

Beyond Passive Monitoring: How AR-Enabled Parental Engagement Affects Early Chinese Language Learners

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Received: February 26th, 2026 | **Accepted:** April 28th, 2026

ABSTRACT

This study demonstrates augmented reality (AR) effectively promotes parental involvement in children's Chinese language learning. Based on Ellis' second language acquisition framework, a co-learning AR system was developed to turn parental supervision into active learning support. In a 12-week randomized controlled trial, 48 adolescent learners (8–15 years old) were assigned to three conditions: AR-supported learning, traditional classroom instruction, or online learning. Post-normalization test results showed the AR group improved most significantly, with large effect sizes compared to the traditional ($d=1.875, P<0.01$) and online groups ($d=1.75, P<0.01$). Qualitative interviews highlighted gains in learner engagement and self-regulation. The findings indicate AR-assisted parent-child interaction bridges formal and informal learning environments, offering new insights for educational technology design in language acquisition.

KEYWORDS

AR, Children, Chinese Language Learning, Parental Engagement, Parent-Child Interaction

INTRODUCTION

Extensive research demonstrated that early second language acquisition (SLA) yields significant cognitive and linguistic benefits for children (Liddicoat & Kirkpatrick, 2020). These findings have increased the popularity of early second language learning among children worldwide. According to existing research, English is the most common second language learned by children (Zhang & Lau, 2022). In recent years, the number of children learning Chinese as a second language (CSL) has also increased rapidly, and the trend toward younger learners overseas has become widespread. It is estimated that the proportion of young learners may have reached 50%, with some countries reaching or exceeding 60%, and the trend continues to grow. By 2024, more than 180 countries and regions have implemented Chinese language teaching, of which 85 have incorporated it into their national education systems. Under international cooperation frameworks, more than 80,000 schools and training institutions have introduced Chinese courses, and the number of Chinese learners has

DOI: 10.4018/IJMBL.409359

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exceeded 30 million, with a cumulative total of more than 200 million learners (China News, 2024). Therefore, research on CSL learning and teaching for children has become a key priority.

Previous studies indicated that parental support and participation are crucial for effective early second language learning in children and contribute to academic performance and the development of language and literacy skills (Levickis et al., 2020; Hao, 2023; Soyooof, 2024; Burlacu, 2025). Specific measures include maternal shared reading and the use of parent manuals (Levickis et al., 2020). With the continuous advancement of mobile devices and digital technology, the use of smartphones, tablets, and similar devices in the home to support children's second language learning has become a primary option for some parents (Hao, 2023). Parents have reported positive outcomes when providing guidance for children's second language learning through digital technology (Soyooof, 2024). These studies indicate that technologies bridging formal and informal learning contexts provide learners with expanded options and enhanced learning experiences (Burlacu, 2025).

However, technology-based parental support also faces challenges. On the one hand, parents' second language proficiency may be limited, and they often lack sufficient time to focus on their children's language learning. On the other hand, even when parents engage with digital learning platforms, their involvement is often limited to monitoring and expressing support rather than providing substantive feedback (Moorhouse & Beaumont, 2020).

Accordingly, the use of augmented reality (AR) in blended learning environments represents a viable approach to addressing these challenges. Recent studies have shown that, in second language teaching, teachers' use of AR-supported learning materials can improve children's interaction frequency, learning motivation, and psychological development, including attention and self-confidence (Topu et al., 2023). Therefore, as AR technology is increasingly integrated into blended learning, beyond teacher-child interaction, how parents can use AR technology to effectively support and participate in children's second language learning remains a new area of inquiry.

LITERATURE REVIEW

The Use of Digital Technology in Children's Second Language Learning

In recent years, digital technologies have been widely used in children's second language learning and development (Joginder Singh et al., 2021; Morris et al., 2022). Whether children engage in vocabulary acquisition, phonological discrimination, or concentration enhancement, information technology and robotic tools offer distinct advantages and are well received by children (Burlacu, 2013; Van den Berghe et al., 2021).

In addition, various computer-based language learning systems and technologies have enabled the assessment of children's literacy in second language learning and provided insights into SLA mechanisms (Zhu & Yang, 2022). Researchers have demonstrated that CALL-based input reinforcement can significantly improve the efficiency of SLA in younger children and facilitate personalized, independent learning unconstrained by time and location (Sun et al., 2019; Yan, 2020). Recent studies have also shown that the social robot developed by Konijn et al. (2022) and the educational robotic system developed by Bernabini et al. (2020) offer advantages for children's second language learning. However, these studies have primarily examined how digital technologies support learning in pedagogical and experimental contexts, with limited attention to parental support and involvement in such digital environments.

Finally, among studies on digital technology use, AR applied to children's second language learning has been shown to improve vocabulary acquisition and attention (Solak & Cakir, 2016). Despite the significant educational potential of AR, most research on its effectiveness has focused on adolescent and adult learners rather than early childhood, and there remains a lack of applied research on children learning Chinese as a second foreign language.

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