

INTERNATIONAL JOURNAL OF
EDUCATION, PSYCHOLOGY
AND COUNSELLING
(IJEPC)

<https://gaexcellence.com/ijepc>




AI-ASSISTED ANALYSIS OF GRANDPARENTS' INFLUENCE ON CHILDREN'S ORAL LANGUAGE LITERACY: A PILOT CASE STUDY IN XI'AN, CHINA

Zhang Ting^{1*}, Liang Jingjing²

¹Faculty of Human Development, Universiti Pendidikan Sultan Idris(UPSI), Malaysia

 zhangtingbodi@126.com

 <https://orcid.org/0009-0007-4194-6897>

²School of Design and Art, Shandong Huayu University of Technology, Dezhou, Shandong, China

 595219465@qq.com

 <https://orcid.org/0009-0008-0109-6020>

*Corresponding Author

Article Info:

Article history:

Received date: 02.04.2026

Revised date: 26.04.2026

Accepted date: 31.05.2026

Published date: 23.06.2026

To cite this document:

Zhang, T., & Liang, J. (2026). AI-Assisted Analysis Of Grandparents' Influence On Children's Oral Language Literacy: A Pilot Case Study In Xi'an, China. *International Journal of Education, Psychology and Counselling*, 11(63), 676-682.

Abstract:

Oral language literacy plays a foundational role in early childhood development and later academic learning, with everyday family interaction serving as a primary context for its emergence (Dickinson et al., 2023). In contemporary urban China, grandparents frequently assume substantial caregiving responsibilities. However, the interactional mechanisms through which grandparents may shape children's oral language experiences remain underexplored, particularly through scalable, transparent analytic approaches (Zhang et al., 2024). This study reports a pilot case study conducted in Xi'an, China, employing an Artificial Intelligence (AI) assisted analytical workflow to examine grandparents' influence on preschool children's oral language literacy. Specifically, the data were collected from six grandparent-child dyads (children aged 3-6 years), including short naturalistic home audio recordings (5-10 minutes) and semi-structured interviews with grandparents and parents. Automated speech processing was used as an assistive tool to structure language samples and extract interpretable interaction indicators, complemented by confidence-aware processing and targeted human audit (Liu, 2023; Pelfrey et al., 2024). Interview data were thematically coded and systematically triangulated with AI-derived discourse features to support interpretability in a small-sample design (Braun & Clarke, 2022). Rather than producing generalizable estimates, the study demonstrates the methodological feasibility of integrating AI-assisted language sample analysis with qualitative family research to examine intergenerational language interaction. Overall, the findings highlight patterned associations between grandparents' interactional practices and children's observed language behaviors, generating testable hypotheses

for future large-scale research on family literacy and early language development (Creswell & Poth, 2023).

DOI: 10.35631/IJEPC.1163040 **Keywords:**

AI-Assisted Analysis; China; Early Childhood; Family Interaction; Grandparents; Oral Language Literacy.



© The authors (2026). This is an Open Access article distributed under the terms of the Creative Commons Attribution (CC BY NC) (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact ijepec@gaexcellence.com.

Introduction

Oral language literacy, encompassing children's ability to understand and use spoken language across vocabulary, syntax, and pragmatic interaction, constitutes a critical foundation for later literacy development and academic learning (Justice & Ezell, 2022). During early childhood, these competencies are primarily shaped through everyday social interaction, particularly within the family environment, where caregivers provide both linguistic input and interactional scaffolding (Rowe & Snow, 2022).

In China's rapidly urbanizing context, grandparents frequently assume routine caregiving responsibilities for preschool-aged children due to parents' work demands and childcare constraints (Zhou et al., 2024). As a result, grandparents often participate in daily conversational routines, storytelling, play, and literacy-related activities, positioning them as influential contributors to children's early language environments (Tang et al., 2023).

However, despite this reality, research on early language development has traditionally focused on parental input, particularly maternal speech, leaving grandparents' interactional roles relatively underexamined (Dickinson et al., 2023). Existing studies that included grandparents often emphasized caregiving structure or time investment rather than the qualitative characteristics of everyday interaction, limiting insight into how language-related mechanisms operate at the interactional level (Zhang et al., 2024).

Methodologically, investigating family language interaction presents persistent challenges. Naturalistic observation and language sample analysis are labor-intensive, requiring extensive transcription, segmentation, and coding, which constrain sample sizes and analytic scope (Liu, 2023). These constraints have limited opportunities to examine intergenerational interaction patterns in ecologically valid contexts (Berman & Slobin, 2022).

Recent advances in Artificial Intelligence (AI), particularly automatic speech recognition and language sample processing, offer new opportunities to support family language research by reducing transcription burden and enabling standardized, transparent analysis of spoken interaction (Pelfrey et al., 2024). However, automated speech processing remains imperfect for children's speech, and its application to home audio data raises methodological and ethical concerns that must be explicitly addressed (Paradeda et al., 2025).

Accordingly, AI tools in early childhood research should be positioned as assistive rather than authoritative, embedded within research designs that foreground human judgment, transparency, and child-centered governance (Williamson & Eynon, 2023). In response to these considerations, the present study employed a pilot case study design. The design aimed to examine the feasibility of integrating AI-assisted language sample analysis with qualitative family interviews to explore grandparents' influence on children's oral language literacy in an urban Chinese context (Creswell & Poth, 2023).

Literature Review

Grandparents And Intergenerational Language Environments

Early childhood language research has long highlighted the importance of caregiver input quality, particularly parental speech, in shaping children's linguistic development (Rowe & Snow, 2022). Nevertheless, demographic changes and caregiving practices in many societies have increased recognition of grandparents as active and sustained caregivers, especially in urban China (Zhou et al., 2024).

Empirical studies suggest that grandparents' interaction styles may differ from those of parents in terms of directive language use, feedback patterns, and affective tone, potentially leading to distinct language socialization experiences for children (Zhang et al., 2024). Such intergenerational differences underscore the need to examine who provides care and how language is used in everyday interaction (Tang et al., 2023).

Oral Language Literacy As An Interactional Construct

Oral language literacy is increasingly conceptualized as an interactionally situated construct that develops through participation in meaningful communicative exchanges rather than through exposure alone (Snow & Matthews, 2022). In particular, core components such as narrative coherence, conversational contingency, and pragmatic responsiveness are shaped through repeated interaction in daily contexts (Justice et al., 2023).

Naturalistic language samples provide a valuable window into these processes by capturing children's spontaneous language use in everyday activities (Berman & Slobin, 2022). Nevertheless, the analytic demands of language sample analysis have historically limited its application in family-based research, particularly when multiple caregivers are involved (Liu, 2023).

AI-Assisted Language Sample Analysis In Early Childhood Research

AI-assisted language analysis has gained attention as a methodological support for scaling research on spoken interaction while maintaining analytic transparency (Pelfrey et al., 2024).

Furthermore, automated transcription and standardized formatting can reduce labor demands and facilitate reproducibility, especially when combined with explicit audit procedures (van der Velde et al., 2025).

Nonetheless, systematic reviews highlighted persistent challenges in applying automatic speech recognition to children's speech, including acoustic variability, pronunciation differences, and background noise (Bhardwaj et al., 2022; Paradedda et al., 2025). These limitations underscore the importance of confidence-aware processing and cautious interpretation when integrating AI tools into early childhood research.

Research Objectives and Questions

The primary objective of this study is to examine the methodological feasibility of integrating AI-assisted language sample analysis with qualitative interview data to explore grandparents' influence on preschool children's oral language literacy in an urban Chinese context (Creswell & Poth, 2023).

The study addresses the following research questions:

1. What interactional features of grandparent–child communication can be feasibly extracted from short naturalistic recordings using an AI-assisted analytical workflow?
2. How do grandparents' reported language and literacy practices align with observable interaction patterns in recorded grandparent–child interactions?
3. What methodological and ethical considerations emerge when applying AI-assisted analysis to child-related home audio data in a small-sample design?

Methodology

Research Design

A pilot case-study design was adopted to allow in-depth examination of interactional mechanisms while prioritizing methodological transparency and feasibility (Yin, 2022). This design is well-suited to exploratory research that seeks to refine analytic approaches rather than produce generalizable estimates (Creswell & Poth, 2023).

Participants And Setting

The study was conducted in Xi'an, Shaanxi Province, China, an urban context where intergenerational childcare is common (Zhou et al., 2024). Six grandparent–child dyads participated, with children aged 3–6 years and grandparents (grandfathers or grandmothers) serving as regular daytime caregivers (Zhang et al., 2024).

Data Collection

Note that each dyad completed one home-based audio recording lasting 5–10 minutes during a routine activity such as play or daily conversation (Pelfrey et al., 2024). Semi-structured interviews were conducted with grandparents and, where appropriate, parents using a 30-item interview protocol addressing language use, literacy practices, and intergenerational transmission (Braun & Clarke, 2022).

Ethical Considerations

Informed consent was obtained from children's legal guardians and participating grandparents, with age-appropriate child assent procedures. Notably, audio data were securely stored and analyzed in accordance with a data-minimization principle, and AI processing was implemented with explicit human oversight to ensure ethical and interpretive accountability (Williamson & Eynon, 2023).

AI-Assisted Analytical Workflow

Audio recordings were transcribed using automatic speech recognition as an assistive tool, with transcripts annotated for confidence and selectively audited for accuracy (Paradedda et al., 2025). Language samples were standardized and analyzed for interpretable interaction indicators such as turn-taking patterns and child response length, with all outputs treated as approximate signals rather than definitive measures (Liu, 2023).

Interview Analysis And Triangulation

Consequently, interview transcripts were thematically coded using a predefined coding framework and triangulated with AI-derived interaction indicators to enhance interpretive rigor (Braun & Clarke, 2022). Discrepancies between reported practices and observed behavior were treated as analytically meaningful rather than as sources of error (Creswell & Poth, 2023).

Results

Given the pilot nature of the study, results are reported as patterned observations rather than inferential findings (Creswell & Poth, 2023). Across cases, grandparents who reported frequent storytelling and open-ended questioning tended to engage in interactions characterized by longer child turns and greater conversational contingency (Justice et al., 2023).

In contrast, interviews emphasizing corrective or directive approaches were associated with more adult-dominated interaction sequences in recordings, suggesting differences in interactional opportunity structures (Zhang et al., 2024). Moreover, activity context influenced both interaction patterns and transcription confidence, with structured activities yielding clearer conversational organization (Paradedda et al., 2025).

Discussion

This pilot study demonstrated the feasibility of integrating AI-assisted language sample analysis with qualitative family interviews to examine intergenerational language interaction in early childhood (Liu, 2023; Pelfrey et al., 2024). Thus, by positioning AI as an assistive tool rather than an evaluative authority, the study aligns methodological innovation with ethical responsibility.

The findings suggested that grandparents' interactional practices shaped children's oral language experiences through mechanisms such as prompting, responsiveness, and narrative engagement, consistent with broader research on caregiver input quality (Dickinson et al., 2023; Tang et al., 2023). Additionally, the study highlights the importance of cautious

interpretation given the limitations of automated speech processing for child language (van der Velde et al., 2025).

Limitations

The small sample size and single-city focus limit generalizability, and short recording durations may not capture the full range of daily interaction (Yin, 2022). Furthermore, Automatic Speech Recognition (ASR) limitations for children's speech constrain measurement precision, underscoring the need for confidence-aware interpretation and human oversight (Paradedda et al., 2025).

Conclusion

This study contributes a transparent, ethically grounded approach to examining grandparents' influence on children's oral language literacy using AI-assisted analysis (Liu, 2023). By integrating automated language processing with qualitative triangulation, it offers a feasible pathway for future large-scale investigations of family language environments in early childhood (United Nations Children's Fund Innocenti, 2025).

Acknowledgements: The authors would like to express their sincere gratitude to Sultan Idris Education University for providing the necessary resources and support throughout the course of this research. Special appreciation is extended to colleagues and peers who contributed valuable insights and constructive feedback, which greatly enhanced the quality of this paper.

Funding Statement: No Funding

Conflict of Interest Statement: The authors declare that there is no conflict of interest regarding the publication of this paper. All authors have contributed to this work and approved the final version of the manuscript for submission to the International Journal of Education, Psychology and Counseling (IJEPC).

Ethics Statement: This study did not involve any human participants, animals, or sensitive data requiring ethical approval. The authors confirm that the research was conducted in accordance with accepted academic integrity and ethical publishing standards.

Author Contribution Statement: All authors contributed significantly to the development of this manuscript. Liang Jingjing was responsible for the conceptualization, methodology, and overall supervision of the study. Zhang Ting handled data collection, analysis, interpretation of results, the literature review, drafting, and critical revision of the manuscript. All authors read and approved the final version of the manuscript prior to submission.

References

- Berman, R. A., & Slobin, D. I. (2022). *Relating events in narrative: A crosslinguistic developmental study*. Psychology Press.
- Bhardwaj, V., Ben Othman, M. T., Kukreja, V., Belkhier, Y., Bajaj, M., Goud, B. S., Rehman, A. U., Shafiq, M., & Hamam, H. (2022). Automatic speech recognition systems for children: A systematic literature review. *Applied Sciences*, 12(9), 4419. <https://doi.org/10.3390/app12094419>
- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. SAGE.
- Creswell, J. W., & Poth, C. N. (2023). *Qualitative inquiry and research design: Choosing among five approaches* (5th ed.). SAGE.
- Dickinson, D. K., Golinkoff, R. M., & Hirsh-Pasek, K. (2023). Talking it up: Play, language, and the role of adult support in early childhood. *Child Development Perspectives*, 17(2), 73–79.
- Justice, L. M., & Ezell, H. K. (2022). Oral language development in early childhood education. *Early Childhood Research Quarterly*, 59, 1–5.
- Justice, L. M., Pelfrey, G. L., & Logan, J. A. R. (2023). Preschool language environments and children's language growth. *Journal of Speech, Language, and Hearing Research*, 66(4), 1234–1247.
- Liu, H. (2023). Automation of language sample analysis: Methods and applications. *Journal of Speech, Language, and Hearing Research*, 66(7), 2560–2574.
- Paradedda, R. B., Green, P., & Abad, A. (2025). Automatic speech recognition for children: Challenges, opportunities, and future directions. *Computer Speech & Language*, 81, 101536.
- Pelfrey, G. L., Justice, L. M., Gonzalez Villasanti, H., & Foster, T. J. (2024). Evaluating the accuracy of automated processing of child and adult language production in preschool classrooms. *Frontiers in Psychology*, 15, 1322665.
- Rowe, M. L., & Snow, C. E. (2022). Analyzing input quality along three dimensions: Interactive, linguistic, and conceptual. *Journal of Child Language*, 49(1), 1–22.
- Snow, C. E., & Matthews, T. J. (2022). Oral language and reading comprehension. *Annual Review of Applied Linguistics*, 42, 69–88.
- Tang, L., Chen, X., & Li, Y. (2023). Intergenerational caregiving and early language development in urban China. *Early Education and Development*, 34(6), 975–992.
- United Nations Children's Fund Innocenti. (2025). *Guidance on AI and children 3.0: Updated guidance for governments and businesses to create AI policies and systems that uphold children's rights*. UNICEF.
- van der Velde, M., Harmsen, W., Veldkamp, B. P., Feskens, R., & Keuning, J. (2025). Speech-enabled assessment of early reading fluency: Validation and implications. *International Journal of Artificial Intelligence in Education*, 35(4), 2569–2595.
- Williamson, B., & Eynon, R. (2023). Historical threads, missing links, and future directions in AI and education. *Learning, Media and Technology*, 48(1), 1–14.
- Yin, R. K. (2022). *Case study research and applications: Design and methods* (6th ed.). SAGE.
- Zhang, M. R., Ng, F. F. Y., Yu, D., & von Suchodoletz, A. (2024). Grandmothers' and mothers' interactions with toddlers during block play in urban China. *Early Childhood Research Quarterly*, 66, 15–27.
- Zhou, Q., Li, Y., & Sun, L. (2024). How does grandparental childcare influence children's effort and engagement? Evidence from China. *Journal of Family Issues*, 45(2), 345–362.