

DESIGN AND IMPLEMENTATION OF AN AI-SUPPORTED PARENT-ASSISTED MICROLEARNING SYSTEM FOR EARLY ENGLISH LANGUAGE ACQUISITION

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Abstract

Early childhood is a critical window for language acquisition, yet parents often lack the time, confidence, or English proficiency to sustain home-based learning, while AI alone lacks the emotional warmth needed to engage young children. This article proposes an AI-supported, parent-assisted microlearning framework for children aged 5–8, relevant to under-resourced regions such as rural Uzbekistan. It integrates speech recognition, an LLM-based reading partner, a parent dashboard with bilingual prompts, and gamification, supported by human-in-the-loop oversight, culturally responsive content, parental training, and data privacy safeguards.

Keywords: early childhood English education, artificial intelligence, microlearning, parental involvement, speech recognition, conversational agents, Uzbekistan

Annotatsiya

Erta bolalik davri til o'zlashtirish uchun muhim davr, biroq ota-onalar ko'pincha uy sharoitida ta'limni davom ettirish uchun yetarli vaqt, ishonch yoki ingliz tili bilimiga ega emas, sun'iy intellekt esa bolalarni jalb qilish uchun zarur hissiy iliqlikka ega emas. Maqolada 5–8 yoshli bolalar uchun, xususan qishloq O'zbekistoni kabi hududlarda dolzarb bo'lgan, sun'iy intellekt yordamidagi va ota-ona ishtirokidagi mikroo'rganish tizimi taklif etiladi. U nutqni tanish, suhbat agenti, ikki tilli ota-ona paneli va geymifikatsiyani birlashtiradi hamda inson nazorati, madaniy mos kontent, ota-onalar treningi va ma'lumotlar maxfiyligiga tayanadi.

Kalit so'zlar: erta bolalik ingliz tili ta'limi, sun'iy intellekt, mikroo'rganish, ota-ona ishtiroki, nutqni tanish, suhbat agentlari, O'zbekiston

Аннотация

Раннее детство — критический период для овладения языком, однако родителям часто не хватает времени, уверенности или знания английского для домашнего обучения, а системам ИИ — эмоциональной теплоты для удержания внимания детей. В статье предлагается система микрообучения на основе ИИ с участием родителей для детей 5–8 лет, актуальная для малообеспеченных регионов, таких как сельские районы Узбекистана. Она объединяет распознавание речи, диалогового агента, родительскую панель с двуязычными подсказками и игровой слой, опираясь на принцип «человек в контуре», культурно адаптированный контент, обучение родителей и защиту данных.

Ключевые слова: раннее обучение английскому языку, искусственный интеллект, микрообучение, участие родителей, распознавание речи, диалоговые агенты, Узбекистан

Introduction

Early childhood is a critical period for language acquisition due to unparalleled neural plasticity, which makes the brain highly receptive to linguistic input. The present study focuses on children aged 5–8, who typically have the literacy readiness, sustained attention, and self-regulation needed for structured microlearning. Advances in artificial intelligence (AI)—speech recognition (ASR), natural language processing, and adaptive learning—now enable personalized learning with immediate pronunciation feedback.

Pedagogical Foundations: Microlearning and Parental Co-Learning

Microlearning is built on short, focused episodes that match young children's attention spans. A concrete goal such as “learn two new animal words today” works better than “learn English” (Slishane, 2026),¹ and such units fit into small routines like two minutes in the car (González Ruiz et al., 2024).² Immediate, warm positive reinforcement is also central (Slishane, 2026).³

This structure depends on parental involvement: shared reading, role-playing, and scaffolding correlate positively with L2 proficiency (Xiao et al., 2025).⁴ However, parents often lack time and English proficiency, which reduces their role to passive monitoring; the system addresses this through its Parent Dashboard and parental training.

3. System Architecture and Core Components

The system is organized around four interconnected components.

Table 1: Core Components of the AI-Supported Parent-Assisted Microlearning System

Component	Function	Key Features	Source
Speech Recognition & Pronunciation Feedback	Real-time, non-judgmental feedback on spoken English	Pronunciation assessment, positive corrective feedback, progress tracking	Ramzan et al. (2026)
LLM-Based Conversational Agent	Dialogic reading partner for children	Questioning, scaffolding, bilingual interaction, storytelling	Xiao et al. (2025)
Parent Dashboard & Co-Learning Support	Scaffolds parental involvement at home	Bilingual prompts, activity suggestions, offline-first design	Wang et al. (2026)
Gamification & Engagement Layer	Sustains motivation through play	Points, badges, achievement systems, collaborative games	Ersyad et al. (2025)

The Speech Recognition and Pronunciation Feedback component uses ASR to give immediate, non-judgmental feedback—vital for young learners who may feel self-conscious speaking before adults. Combined with corrective feedback, speech-to-text recognition significantly improves oral performance (Ramzan et al., 2026).⁵

¹ Slishane, K. (2026). Microteaching as a Means of Creating a Personalized Learning Area in Primary School English Lessons. HSE University.

² González Ruiz, C. J., et al. (2024). Microlearning in teacher and family training for Early Childhood Education. *EduTec*, 88, 120–138.

³ Slishane, K. (2026). Microteaching as a Means of Creating a Personalized Learning Area in Primary School English Lessons. HSE University.

⁴ Xiao, F., et al. (2025). Parent-Led vs. AI-Guided Dialogic Reading: Evidence from a Randomized Controlled Trial. *British Journal of Educational Technology*, 56(5), 1784–1813.

⁵ Ramzan, A., et al. (2026). AI-enhanced early childhood English education in rural contexts: A comparative study of Pakistan and China. *The International Journal of Technology, Innovation, and Education*, 4(2), 75–102.

The LLM-Based Conversational Agent serves as a dialogic reading partner. Randomized controlled trials show that children using such agents achieve reading comprehension gains comparable to, and in some measures exceeding, those in parent-led reading groups (Xiao et al., 2025). Agents work best as a complement to parents, extending the quantity and consistency of practice.

The Parent Dashboard addresses four recurring challenges in parent-led learning: content selection, language expression, balancing instruction with play, and everyday problem-solving (Wang et al., 2026). It suggests age-appropriate activities, offers bilingual prompts for parents with limited proficiency, and works offline-first for households with limited connectivity.

Finally, the Gamification layer—points, badges, narrative journeys, and collaborative games—sustains motivation without displacing learning objectives (Ersyad et al., 2025).⁶

Implementation Framework for Ethical and Effective AI-Assisted Early Literacy Learning

A human-in-the-loop approach ensures that automated suggestions never replace human judgment: parents review feedback and materials as a first filter for accuracy and cultural fit, teachers guide the learning path, and AI supplies repetitive practice and immediate corrective feedback.

Content must be age-appropriate and culturally resonant: bright, familiar visuals, clear pronunciation models, and everyday scenarios such as the home or the market. In rural communities, local dialects, idioms, and cultural references are core entry points for comprehension.

Parental training is the third pillar: brief hands-on orientation sessions, jargon-free progress updates, simple tips such as five-minute conversation games, and peer support groups turn parents from passive observers into active partners.

Finally, robust data privacy is essential: transparent plain-language policies, explicit and granular parental consent for every type of data, secure and encrypted storage, and retention only as long as necessary.

Conclusion

This article proposed a framework for an AI-supported, parent-assisted microlearning system for early English acquisition among children aged 5–8, particularly in under-resourced contexts such as rural Uzbekistan, aligning technological design with the developmental realities of young learners.

The four components function as a unified architecture: AI extends the quantity and consistency of language input, while parents and educators retain the warmth, encouragement, and judgment AI cannot replicate.

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