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Augmenting Early Childhood Speech Skills through Audiovisual Talk Time Playing (ATTP): A Research & Development Approach

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Abstract

This study focused on developing, validating, and evaluating the effectiveness of the Audiovisual Talk Time Playing (ATTP) model for enhancing speech skills in 5-6-year-old children within a kindergarten environment. Employing research with development methodology, this study followed Plomp's (1997) framework through four phases: design, realization/construction, testing, evaluation, and implementation. The ATTP model was developed through a detailed analysis and synthesis of requirements for fostering young learners' speaking skills. Its practical application involved translating the theoretical model into a classroom with 15 children. The model's effectiveness was evaluated using validation sheets, model assessments, usability sheets, observation sheets, teacher questionnaires, and student learning outcome evaluation sheets. Qualitative data was collected through observations and teacher questionnaires, while quantitative data was derived from assessments of children's speaking abilities. The results indicated a significant improvement in children's communication skills, with an increased percentage of children moving from 'adequate' to 'good' speech skills categories. Educators responded positively to the ATTP model, emphasizing its practicality and effectiveness. The study concluded that the ATTP model, with its interactive and multisensory approach, is a more engaging and effective method for language development in early childhood education than traditional methodologies. However, the study's limited focus on a specific age group and setting suggests the need for future research to explore the model's long-term impacts and adaptability in different educational contexts.

Introduction

The increasing interest in early childhood education underscores the critical role of kindergarten in supporting various aspects of a child's development, such as physical coordination, intellectual ability, socio-emotional skills, and particularly language and communication skills (Berti et al., 2019; Kesäläinen et al., 2022; Taupiac et al., 2021). This role aligns with children's unique developmental stages during these formative years (Russotti et al., 2021; M.-T. Wang et al., 2019). Literacy is crucial in these developmental aspects due to its close connection with other developmental domains. Adequate literacy skills enable children to articulate their thoughts and adapt to their environment(Matsumoto & Miho, 2018). Focusing on literacy development, especially in kindergarten, supports a child's intellectual growth and basic abilities (Romeo et al., 2018).

The ability to express thoughts and ideas through language, mainly speaking skills, plays a vital role in social interaction and the overall development of a child. Although speaking is a natural ability for most individuals, mastering effective kindergarten supports children's articulation skills and significant proficiency in organizing and implementing structured sentences (McLeod et al., 2018). Furthermore, speaking skills are crucial for everyday life success.

They are closely linked to a child's cognitive development, with the opportunity to express ideas and ask questions essential for this growth (Ruggeri et al., 2019). This highlights the importance of nurturing speaking skills in early childhood education.

However, developing speaking skills in children often presents challenges. A common obstacle is a lack of confidence in expressing oneself orally. This anxiety can hinder children from participating in speaking activities, necessitating focused efforts to stimulate and enhance early childhood speaking skills (van der Wilt et al., 2018). Traditional learning models in early childhood education have not fully utilized advancements in science and technology. In contrast, using innovative intelligence and games has become increasingly common in applications (Dorouka et al., 2020). Therefore, integrating audiovisual technology in kindergarten education represents a progressive trend due to its high appeal to children (Oakley et al., 2018).

Lev Vygotsky's theory (W. Wang & Delfin, 2021) harmful is the concept of the while applying identified stimulation that has the most significant impact on child development when directed at a child's potential using the proximal development zone. Kindergarten learning, which does not proportionally align with advancements in Science and Technology (IPTEK), contrasts with the daily environment of children, where the intelligence of brilliant media-based games has become a part of their world (Nilsson et al., 2018; Nobre et al., 2020), implementing the application of audiovisual-based technology in kindergarten should be a continually evolving trend regarding high attractiveness to children (Oakley et al., 2018). Children's interest in the latest technology is evident in kindergarten-aged children, and even two-year-olds show an interest in interactive audiovisual media provided in the form of games.

One solution to address the challenges of changing times is using innovative learning models that align with the advancements in science and technology (Hassenfeld et al., 2020). These models are designed to enhance speaking skills in children (and potentially improve other language abilities such as listening and reading), fulfilling the children's needs, boosting motivation, and alleviating boredom in the learning process through the selection of appropriate media and learning tools (Gonzalez et al., 2022). Additionally, they aim to develop teachers' abilities to provide engaging learning experiences (Towell et al., 2021). One alternative solution is the Audiovisual Talk Time Playing (ATTP) learning model, which utilizes audiovisual media, increasing children's interest and motivation in learning. The choice of modern instructional media, keeping pace with the times (advancements in science and technology), includes visually and audibly oriented media focused on superior, innovative media (Rahiem, 2021).

The Audiovisual Talk Time Playing (ATTP) model maximizes children's potential to develop speaking skills by setting targets for each child to demonstrate their speaking abilities. "Talk" refers to the capability of uttering sounds or words to express, state, or convey thoughts, ideas, and emotions. Speaking, as a language skill, develops in a child's life (Kim & Hachey, 2021), preceded only by listening skills, and it implements the rule that speaking skills are learned. "Time" refers to moments when a process, action, or state is closely linked. In this context, the time scale is an interval between two states/events or the duration of an event. "Playing" involves various voluntary, intrinsically motivated activities usually associated with enjoyment. The ATTP learning model is oriented towards an audiovisual media-based learning model to facilitate teachers in conveying learning information. For students, according to Maureen et al., (2018), the use of audiovisual media can stimulate motivation and interest in learning, provide learning activity stimuli, and even offer a more enjoyable learning psychology.

Recognizing the gaps in existing educational practices, this study introduces the Audiovisual Talk Time Playing (ATTP) l. This innovative approach uses audiovisual media to stimulate speaking skills in children aged 5-6. The ATTP model is based on the principle that learning through audiovisual media can significantly enhance children's motivation and interest in learning activities (Rahiem, 2021). Focusing on each child's speaking abilities and utilizing

engaging audiovisual content, ATTP strives to maximize the potential of children to develop practical speaking skills.

Previous studies have explored various aspects of language and speech development in children, offering insights relevant to the ATTP model. For instance, the use of transcranial direct current stimulation and Delayed Auditory Feedback has shown improvements in speech fluency in adults(Moein et al., 2022), while musical activities have been found to enhance language skills in children with hearing disorders (Torppa & Huotilainen, 2019). The effectiveness of audio-visual speech enhancement systems in noisy environments has been demonstrated (Michelsanti et al., 2019), and telepractice for speech pathology interventions has proven beneficial, especially with audiovisual materials (Palomares-Aguilera et al., 2021). These studies, among others, provide a background against which the ATTP model can be contextualized and evaluated.

Despite advancements in understanding and enhancing language development in children, current approaches remain limited and gaps. Most notably, there is a need for educational models that integrate contemporary technological advancements to stimulate and effectively enhance speaking skills. The ATTP model, focusing on audiovisual media, seeks to address this gap by providing young children with an engaging and effective learning environment.

This research aims to develop and evaluate the ATTP model as a practical, effective, and valid approach to stimulate speaking skills in 5-6-year-old children in kindergarten. This study seeks to contribute to early childhood education by providing an innovative model that aligns with the evolving technological landscape and addresses current challenges in developing speaking skills among young learners.

Methods

The research conducted in this study utilized a Research and development (R&D) methodology specifically tailored to develop an Audiovisual Talk Time Playing (ATTP) model aimed at enhancing speaking skills in kindergarten-aged children. This approach was meticulously guided by the framework conceptualized by Plomp (1997), which is segregated into four comprehensive phases: the design phase, the realization/construction phase, the test, evaluation, and revision phase, and the implementation phase. The foundational objective was to formulate a learning model that was valid, practical, and efficient in its application. The initial design phase was critical, involving an in-depth analysis and synthesis of requirements for fostering speaking skills among young learners. This phase laid the groundwork for the subsequent phases, ensuring that the ATTP model was rooted in a robust theoretical foundation.

In the realization/construction phase, the theoretical model was translated into a practical application, marking a pivotal shift from conceptual design to tangible implementation. This transition was essential for the subsequent testing, evaluation, and revision phase, where the model underwent meticulous scrutiny. The effectiveness and applicability of the ATTP model were rigorously evaluated using various research instruments, including validation sheets, model assessment and usability sheets, observation sheets, teacher questionnaires, and student learning outcome evaluation sheets. These tools were instrumental in refining the model, ensuring its suitability for the targeted educational context. The final implementation phase involved applying the ATTP model in a real-world kindergarten setting involving 15 children. This phase was critical in assessing the model's practical impact on the children's speaking skills, with data collected from multiple sources such as the drafted model design, observations of the learning process, and assessments of student learning outcomes.

The study employed qualitative and quantitative methods for data collection and analysis, with qualitative data gathered through observations and teacher questionnaires and quantitative data derived from assessing children's speaking abilities before and after the intervention (Creswell & Creswell, 2018). To ensure the study's reliability and validity, the research instruments were meticulously crafted and tested, and the research procedures and

methodologies were consistently reviewed and refined, upholding the highest academic rigor and integrity standards.

The data sources used in this research include the formulation of the model design, observation of the implementation of learning, and measurement of the student's learning outcomes. These are detailed as follows:

Table 1. Type, Source, and Data Collection Techniques

Data	Source of Data	Data Collection Technique	Instrument
Drafting Material for Model	Textbooks, journals, papers, research reports.	Literature study	Record Cards Observation Sheet
	Teaching and learning activities.	Observation	Interview List
Model Feasibility and Validity	Validators (Experts)	Providing model validation sheets along with model book manuscripts and supporting tools	Feasibility and Validation Sheet
Model Practicality	Observers	Providing observation sheets to 2 observers	Observation Sheet
Model Effectiveness	Observers	Providing observation sheets to 2 observers	Observation Sheet
Learning Outcomes	Students	Conducting assessments of students' speaking skills	Observation Sheet
Teacher Response	Teachers	Providing survey sheets	Survey

Result

3.1. Phase Design

3.1.1. Syntax of ATTP Learning Model

The ATTP learning model is based on six stages of learning steps. The detailed steps of the ATTP model are described in the table below:

Steps	Teacher's Activities	Student's Activities
Phase 1: Initial Orientation of Learning	- Checking the presence of students - Preparing students as the learning activity begins - Presenting the topic and format of the learning activity	- Listening to the teacher's directions - Arranging their seating positions
Phase 2: Delivery of Material/Idea Development	- Presenting learning material through audiovisual media - Observing student activities in receiving audiovisual content - Providing feedback to students after the audiovisual presentation ends	- Paying attention to the audiovisual media shown by the teacher - Participating in the learning activities - Responding to the teacher's questions related to the displayed content
Phase 3: Setting Speaking Time	- Allocating a speaking time of 2 minutes per level 1 (time allocation based on the meeting)	- Paying attention to the instructions given by the teacher
Phase 4: Performance (Speaking Activity)	- Allowing students to speak according to the predetermined time - Assessing students' speaking abilities during the activity - Giving students turns to speak	- Speaking within the allotted time - Waiting for their turn to speak

Phase 5 Evaluation and Assessment	- Communicating the assessment of skills to students - Preparing students for the next level of speaking activities (the same activity in the next meeting)	- Listening to the teacher's assessment of their speaking skills
Phase 6 Recognition	- Awarding students who have shown excellent development in speaking skills - Motivating students who are yet to develop to improve their abilities	- Receiving awards from the teacher - Encouraging other students

3.1.2. Social System

The implementation of the ATTP learning model has a social system derived from observing the impact during the model application. This is based on the activities of both teachers and students during the application of the ATTP model in the classroom. The social system in a learning model provides an overview of the roles and reciprocal relationships formed between educators and students and among students during the learning process. In implementing the ATTP learning model, the teacher acts as a facilitator and applies the principle of student active learning with the concept of learning while playing. The teacher guides the learning process by providing activity instructions and conducting initial and concluding instructions.

The social activities in the ATTP (Audio-Textual et al.) learning model, carried out through performance activities in the form of public speaking in front of peers, assign the speaker a central role while positioning other children as listeners. This process guides children in developing the confidence to speak in front of others, encouraging their peers to respect others when expressing thoughts or opinions.

3.1.3. Principle of Reaction

Observations of student and teacher activities during the implementation of the ATTP learning model provide insights into the reaction principles that emerge during the learning process. Educators, serving as motivators and facilitators, are expected to consistently position themselves effectively throughout the learning process. The ability to respond, cultivate interest, and address the needs of students forms the cornerstone of reaction principles in a practical learning model. The teacher's ability to present and manage the learning process influences student interest in activities, thereby optimally achieving developmental goals. Educators should provide high-level responses, enthusiasm, and appreciation for student activities, encouraging pride and satisfaction in their achievements.

The reaction principles outlined show the educator's role as a facilitator in learning, particularly in implementing the ATTP model, in aspects such as 1) Delivering learning material through audiovisual media using projectors and computers; 2) Setting speaking times (beginning and end) to stimulate children to develop speaking skills progressively in each session; 3) Providing clear instructions for learning activities to ensure they are directed and purposeful; 4) Assessing student performance to determine the impact on their speaking skills based on set achievement indicators; and 5) Motivating students to perform better in future activities.

3.1.4. Support System

The support system for the ATTP learning model encompasses all materials, facilities, and equipment used during the learning process. This includes a planned learning program consisting of audiovisual media sourced from stories in audiovisual formats. The support system also involves the availability of ICT-based learning facilities, the teacher's proficiency in audiovisual media, and their competence in Technological Pedagogical Content Knowledge (TPACK).

3.1.5. Instructional Impact and Ancillary Effects

The ATTP learning model aims to enhance language skills, particularly speaking, in 5-6 year-olds, focusing on pronunciation, vocabulary, sentence structure, content, confidence, fluency, and body language. Additionally, it boosts self-confidence, listening skills, and bravery, and fosters social competencies through better communication abilities.

3.2. Phase of Realization/Construction

The construction phase of the ATTP Learning Model involves developing the model's design, which includes steps for implementing the learning model. Relevant instruments were designed to gather data on the process and results of creating the ATTP learning model. These instruments include tools for assessing the validity, practicality, and effectiveness of the ATTP learning model.

3.3. Phase Test, Evaluation and Revision

The data from the validation test assessment of the ATTP learning model can be seen in the average indicator values given by experts for each aspect of the ATTP learning model validation sheet.

Table 3. Expert Validation Results

No.	Evaluated Aspect	Total Average Indicator Value for Each Aspect from Validators	Category
1	Rational Model	2.83	Valid
2	Supporting Theory	3.75	Highly Valid
3	Model Development Principles	3.77	Highly Valid
4	Model Development Guidelines	3.33	Valid
5	Syntax	3.77	Highly Valid
6	Social System	3.73	Highly Valid
7	Reaction Principles	3.88	Highly Valid
8	Support System	3.83	Highly Valid
9	Instructional and Ancillary Impact	3.44	Valid
10	Assessment Guidelines and Learning Outcomes	4.00	Highly Valid
	Total Average Value for Aspects	**3.63**	**Highly Valid**

The total average for all aspects of validation is 3.63. Referring to the criteria for determining the validity of the ATTP learning model, it can be concluded that the developed ATTP Learning Model falls into the 'Highly Valid' category.

3.4. Phase Implementation

The analysis of the practicality data of the ATTP Learning Model shows a Percentage of Agreement (PA) of 77.08%. Referring to the reliability criteria, this PA value indicates that the observation sheet for the syntax component of the ATTP Learning Model is reliable. An observation sheet is reliable if the PA value is ≥ 75%. Furthermore, the data analysis shows that the observer's results (IO value) for the ATTP learning model syntax component is 3.51. It is concluded that the practicality of the ATTP learning model falls into the 'Very High' category. Thus, the practicality of the ATTP Learning Model has an adequate degree of implementation or is executed very well in its entirety.

Table 4. Data on the Implementation of the ATTP Learning Model

No.	Observed Component	Component Average	Agreement	Disagreement	PA (%)
1	Syntax	3.63	68	10	87.17
2	Reaction Principles	3.65	23	7	76.66
3	Social System	3.63	26	4	86.66
4	Support System	3.67	20	4	83.33
5	Instructional and Ancillary Impact	3.56	14	4	77.77
	Total Component Average (IO)	**3.63**			
	Total Agreement and Disagreement	151	29		

Percentage of Agreement (PA)	82.32

Notes:
- IO: Intended ↔ Operational
- A: Agreement
- D: Disagreement
- PA: Percentage of Agreement

The effectiveness of the ATTP Learning Model's application in terms of children's speaking skills is also reinforced by the observed improvement in children's abilities before and after implementing the ATTP Learning Model. Of the 15 children who were subjects of the study, a significant change was observed in their speaking skills, moving from the 'Sufficient' category to the 'Good' category.

The analysis results of children's communication skills are outlined as follows:

Table 5. Analysis Results of Children's Communication Skills

Pretest				Posttest	
Frequency	(%)	Ability Level	Category	Frequency	(%)
1	6.68	3.1 – 4.0	Very Good	5	33.30
4	26.66	2.1 – 3.0	Good	9	60.00
10	66.66	1.1 – 2.0	Sufficient	1	6.70
0	0	0.0 – 1.0	Poor	0	0.00
15	100			15	100

The communication ability of children before the implementation of the ATTP Learning Model indicated that their speaking skills were predominantly in the developing category, involving eight children. The percentage of children's communication skills in the low category was 66.66%. Therefore, it can be concluded that applying the ATTP learning model to communication skills has met the criteria for effectiveness.

Concerning children's activity in participating in learning, it was observed that 3.70% of children showed harmful learning activity while applying the ATTP learning model. Conversely, 96.30% of children demonstrated positive learning activity using this model. The data response from teachers indicated that 36.36% of teachers agreed, and 63.64% strongly agreed with the aspects in question. There were no reactions of 'somewhat agree' or 'disagree'. This indicates that the positive response from teachers toward implementing the ATTP learning model was 97%. Hence, it can be concluded that the ATTP learning model regarding speaking skills, children's learning activities, and teacher responses has met the effectiveness criteria, i.e., at least 75% of all observation criteria show activities positively.

Discussion

The Audiovisual Talk Time Playing (ATTP) model represents a novel approach in early childhood education, specifically designed to enhance speaking skills in children aged 5-6 years within a kindergarten environment. This model aligns with the growing body of research emphasizing the importance of interactive and engaging methodologies in early language development. Prior studies have consistently shown that young learners benefit from educational strategies incorporating audiovisual elements, which can significantly boost engagement and facilitate deeper learning (Hanifah, 2014; Ulfa, 2019). The ATTP model is built upon these foundational insights, integrating principles of active learning and student participation, which are crucial in contemporary educational paradigms (Kusuma Sari, 2021; Murtiyah et al., 2021). This approach is particularly relevant in the context of language acquisition, where multisensory and interactive experiences are known to be highly effective (Agustini & Ngarti, 2020; Vadia et al., 2020).

The implementation of the ATTP model demonstrated significant efficacy in stimulating speech skills, as evidenced by the substantial improvements in children's communication abilities post-intervention. This model, encompassing six structured phases, was meticulously crafted to ensure comprehensive skill development, from orientation to performance and

evaluation. Such a design was instrumental in creating an engaging and supportive learning environment, fostering skill acquisition and social interaction (Atkinson et al., 2005; Behnamnia et al., 2020; Laakso et al., 2021). The positive outcomes of this study are consistent with previous research that underscored the effectiveness of interactive learning environments in enhancing language skills (Hu et al., 2019; McLeod et al., 2018; Nilsson et al., 2018). These results validate the ATTP model as a practical and impactful tool in early childhood education, particularly in fostering language development.

The current study's findings align with and extend previous research, particularly in demonstrating the effectiveness of a structured, interactive learning model in language development. This contrasts with earlier studies that focused more on passive learning methods, thus underscoring the ATTP model's innovative approach in early childhood education (Hassenfeld et al., 2020; Kim & Hachey, 2021; Teale et al., 2020). The study's approach to integrating audiovisual media in a structured manner adds a new dimension to the existing literature, which has predominantly emphasized the importance of media richness and teacher involvement in enhancing learning outcomes (Feldman et al., 2020; Nicolaou et al., 2021; Vadia et al., 2020).

The success of the ATTP model can be primarily attributed to its comprehensive and multisensory approach, consistent with cognitive and pedagogical theories advocating for multisensory integration in early childhood learning. The model's structured phases, from orientation to evaluation, ensure a progressive and inclusive approach to skill development. This aligns with studies highlighting the importance of a well-structured learning environment in facilitating language acquisition and cognitive development in young children (Edgar et al., 2023; Mason et al., 2019). However, it is essential to interpret these findings cautiously, considering the specific demographic context and the potential variability in teacher proficiency with technology and audiovisual tools.

In addition to its structured approach, the ATTP model's effectiveness is also attributed to its social system that promotes active learning and interaction. This aspect of the model is particularly crucial as it not only aids in language skill acquisition but also in developing interpersonal skills and confidence among children. The integration of audiovisual media in the model aligns with findings from previous studies, which have emphasized the role of multisensory experiences in enhancing cognitive development and language skills in early childhood (Fitria, 2014; He et al., 2022). As the Technological Pedagogical Content Knowledge framework indicates, the educator's role as a facilitator in the ATTP model is another critical factor contributing to the model's success(Çetin, 2021).

The study underscores the need for educators to be proficient in using audiovisual tools and creating engaging, learner-centered environments. This requirement is consistent with contemporary educational research, which emphasizes the importance of teacher competence in technology use and its impact on learning outcomes (Dhivya et al., 2023; Jusslin et al., 2022). While the study's findings are promising, they should be interpreted cautiously due to potential limitations such as the sample size and the specific educational context. These factors might influence the generalizability of the findings across different demographic settings.

Implications of the FindingsThe success of the ATTP model has a far-reaching impact on early childhood education, especially in language development contexts. It suggests a shift towards more interactive and multisensory teaching approaches, which are more effective than traditional methods in engaging young learners and facilitating more profound learning. Adapting this model to various educational contexts could benefit a broader range of learners, including those with different learning styles and needs. However, future research should aim to diversify the sample and explore the long-term impacts of the model to further validate and refine its applicability and effectiveness in different educational settings.

Conclusion

The primary aim of this study was to develop, validate, and assess the effectiveness of the Audiovisual Talk Time Playing (ATTP) model in enhancing speech skills among 5-6-year-old children in a kindergarten setting. The findings of this research are significant, demonstrating not only the model's validity and practicality but also its effectiveness in substantially improving children's communication skills. The ATTP model's interactive and multisensory teaching approach departs from traditional methodologies. It indicates a more engaging and effective means of language development in early childhood education. The positive response from educators and notable enhancement in speech skills among participants underscores the potential of the ATTP model as an invaluable educational tool. However, the study's scope was limited by its focus on a specific age group and academic setting, as well as restricted sample size and diversity, which could impact the generalizability of the results. Therefore, it is recommended that future research should broaden the study's demographic and setting parameters to explore the model's long-term impacts and its adaptability across various educational contexts. Such research is imperative for a deeper understanding of effective early childhood teaching strategies and advancing language development programs for young learners.

References

Agustini, K., & Ngarti, J. G. (2020). Pengembangan Video Pembelajaran Untuk Meningkatkan Motivasi Belajar Siswa Menggunakan Model R & D. *Jurnal Ilmiah Pendidikan Dan Pembelajaran*, *4*(April 2020), 62–78.

Atkinson, R. K., Mayer, R. E., & Merrill, M. M. (2005). Fostering social agency in multimedia learning: Examining the impact of an animated agent's voice. *Contemporary Educational Psychology*, *30*(1), 117–139. https://doi.org/https://doi.org/10.1016/j.cedpsych.2004.07.001

Behnamnia, N., Kamsin, A., Ismail, M. A. B., & Hayati, A. (2020). The effective components of creativity in digital game-based learning among young children: A case study. *Children and Youth Services Review*, *116*, 105227. https://doi.org/https://doi.org/10.1016/j.childyouth.2020.105227

Berti, S., Cigala, A., & Sharmahd, N. (2019). Early Childhood Education and Care Physical Environment and Child Development: State of the art and Reflections on Future Orientations and Methodologies. *Educational Psychology Review*, *31*(4), 991–1021. https://doi.org/10.1007/s10648-019-09486-0

Çetin, E. (2021). Digital storytelling in teacher education and its effect on the digital literacy of pre-service teachers. *Thinking Skills and Creativity*, *39*, 100760. https://doi.org/https://doi.org/10.1016/j.tsc.2020.100760

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE.

Dhivya, D. S., Hariharasudan, A., & Nawaz, N. (2023). Unleashing potential: Multimedia learning and Education 4.0 in learning Professional English Communication. *Cogent Social Sciences*, *9*(2), 2248751. https://doi.org/10.1080/23311886.2023.2248751

Dorouka, P., Papadakis, S., & Michail, K. (2020). Tablets and apps for promoting robotics, mathematics, STEM education and literacy in early childhood education. *International Journal of Mobile Learning and Organisation*, *14*(2). https://doi.org/10.1504/IJMLO.2020.106179

Edgar, E. V, Eschman, B., Todd, J. T., Testa, K., Ramirez, B., & Bahrick, L. E. (2023). The effects of socioeconomic status on working memory in childhood are partially mediated by intersensory processing of audiovisual events in infancy. *Infant Behavior and Development*, *72*, 101844. https://doi.org/https://doi.org/10.1016/j.infbeh.2023.101844

Feldman, J. I., Dunham, K., Conrad, J. G., Simon, D. M., Cassidy, M., Liu, Y., Tu, A., Broderick, N., Wallace, M. T., & Woynaroski, T. G. (2020). Plasticity of temporal binding in children with

autism spectrum disorder: A single case experimental design perceptual training study. *Research in Autism Spectrum Disorders*, *74*, 101555. https://doi.org/https://doi.org/10.1016/j.rasd.2020.101555

Fitria, A. (2014). Penggunaan Media Audio Visual Dalam Peroses Pembelajaran. *Cakrawala Dini*, *5*((2)), 57–63.

Gonzalez, J. E., Liew, J., Zou, Y., Curtis, G., & Li, D. (2022). "They're Going to Forget About Their Mother Tongue": Influence of Chinese Beliefs in Child Home Language and Literacy Development. *Early Childhood Education Journal*, *50*(7), 1109–1120. https://doi.org/10.1007/s10643-021-01241-x

Hanifah, T. U. (2014). Pemanfaatan Media Pop-Up Book Berbasis Tematik Untuk Meningkatkan Kecerdasan Verbal-Linguistik Anak Usia 4-5 Tahun (Studi Eksperimen Di Tk Negeri Pembina Bulu Temanggung). *Early Childhood Education Papers (Belia)*, *3*(2), 46–54. https://doi.org/https://doi.org/10.15294/belia.v3i2.3727

Hassenfeld, Z. R., Govind, M., Ruiter, L. E. De, & Bers, M. U. (2020). If You Can Program, You Can Write: Learning Introductory Programming Across Literacy Levels. *Journal of Information Technology Education: Research*, *92*, 065–085. https://doi.org/10.28945/4509

He, L., Niu, M., Tiwari, P., Marttinen, P., Su, R., Jiang, J., Guo, C., Wang, H., Ding, S., Wang, Z., Pan, X., & Dang, W. (2022). Deep learning for depression recognition with audiovisual cues: A review. *Information Fusion*, *80*, 56–86. https://doi.org/https://doi.org/10.1016/j.inffus.2021.10.012

Hu, B. Y., Fan, X., Wu, Y., LoCasale-Crouch, J., & Song, Z. (2019). Contributions of Teacher–Child Interaction Quality to Chinese Children's Development in the Early Childhood Years. *Early Education and Development*, *30*(2), 159–177. https://doi.org/10.1080/10409289.2018.1544809

Jusslin, S., Korpinen, K., Lilja, N., Martin, R., Lehtinen-Schnabel, J., & Anttila, E. (2022). Embodied learning and teaching approaches in language education: A mixed studies review. *Educational Research Review*, *37*, 100480. https://doi.org/https://doi.org/10.1016/j.edurev.2022.100480

Kesäläinen, J., Suhonen, E., Alijoki, A., & Sajaniemi, N. (2022). Children's play behaviour, cognitive skills and vocabulary in integrated early childhood special education groups. *International Journal of Inclusive Education*, *26*(3), 284–300. https://doi.org/10.1080/13603116.2019.1651410

Kim, S. J., & Hachey, A. C. (2021). Engaging Preschoolers with Critical Literacy Through Counter-Storytelling: A Qualitative Case Study. *Early Childhood Education Journal*, *49*(4), 633–646. https://doi.org/10.1007/s10643-020-01089-7

Kusuma Sari, N. M. I. (2021). Media Pembelajaran Berbasis Audio Visual Ayo Belajar Budaya Nusantara untuk Menstimulasi Perkembangan Bahasa Anak Usia Dini. *Jurnal Pendidikan Anak Usia Dini Undiksha*, *9*(3), 391. https://doi.org/10.23887/paud.v9i3.37937

Laakso, N. L., Korhonen, T. S., & Hakkarainen, K. P. J. (2021). Developing students' digital competences through collaborative game design. *Computers & Education*, *174*, 104308. https://doi.org/https://doi.org/10.1016/j.compedu.2021.104308

Mason, G. M., Goldstein, M. H., & Schwade, J. A. (2019). The role of multisensory development in early language learning. *Journal of Experimental Child Psychology*, *183*, 48–64. https://doi.org/https://doi.org/10.1016/j.jecp.2018.12.011

Matsumoto, H., & Miho, M. T. (2018). Teachers' beliefs about literacy practices for young children in early childhood education and care settings. *International Journal of Early Years Education*, *27*(3), 1–16. https://doi.org/10.1080/09669760.2018.1547630

Maureen, I. Y., van der Meij, H., & de Jong, T. (2018). Supporting Literacy and Digital Literacy Development in Early Childhood Education Using Storytelling Activities. *International Journal of Early Childhood*, *50*(3), 371–389. https://doi.org/10.1007/s13158-018-0230-z

McLeod, S., Crowe, K., McCormack, J., White, P., Wren, Y., Baker, E., Masso, S., & Roulstone, S. (2018). Preschool children's communication, motor and social development: Parents' and

educators' concerns. *International Journal of Speech-Language Pathology*, *20*(4), 468–482. https://doi.org/10.1080/17549507.2017.1309065

Michelsanti, D., Tan, Z.-H., Sigurdsson, S., & Jensen, J. (2019). Deep-learning-based audio-visual speech enhancement in presence of Lombard effect. *Speech Communication*, *115*, 38–50. https://doi.org/https://doi.org/10.1016/j.specom.2019.10.006

Moein, N., Mohamadi, R., Rostami, R., Nitsche, M., Zomorrodi, R., & Ostadi, A. (2022). Investigation of the effect of delayed auditory feedback and transcranial direct current stimulation (DAF-tDCS) treatment for the enhancement of speech fluency in adults who stutter: A randomized controlled trial. *Journal of Fluency Disorders*, *72*, 105907. https://doi.org/https://doi.org/10.1016/j.jfludis.2022.105907

Murtiyah, Wijiyanto, A., & Asrifan, A. (2021). Pengaruh Media Pembelajaran Audio Visual Dan Alat Peraga Edukatif Terhadap Hasil Perkembangan Anak Di Ra Al Khodijah Purworejo Kecamatan Ngunut Kabupaten Tulung Agung. *Jurnal Pendidikan*, *1*(1), 1–23.

Nicolaou, C., Matsiola, M., Karypidou, C., Podara, A., Kotsakis, R., & Kalliris, G. (2021). Media Studies, Audiovisual Media Communications, and Generations: The Case of Budding Journalists in Radio Courses in Greece. In *Journalism and Media* (Vol. 2, Issue 2, pp. 155–192). https://doi.org/10.3390/journalmedia2020010

Nilsson, M., Ferholt, B., & Lecusay, R. (2018). 'The playing-exploring child': Reconceptualizing the relationship between play and learning in early childhood education. *Contemporary Issues in Early Childhood*, *19*(3), 231–245. https://doi.org/10.1177/1463949117710800

Nobre, J. N. P., Vinolas Prat, B., Santos, J. N., Santos, L. R., Pereira, L., Guedes, S. da C., Ribeiro, R. F., & Morais, R. L. de S. (2020). Quality of interactive media use in early childhood and child development: a multicriteria analysis. *Jornal de Pediatria*, *96*(3), 310–317. https://doi.org/10.1016/j.jped.2018.11.015

Oakley, G., Wildy, H., & Berman, Y. (2018). Multimodal digital text creation using tablets and open-ended creative apps to improve the literacy learning of children in early childhood classrooms. *Journal of Early Childhood Literacy*, *20*(4). https://doi.org/10.1177/14687984187791

Palomares-Aguilera, M., Inostroza-Allende, F., & Solar, L. R. (2021). Speech pathology telepractice intervention during the COVID-19 pandemic for Spanish-speaking children with cleft palate: A systematic review. *International Journal of Pediatric Otorhinolaryngology*, *144*, 110700. https://doi.org/https://doi.org/10.1016/j.ijporl.2021.110700

Plomp, T. (1997). Educational and training system design. *Enschede, The Netherlands: Univercity of Twente*.

Rahiem, M. D. H. (2021). Storytelling in early childhood education: Time to go digital. *International Journal of Child Care and Education Policy*, *15*(1). https://doi.org/10.1186/s40723-021-00081-x

Romeo, R. R., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., Rowe, M. L., & Gabrieli, J. D. E. (2018). Beyond the 30-Million-Word Gap: Children's Conversational Exposure Is Associated With Language-Related Brain Function. *Psychological Science*, *29*(5), 700–710. https://doi.org/10.1177/0956797617742725

Ruggeri, A., Xu, F., & Lombrozo, T. (2019). Effects of explanation on children's question asking. *Cognition*, *191*(May), 1–11. https://doi.org/10.1016/j.cognition.2019.05.003

Russotti, J., Warmingham, J. M., Duprey, E. B., Handley, E. D., Manly, J. T., Rogosch, F. A., & Cicchetti, D. (2021). Child maltreatment and the development of psychopathology: The role of developmental timing and chronicity. *Child Abuse & Neglect*, *120*, 105215. https://doi.org/https://doi.org/10.1016/j.chiabu.2021.105215

Taupiac, E., Lacombe, D., Thiébaut, E., Van-Gils, J., Michel, G., Fergelot, P., & Adrien, J.-L. (2021). Psychomotor, cognitive, and socio-emotional developmental profiles of children with Rubinstein-Taybi Syndrome and a severe intellectual disability. *Journal of Intellectual & Developmental Disability*, *46*(1), 80–89. https://doi.org/10.3109/13668250.2020.1776455

Teale, W. H., Whittingham, C. E., & Hoffman, E. B. (2020). Early literacy research, 2006–2015: A

decade of measured progress. *Journal of Early Childhood Literacy*, *20*(2), 169–222. https://doi.org/10.1177/1468798418754939

Torppa, R., & Huotilainen, M. (2019). Why and how music can be used to rehabilitate and develop speech and language skills in hearing-impaired children. *Hearing Research*, *380*, 108–122. https://doi.org/https://doi.org/10.1016/j.heares.2019.06.003

Towell, J. L., Bartram, L., Morrow, S., & Brown, S. L. (2021). Reading to babies: Exploring the beginnings of literacy. *Journal of Early Childhood Literacy*, *21*(3), 321–337. https://doi.org/10.1177/1468798419846199

Ulfa, M. (2019). Pembelajaran PAKEM Berbasis Media Audio Visual Gerak dalam Melatih Konsentrasi Belajar Anak di TPA Sahabat Hati Pontianak. *Al-Athfal : Jurnal Pendidikan Anak*, *5*(1), 53–68. https://doi.org/10.14421/al-athfal.2019.51-04

Vadia, P., Riandini, A., Sudatha, I. G. W., & Parmiti, D. P. (2020). Korelasi antara Kecerdasan Emosional dan Motivasi Belajar dengan Hasil Belajar PPKn. *Jurnal Mimbar PGSD Undiksha*, *8*(3), 468–478.

van der Wilt, F., van der Veen, C., van Kruistum, C., & van Oers, B. (2018). Why can't I join? Peer rejection in early childhood education and the role of oral communicative competence. *Contemporary Educational Psychology*, *54*, 247–254. https://doi.org/https://doi.org/10.1016/j.cedpsych.2018.06.007

Wang, M.-T., Degol, J. L., & Henry, D. A. (2019). An integrative development-in-sociocultural-context model for children's engagement in learning. In *American Psychologist* (Vol. 74, Issue 9, pp. 1086–1102). American Psychological Association. https://doi.org/10.1037/amp0000522

Wang, W., & Delfin, A. B. (2021). Learning Chinese Mandarin characters in an English-speaking country: The development of a child's symbolic mind. *Journal of Childhood, Education and Society*, *2*(2), 87–105. https://doi.org/10.37291/2717638X.20212276