Assessing AI Characters as Facilitators of Children's Learning Experiences

Sonia Tiwari

sonia@kidsai.io

Kids AI

Abstract

This study examines how children's interaction with AI characters can shape their learning experiences. Drawing on a literature review of child–AI interactions in educational contexts, this study presents AI Character Assessment (AIC-A) as an analytical framework for researchers assessing how well an AI character's design and interaction align with children's needs. The framework organizes factors into three categories: Child (learning goal, context awareness, developmental aptness), Interaction (communication structure, interaction scale, engagement style), and Character (design, persona, transparency). In this framework, child context shapes character design, with interaction linking the two. AIC-A can be operationalized as a statistical model to examine correlations between child factors and character design, moderated by interaction conditions, allowing the possibility of usage by researchers in both qualitative and quantitative studies assessing AI characters as learning facilitators for children.

Introduction

In the context of this study, AI characters can be defined as digital, tangible, or hybrid fictional personalities that engage users through partial or complete interactions powered by artificial intelligence, with alive-like appearance and/or behavior. These AI characters may take the form of smart speakers, chatbots, social robots, smart toys and other formats. While these AI characters can make learning more engaging and interactive, not every design is an ethical, effective, and developmentally appropriate for children. The way a character looks, speaks, and responds can either support a child's growth or work against it. Prior research has explored how these characters can support learning and where they can cause harm, but there is a need for systematically organized assessment tools to understand child-AI interactions. The AI Character Assessment (AIC-A) framework offers researchers a tool to look at how well an AI character ethically support children's learning experiences.

POWER Principles as a Theoretical Framework

Ethical guidance provides an important foundation for understanding how AI characters should be designed for children's learning. Chen and Lin (2024) proposed the POWER principles (Purposeful, Optimal, Wise, Ethical, Responsible) to help educators and designers ensure that AI technologies are not only functional but also developmentally appropriate and value driven. This framing highlights the importance of aligning design choices with children's learning goals and well-being.

Educational Impacts of AI Characters

Building on this ethical frame, research on AI characters in educational contexts shows their potential to engage children in meaningful learning activities. In a study with preschoolers, Xu et al. (2022) found that conversational agents could match human partners in promoting story comprehension and verbal engagement, suggesting that well-designed AI can sustain attention and support learning outcomes. Ali and colleagues (2019) further demonstrated that social robots modeling creative behaviors could encourage children to generate more original ideas, indicating that AI characters can act as catalysts for creativity. These educational gains depend not only on the capabilities of the AI but also on how interactions are structured to match learning objectives.

Some AI learning tools also illustrate the role of goal-oriented interaction in sustaining engagement. Shetye (2025) examined *Khanmigo*, a generative AI tutor, and found that scaffolded, purposeful exchanges could help children navigate tasks and build knowledge. This aligns with Gutiérrez's concept

of horizontal expertise, where learners integrate new resources into their own practices, but it also underscores the need for careful design to maintain relevance and focus.

Psychological Dimensions of Child–AI Relationships

Educational potential cannot be separated from the psychological dimensions of child–AI relationships. Bond and Calvert (2014) identified how children's parasocial relationships with characters involve dimensions such as personification, social realism, and attachment, which can deepen with repeated exposure. Yet Blake, Carter, and Velloso (2025) noted that traditional PSR and PSI measures may fail to capture the interactive and adaptive qualities of AI characters. Tools like Hartmann and Goldhoorn's (2011) EPSI scale offer more nuanced, moment-to-moment insights into parasocial experiences, but even these measures were designed for one-way media, not responsive AI. This points to a gap: understanding emotional connection alone is not enough without also assessing whether design features support the child's learning context.

Risks associated with emotionally engaging AI design are also well-documented. Brittain (2024) reported a case where a chatbot developed harmful influence over a child, underscoring the urgency of safeguarding children in interactive media environments. Such cases show how persuasive design traits, if not grounded in ethical and educational priorities, can be exploited.

Social Contexts and Joint Media Engagement

Social and family contexts further shape how children experience AI characters. Stevens and Takeuchi (2011) defined Joint Media Engagement as co-use of media to promote learning through dialogue. Druga and colleagues (2022) described families as a "third space" for developing AI literacy, where parents act as co-learners and co-explainers. Similarly, Long and colleagues (2022) observed how parental scaffolding during AI interactions fostered children's reasoning and problem-solving. These findings emphasize that AI characters operate within social ecosystems, where design, interaction, and family mediation all influence learning outcomes.

Together, this research reveals both the promise and the limitations of current approaches. While existing measures capture elements of engagement and attachment, a more holistic framework is needed to assess how AI character design, interaction style, and contextual fit combine to support children's learning.

<div align="center">

Proposed Framework: AI Character Assessment (AIC-A)

</div>

Based on the literature review, this study proposes the AI Character Assessment (AIC-A) framework as a tool for researchers to analyze how well an AI character supports a child's learning experience (Figure 1). The framework includes three categories: child factors, interaction factors, and character factors, expanded in Appendix A.

Child factors include learning goal (ranging from pre-defined to undefined), context awareness (full to none), and developmental aptness (high to low). The POWER principles (Chen & Lin, 2024) call attention to aligning learning tools with the child's context. For instance, Shetye (2025) describes how *Khanmigo* adapts to scaffold goal-oriented tutoring. *Interaction factors* include communication structure (structured to unstructured), interaction scale (info retrieval to companionship), and engagement style (joint to individual). Xu et al. (2022) showed how PBS Kids' conversational agents supported story comprehension through light, scaffolded interaction. Similarly, Druga et al. (2022) emphasized the role of family scaffolding in shaping children's engagement with AI. *Character factors* include character design (abstract to hyperreal), persona (mentor, friend, or a mix of both), and transparency (full to low). In the PBS study, the agent was designed as a friendly guide with a stylized form and clear communicative intent, supporting both narrative immersion and learning. While cute or lifelike

characters can enhance engagement (Nittono et al., 2012), they also raise ethical concerns when paired with persuasive content (Stokel-Walker, 2025). Existing measures tend to focus on attachment (Hartmann & Goldhoorn, 2011), but few assess whether character traits are aligned with developmental and educational goals (Blake et al., 2025). AIC-A analytical framework can also be operationalized as a statistical model by examining correlations between child factors and character design, with interaction factors serving as potential moderators. This approach enables researchers to analyze patterns across different AI character designs and identify which configurations are most effective for supporting children's learning in specific contexts. Together, these three factors (child, characters, and the interactions between them) can help researchers assess whether an AI character's design and interaction approach meaningfully align with a child's learning context.

AI Character Assessment

Character Design
| ABSTRACT | STYLIZED | HYPER REAL |

Character Persona
| MENTOR | HYBRID | FRIEND |

Transparency
| FULL | PARTIAL | LOW |

CHARACTER · INTERACTION · CHILD
DV · MV · IV

Communication Structure
| STRUCTURED | SEMI-STRUCTURED | UNSTRUCTURED |

Interaction Scale
| INFO RETREIVAL | LIGHT INTERACTION | COMPANIONSHIP |

Engagement Style
| JOINT | HYBRID | INDIVIDUAL |

Learning Goal
| PRE-DEFINED | EMERGENT | UNDEFINED |

Context Awareness
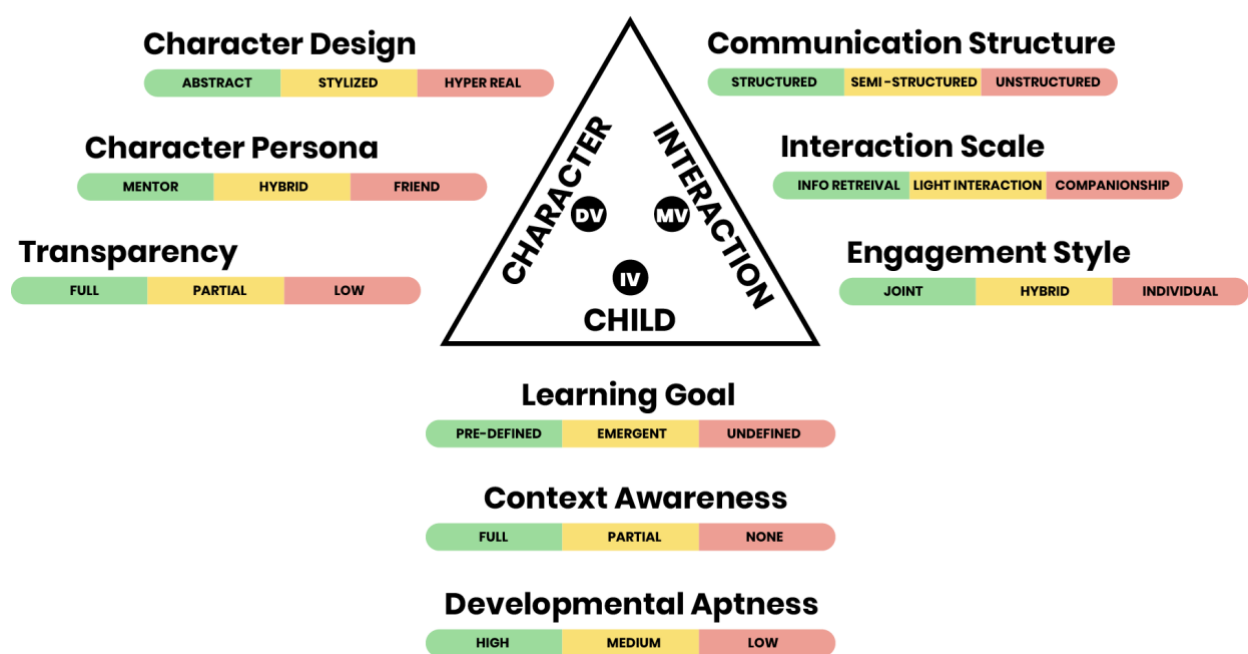| FULL | PARTIAL | NONE |

Developmental Aptness
| HIGH | MEDIUM | LOW |

Figure 1. AI Character Assessments (AIC-A) Framework

Discussion and Limitations

The AIC-A framework provides a structured lens to examine how AI character design and interaction approaches align with children's learning contexts, informed by research in education, psychology, and media studies. It offers researchers a way to assess the relevance of character features and interaction styles based on children's learning goals, engagement needs, and developmental conditions. This framework also highlights potential risks when character design or interaction strategies are poorly matched to child context, especially in emotionally engaging or unsupervised use cases. However, the current version of AIC-A is grounded in literature synthesis rather than empirical testing. Its categories and subcategories are informed by prior research but have not yet been validated through large-scale studies. Some components, such as assessing transparency or determining the scale of interaction, may require subjective interpretation depending on the evaluator's perspective or the context of use. Inconsistencies in how AI characters present themselves across platforms may also complicate coding and comparison. Additionally, child contexts are diverse and evolving, which makes

any single framework necessarily limited in scope. Future research should examine how the AIC-A framework can be applied across varied learning settings, age groups, and media formats. Empirical studies can test its utility by coding existing AI characters and analyzing patterns in their effectiveness, including how interaction styles moderate the fit between design and context. The framework also opens the possibility for statistical modeling of these relationships, enabling researchers to investigate measurable links between child factors, character design, and learning outcomes. The author intends to apply AIC-A in future work to evaluate current educational AI tutors such as *Khanmigo*, *Buddy*, and *Ello*. Insights from those analyses will support the development of concrete, values-driven design guidelines for future character-based learning tools.

Conclusion

This study introduced the AI Character Assessment (AIC-A) framework to help researchers examine how AI character design aligns with children's learning and developmental contexts. Grounded in interdisciplinary literature, the framework organizes key considerations into three categories: child, interaction, and character. These factors are not isolated but work together to shape the overall learning experience. The framework can be used both as a conceptual guide and as a structure for empirical analysis. By applying AIC-A, researchers can explore which design elements support meaningful engagement and learning. This framework offers a starting point for future studies aiming to evaluate and improve the educational value of AI characters.

References

Ali, S., Moroso, T., & Breazeal, C. (2019). Can children learn creativity from a social robot? In *Proceedings of the 2019 Conference on Creativity and Cognition* (pp. 359–368). https://doi.org/10.1145/3325480.3325499

Blake, A., Carter, M., & Velloso, E. (2025, June). Are Measures of Children's Parasocial Relationships Ready for Conversational AI?. In *Proceedings of the 2025 ACM Conference on Fairness, Accountability, and Transparency*(pp. 1145-1158). https://doi.org/10.1145/3715275.3732075

Bond, B. J., & Calvert, S. L. (2014). A model and measure of U.S. parents' perceptions of young children's parasocial relationships. *Journal of Children and Media, 8*, 286–304. https://doi.org/10.1080/17482798.2014.890948

Brittain, B. (2024, October 23). Mother sues AI chatbot company Character.AI, Google over son's suicide. *Reuters*. Retrieved from https://www.reuters.com/legal/mother-sues-ai-chatbot-company-characterai-google-sued-over-sons-suicide-2024-10-23/

Chen, J. J., & Lin, J. C. (2024). Artificial intelligence as a double-edged sword: Wielding the POWER principles to maximize its positive effects and minimize its negative effects. *Contemporary Issues in Early Childhood, 25*(1), 146–153. https://doi.org/10.1177/14639491231169813

Druga, S., Christoph, F. L., & Ko, A. J. (2022, April). Family as a third space for AI literacies: How do children and parents learn about AI together? In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*(pp. 1–17). https://doi.org/10.1145/3491102.3502031

Hartmann, T., & Goldhoorn, C. (2011). Horton and Wohl revisited: Exploring viewers' experience of parasocial interaction. *Journal of Communication, 61*(6), 1104–1121. https://doi.org/10.1111/j.1460-2466.2011.01595.x

Long, D., Teachey, A., & Magerko, B. (2022, April). Family learning talk in AI literacy learning activities. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (pp. 1–20). https://doi.org/10.1145/3491102.3502091

Shetye, S. (2025). An evaluation of Khanmigo, a generative AI tool, as a computer-assisted language learning app. *Studies in Applied Linguistics and TESOL, 24*(1). https://orcid.org/0000-0002-9483-9100

Stevens, R., & Takeuchi, L. (2011). *The new coviewing: Designing for joint media engagement*. The Joan Ganz Cooney Center at Sesame Workshop.

Xu, Y., Aubele, J., Vigil, V., Bustamante, A. S., Kim, Y.-S., & Warschauer, M. (2022). Dialogue with a conversational agent promotes children's story comprehension via enhancing engagement. *Child Development, 93*(2), e149–e167. https://doi.org/10.1111/cdev.13708

Appendix A

AIC-A Framework Assessment Checklist

Child Factors (Independent Variable)

1. Learning Goal
   - ☐ Pre-defined: Learning outcomes are clearly defined by the system
   - ☐ Emergent: Learning goals are shaped by the child's choices or interests
   - ☐ Undefined: No clear educational goal or objective
2. Context Awareness
   - ☐ Full: The character recognizes specific user data such as age, interests, or prior actions
   - ☐ Partial: The character responds to broad categories or cues like grade level
   - ☐ None: The character provides generic responses without regard to user context
3. Developmental Aptness
   - ☐ High: Content, pacing, and tone are closely aligned with the child's developmental stage
   - ☐ Medium: Some aspects are developmentally aligned, others may be too advanced or too simple
   - ☐ Low: The design is one-size-fits-all with no developmental targeting

Interaction Factors (Moderating Variable)

4. Communication Structure
   - ☐ Structured: Interactions are guided, such as multiple choice or scripted prompts
   - ☐ Semi-structured: The character allows limited flexibility with some open-ended options
   - ☐ Unstructured: Interactions are free-form or open-ended with no scaffolding
5. Interaction Scale
   - ☐ Information Retrieval: Limited to answering task-specific queries
   - ☐ Light Interaction: Brief back-and-forth exchanges that are purposeful but not persistent.
   - ☐ Companionship: Ongoing, personal interactions that simulate a close relationship
6. Engagement Style
   - ☐ Joint: Designed to support co-use with peers or adults through prompts or features
   - ☐ Hybrid: Allows both solo and social use depending on context
   - ☐ Individual: Primarily intended for solo use without collaborative elements

Character Factors (Dependent Variable)

7. Character Design
   - ☐ Abstract: Symbolic, icon-like visuals with minimal realism
   - ☐ Stylized: Moderately realistic with exaggerated or cartoon-like features
   - ☐ Hyper-real: Lifelike appearance, potentially indistinguishable from real humans or animals
8. Character Persona
   - ☐ Mentor: Acts as a guide, educator, or coach
   - ☐ Hybrid: Switches roles based on context or task
   - ☐ Friend: Presents itself as a peer or companion
9. Transparency
   - ☐ Full: Explicitly identifies as AI and explains its limitations
   - ☐ Partial: Offers occasional cues about being non-human
   - ☐ Low: Presents itself as human-like with no clarification