

Development, Deployment and Evaluation of Personalized Learning Companion Robots for Early Literacy and Language Learning (Poster #19)



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Key Problems

P1: 1/3 of American children do not reaching basic levels of literacy, and 2/3 fail to reach proficiency levels of literacy.

→ Kinder is the most critical and cost-effective time to intervene.

P2: Many intelligent tutoring systems have been proposed, but neglect engaging children's social and emotional learning abilities and only focus on inserting knowledge.

→ Personalized, social robot augmented learning interventions that are well matched to the social, emotional, and cognitive learning needs of young children could dramatically improve school readiness.

Impact #1: Long-term Personalized Reading Companion (Breazeal, Park)

- Jibo Stations sent to **children's homes** to **support remote learning** during COVID pandemic.
- **Cross-task Learning** to accelerate personalization of multiple literacy tasks.
- **Affective Personalization** for maximizing engagement and learning using hierarchical reinforcement learning.



16 in classrooms and 12 at homes

Impact #3: Contextually Grounded Dialogic QnA (Ostendorf)

- Accounting for child engagement and uncertainty in **question timing**
- Contextually grounded dynamic **question generation** and quality assessment
- **Novel corpora** of disfluency annotated child speech and questions designed for spoken conversations

Question Proposal

Verbal & Non-verbal

Training Data

txt/audio Time Alignment

Impact #2: Automatic Child Speech Recognition (Alwan, Bailey)

- **Engaging speech collection protocol** administered by a social robot and a **novel longitudinal corpus** of child speech
- **Effective child ASR system** using **transfer learning & data augmentation** techniques
- **Diarization** and **speaker identification** systems to enable personalized learning and assessment

Real-time ASR

Training Data