more frequent reading discussions at home. The findings will guide system optimization and recommendation feature development.

Acknowledgements

This study was funded by the National Science and Technology Council of Taiwan (112-2410-H-008-020-MY3) and by Research Center for Science and Technology for Learning, National Central University, Taiwan.

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