E-ISSN: 2962-6110
P-ISSN: 2964-7843
JSRET
jsret.knpub.com
Journal of Scientific Research, Education, and Technology

Assessment, Intervention, and Language Development Monitoring Model for Children with Speech Delay

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ABSTRACT

This study aims to develop a Model for Assessment, Intervention, and Monitoring of Language Development for Children with Speech Delay (MAP-ASD) in West Jakarta. The high prevalence of speech delay (23.3%) and the lack of context-appropriate assessment instruments (87.5% of PAUDs do not have specific instruments) are the basis for the urgency of this research. Using the 4D model development approach (Define, Design, Develop, Disseminate), the study involved 15 children with speech delay and 15 PAUD teachers. Validation was carried out by three experts in the fields of child developmental psychology, learning assessment, and speech therapy. The results showed that the MAP-ASD has very good validity (CVI 0.97), high reliability (Kappa 0.77; ICC 0.81), and very good practicality (T-Score 67.7). Effectiveness testing demonstrated significant improvements in children's language skills following MAP-ASD-based intervention, with an average increase of 5 points (22.7%), highest in semantics (6 points) and lowest in syntax and pragmatics (4 points). Mild speech delay cases demonstrated the best response (26.9% improvement), while severe cases continued to show significant progress (20.0%). This model integrates a multilingual approach tailored to the West Jakarta context and links assessments with specific intervention recommendations. MAP-ASD significantly contributes to filling the gap in contextual assessment tools for speech delay in Indonesia, enabling early identification and appropriate interventions that improve the quality of inclusive education at the early childhood education (ECE) level.

Keywords: *Language Development Assessment, Speech Delay, Early Childhood Education*

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INTRODUCTION

Language development is a fundamental aspect of child development, determining the success of future communication and social interactions. Ideally, children's language development follows standardized patterns and stages appropriate for specific age ranges. Optimal language development allows children to express their thoughts, develop cognitive abilities, and build strong social relationships with their surroundings.(Fauzi & Basikin, 2020)However, reality shows that not all children experience language development

according to normal stages. Speech delay is a fairly common language development disorder in early childhood, with a global prevalence of 5-12% (Shriberg et al., 2019). Speaking skills are a crucial aspect of early childhood development, serving not only as a means of communication but also as a foundation for cognitive growth and social interaction. However, not all children reach speech milestones within the expected timeframe (Gustini & Yuliantina, 2025).

Ideally, every early childhood education institution should have a standardized language development assessment instrument that can be used to identify speech delays early on. The instrument should cover comprehensive linguistic aspects, such as phonology, semantics, syntax, and pragmatics, and be applicable to specific socio-cultural contexts.(Fatmawati & Aziz, 2022). In addition, effective assessment instruments must also be sensitive to individual variations and contextual factors that influence children's language development, such as bilingualism and multilingualism, which are common in urban areas like West Jakarta.(Siregar et al., 2023).

Efforts to improve the quality of education can be achieved by improving the quality of learning and the quality of its assessment system. The quality of learning can be seen from the results of assessments. Furthermore, a good assessment system will encourage educators to determine effective teaching strategies to motivate students to learn better.(Ernawidiastuti & Suryani, 2024)However, the reality on the ground shows a significant gap between the need for and the availability of adequate assessment models. Based on pre-observations conducted at 15 early childhood education institutions in West Jakarta in January-February 2025, it was found that 87% of educational institutions did not have specific language development assessment instruments to identify cases of speech delay. Of the 13% of institutions that did have instruments, most used generic instruments that were not specifically designed for the socio-cultural context of Indonesia, especially Jakarta with its multicultural urban society (Pre-observation Results, 2025).

In West Jakarta, the phenomenon of speech delays in early childhood is also a serious concern. Based on pre-observations and interviews with several teachers and principals in the area, it was found that approximately 15% of children aged 3-5 years old show signs of speech delay. Teachers revealed that these children often have difficulty following simple instructions, have limited vocabulary, and tend to be quiet or frustrated when interacting with peers. The principal added that the lack of appropriate assessment tools hinders early detection and intervention, preventing children from receiving the help they need in a timely manner (Wahyuni & Hasibuan, 2024).

In terms of phenomena, the gaps include a lack of awareness and understanding among parents and educators regarding the importance of early detection and intervention for speech delays. Many parents consider speech delays to be normal and will improve over time without special intervention. However, without proper treatment, speech delays can impact a child's future academic and social abilities. Furthermore, educators often lack the tools or adequate training to identify and manage children with speech delays. The urgency of this research lies in the need to develop an effective language development assessment model for children with speech delays in West Jakarta. Currently, available assessment tools

have not been fully adapted to the local context and the specific needs of children in the region. Furthermore, many existing assessment tools focus more on medical aspects and do not consider the environmental, cultural, and social factors that influence children's language development. Thus, there is a research gap in the development of comprehensive and contextual assessment tools.

Several existing language development assessment products used in Indonesia include the Denver Developmental Screening Test II (DDST II), the Capute Scales, and several adaptations of international instruments such as the CELF (Clinical Evaluation of Language Fundamentals). However, these products have several limitations in the context of their use in Indonesia, particularly in West Jakarta. The DDST II, for example, while quite comprehensive in assessing general child development, is not specific enough in assessing linguistic aspects relevant to the multilingual context of West Jakarta. The Capute Scales focus more on cognitive aspects and less on the pragmatic aspects of language, which are crucial in Indonesia's socio-cultural context.(Zhukova et al., 2022)A close comparison of existing assessment instruments reveals fundamental weaknesses in identifying and addressing speech delay. The DDST II, developed in Denver, Colorado, was designed based on a monolingual American population with sociocultural characteristics very different from those of West Jakarta. This instrument tends to categorize multilingual children as delayed, when in fact they may simply exhibit different patterns of language development. The Capute Scales have limitations in assessing pragmatics and social communication skills, which are critical areas for children with speech delay. Meanwhile, the CELF, although more comprehensive, requires a long administration time (90-120 minutes) and intensive specialized training, making it impractical for use by preschool teachers with high workloads. More crucially, none of these instruments provide contextual intervention guidance that can be directly applied in Indonesian educational settings.

Based on a comparative analysis of existing instruments, several critical gaps were identified that need to be addressed: (1) the absence of instruments specifically designed for the multilingual and multicultural context of West Jakarta, (2) the lack of integration between assessment and intervention guidelines, (3) the complexity of use that makes it difficult for PAUD teachers with limited training, and (4) the lack of sensitivity to variations in language development in bilingual/multilingual contexts. The Language Development Assessment Model for Children with Speech Delay (MAP-ASD) developed in this study is designed as an alternative solution that addresses these gaps. MAP-ASD is not simply an additional assessment instrument, but rather a comprehensive model that integrates detection, intervention, and monitoring into a single system. This model is designed to bridge the gap between field needs and the limitations of existing instruments, while maintaining the validity and reliability standards required for accurate assessment. The development of this model is expected to make a significant contribution to improving the quality of early detection and treatment of speech delay in Indonesia, particularly in urban areas with multicultural characteristics such as West Jakarta.

METHOD

This study uses a research and development (R&D) approach with the 4D model (Define, Design, Develop, and Disseminate) proposed by Thiagarajan (1974). The aim of this study is to develop a contextual and applicable Assessment, Intervention, and Monitoring Model for Language Development for Children with Speech Delay (MAP-ASD) for Early Childhood Education (PAUD) institutions in West Jakarta.

The research was conducted in three sub-districts: Kembangan, Grogol Petamburan, and Kalideres, selected for their socio-cultural diversity and varied early childhood education practices. The subjects were 15 children with speech delays and 15 early childhood education teachers who were actively involved in the assessment and model testing process. The study was conducted over six months (April–August 2025).

The Define stage is conducted through a needs analysis using observations and interviews with teachers, parents, and therapists to identify problems and needs for language development assessment. The Design stage includes the preparation of an initial draft of the model consisting of assessment indicators, observation sheets, performance tests, and assessment rubrics. The Develop stage involves validation by three experts (child development psychology, educational assessment, and speech therapy) as well as limited and extensive trials to assess the validity, reliability, and practicality of the model. The final stage, Disseminate, is conducted through teacher training, workshops, and publication of the development results to target PAUD institutions.

Data analysis was conducted using quantitative and qualitative descriptive techniques. Quantitative analysis was used to measure validity (Content Validity Index/CVI), reliability (Kappa and Intraclass Correlation Coefficient/ICC), and practicality (T-score). Meanwhile, qualitative data from observations and interviews were analyzed thematically to interpret the implementation context and user responses to the model.

Through this approach, the MAP-ASD model was developed systematically, empirically validated, and proven to be practical for identifying and monitoring the language development of children with speech delays in early childhood education settings.

FINDING AND DISCUSSION

1. Research result

1.1. Assessment Model Needs Analysis

A needs analysis was conducted on 32 early childhood education institutions in three districts of West Jakarta (Kalideres, Grogol Petamburan, and Kembangan). The survey results revealed a concerning situation regarding the availability of speech delay assessment instruments.

Table 1. Availability of Speech Delay Assessment Instruments in Early Childhood Education Institutions

No	Institution Category	Number of Institutions	Have Instruments	Do not have	Availability Percentage
1	Public Early Childhood Education	8	2	6	25%
2	Private Early Childhood Education	24	2	22	8.3%
	Total	**32**	**4**	**28**	**12.5%**

Data shows that only 12.5% of institutions (4 out of 32) have specific assessment tools for speech delay. A significant disparity was observed between public (25%) and private (8.3%) early childhood education institutions, indicating a gap in access to assessment resources based on institutional status. Interviews with 25 teachers and 8 principals revealed key obstacles to conducting speech delay assessments (Table 2).

Table 2. Teachers' Obstacles in Conducting Speech Delay Assessments

No	Types of Constraints	Frequency	Percentage
1	Not having the right instruments	23	92%
2	Lack of assessment training	22	88%
3	Lack of knowledge about speech delay	21	84%
4	Difficulty distinguishing speech delay from normal variations	20	80%
5	Time constraints for individual assessment	18	72%

The results indicated the lack of appropriate instruments (92%) as the top obstacle, followed by lack of training (88%) and limited knowledge (84%). These findings underscore the urgency of developing valid, reliable, and practical assessment models. Screening of 150 children aged 3-6 years identified a high prevalence of speech delay (Table 3).

Table 3. Prevalence of Speech Delay Indications Based on Age

Age Group	Number of children	Speech Delay Indications	Percentage
3-4 years	45	12	26.7%
4-5 years	55	13	23.6%
5-6 years	50	10	20%
Total	**150**	**35**	**23.3%**

The overall prevalence reached 23.3%, well above the global average (5-12%) and even higher than the Jakarta average (14.7%). The 3-4 age group showed the

highest prevalence (26.7%), indicating the importance of early detection during this period.

1.2. Development and Validation of the MAP-ASD Model

The Language Development Assessment Model for Children with Speech Delay (MAP-ASD) was developed by integrating four dimensions of language (phonology, semantics, syntax, and pragmatics) with a multilingual contextual approach. Validation was conducted by three experts from the fields of child developmental psychology, learning assessment, and speech therapy.

Table 4. Expert Validation Results Based on CVR Analysis

Assessment Aspects	Number of Items	Average CVR	Interpretation
Instrument Readability	4	1.00	Valid
Content Validity	4	1.00	Valid
Integration and Consistency	3	1.00	Valid
Practicality	3	0.78	Valid
Accuracy of Assessment	4	1.00	Valid
Practical Validity	2	1.00	Valid
CVI (Overall)	**20**	**0.97**	**Very Valid**

A Content Validity Index (CVI) of 0.97 indicates that the MAP-ASD model has excellent content validity. This value exceeds Lynn's (1986) criteria, which requires a CVI of ≥ 0.78 for three or more validators. Perfect agreement (CVR = 1.00) on nearly all aspects confirms the model's relevance and accuracy.

Table 5. Results of Inter-rater Reliability Test

Dimensions	Kappa Coefficient	Category	ICC	Category
Phonology	0.83	Very high	0.87	Very high
Semantics	0.78	Tall	0.82	Very high
Syntax	0.76	Tall	0.79	Tall
Pragmatics	0.72	Tall	0.75	Tall
Overall	**0.77**	**Tall**	**0.81**	**Very high**

The reliability test involved five early childhood education teachers assessing the same 10 children. A Kappa coefficient of 0.77 (High) and an ICC of 0.81 (Very High) confirmed the model's consistency and stability when used by different raters. The highest reliability was found in the phonology dimension (Kappa=0.83; ICC=0.87), indicating that this aspect is the easiest to assess objectively.

1.3. Effectiveness of the MAP-ASD Model

The effectiveness trial involved 15 children with speech delay who underwent a complete assessment, 3 weeks of intervention, and then progress evaluation.

Table 6. Comparison of Pre-test and Post-test Language Development Scores

Dimensions	Pre-test (Mean±SD)	Post-test (Mean±SD)	Increase (Mean)	Percentage
Phonology	2.3 ± 0.48	2.8 ± 0.42	0.5	21.7%
Semantics	2.5 ± 0.43	3.1 ± 0.37	0.6	24.0%
Syntax	1.9 ± 0.58	2.3 ± 0.53	0.4	21.1%
Pragmatics	2.2 ± 0.51	2.6 ± 0.47	0.4	18.2%
Overall	**2.2 ± 0.50**	**2.7 ± 0.45**	**0.5**	**22.7%**

Results showed significant improvement across all language dimensions. Semantics showed the highest improvement (0.6 points; 24%), indicating the responsiveness of vocabulary comprehension to short-term intervention. Syntax and pragmatics showed moderate improvement (0.4 points), reflecting the complexity of these areas, which require longer intervention periods.

Table 7. Progress Based on Severity of Speech Delay

Severity Level	Number children	of Pre-test Score	Post-test Score	Improvement	Progress Percentage
Light	7	26	33	7	26.9%
Currently	5	21	26	5	23.8%
Heavy	3	15	18	3	20.0%
Overall	**15**	**22**	**27**	**5**	**22.7%**

Analysis by severity showed that children with mild speech delays responded best (26.9%), followed by moderate (23.8%) and severe (20.0%) cases. However, even severe cases showed significant progress, confirming the model's effectiveness across a range of severity levels.

1.4. Practicality of the MAP-ASD Model

The practicality test involved 15 teachers from various backgrounds who had implemented the model in the field.

Table 8. Results of Instrument Practicality Test

Rated aspect	Average Score	T-Score	Criteria
Ease of Use	4.35	68.5	Very Practical
Time Efficiency	4.18	64.2	Practical
Affordability and Accessibility	4.27	66.9	Very Practical
Suitability to Field Conditions	4.42	70.1	Very Practical
Flexibility of Use	4.15	63.7	Practical
User Satisfaction	4.53	72.6	Very Practical
Sustainability of Use	4.31	67.8	Very Practical
Overall Average	**4.32**	**67.7**	**Very Practical**

The overall T-Score of 67.7 places the MAP-ASD model in the "Very Practical" category. User satisfaction reached the highest value (T-Score of 72.6), indicating the model meets the needs of practitioners in the field. Time efficiency scored relatively lower (T-Score of 64.2), indicating the need for adaptation time during initial use, but it remains in the practical category.

Table 9. Frequency Distribution of Practicality Test Results

Category	T-Score Range	Frequency	Percentage
Very Practical	65-80	12	80%
Practical	50-64	3	20%
Quite Practical	35-49	0	0%
Impractical	20-34	0	0%
Total		**15**	**100%**

The distribution shows that 80% of assessors (12 out of 15) rated the model as very practical, while 20% (3 assessors) rated it as practical. There were no assessments in the category of quite practical or not practical, confirming the high level of practicality of the model in the field. Overall, the MAP-ASD model has met the criteria for the feasibility of an assessment instrument with very good validity (CVI=0.97), high reliability (Kappa=0.77; ICC=0.81), proven effectiveness (22.7% improvement), and very good practicality (T-Score=67.7). This model is ready to be implemented to support early detection and intervention for children with speech delay in early childhood education.

2. Discussion

The finding of a speech delay prevalence of 23.3% in children aged 3-6 years in West Jakarta shows a figure significantly higher than the global prevalence (5-12%) reported by Shriberg et al. (2019) and the Indonesian national average (5-10%)

according to Yulinawati et al. (2024). This figure even exceeds the prevalence in Jakarta in general (14.7%) reported by Anisa Putri Alya et al. (2023). This high prevalence can be explained by several contextual factors. First, the urban characteristics of West Jakarta with high gadget exposure (80% of children use gadgets 3-5 hours/day) are in line with the findings of Aurelia et al. (2022) who identified excessive gadget use as a major risk factor for speech delay. One-way interaction with gadgets replaces two-way communication which is crucial for children's language development.(Aurelia et al., 2022)Second, the lack of verbal stimulation at home (71.4%) confirms Alfin and Pangastuti's (2020) research on the importance of a communicative environment in children's language acquisition. The finding that only 12.5% of early childhood education institutions have specific assessment instruments for speech delay is in line with the study by Ishartiwi et al. (2023) which found a lack of contextual assessment instruments in Indonesia. The disparity between public (25%) and private (8.3%) early childhood education institutions reflects the gap in access to resources.(Alfin & Pangastuti, 2020)This condition exacerbates the situation where 92% of teachers do not have the right instruments and 88% have not received adequate training, confirming the findings of arumsari (2020) regarding the limited capacity of teachers in assessing language development.(Arumsari & Putri, 2020).

The Content Validity Index (CVI) of 0.97 indicates that the MAP-ASD model has excellent content validity, exceeding Lynn's (1986) criteria, which requires a CVI ≥ 0.78. This value is higher than the language assessment instrument developed by Indraswari et al. (2021) with a reliability value of 0.75. Perfect agreement (CVR=1.00) on most aspects indicates the model's high relevance to field needs. Inter-rater reliability with a Kappa coefficient of 0.77 (High) and an ICC of 0.81 (Very High) confirms the model's stability. These results are consistent with the findings of Yudha (2023) who emphasized the importance of high reliability in early childhood assessment instruments.(Yudha, 2023)The variation in reliability across dimensions—highest in phonology (Kappa=0.83) and lowest in pragmatics (Kappa=0.72)—reflects the varying complexity of assessing these aspects of language. The more concrete and observable phonology yields higher rater agreement, while the contextual and situational pragmatics requires more subjective interpretation. Compared with conventional instruments such as the DDST II or CELF, which require 75–120 minutes, the MAP-ASD can be completed in an average of 43 minutes. This efficiency aligns with recommendations.(Rivo Panji Yudha & Rika Sepriani, 2024)about the importance of practicality in the adoption of assessment instruments by PAUD teachers.

The significant 22.7% increase in children's language skills after MAP-ASD-based intervention is consistent with the findings of Rahmawati and Supriyanto (2020), who reported a 15-25% increase in speech delay intervention. However, the pattern of improvement differed—MAP-ASD showed the highest improvement in semantics (24%) compared to syntax and pragmatics (21.1% and 18.2%, respectively), while Rahmawati and Supriyanto found a more balanced improvement.

This difference can be explained by the relatively short duration of the intervention (3 weeks). Semantics, as an aspect of vocabulary comprehension, is more responsive to short-term interventions through vocabulary enrichment and exposure to new words. In contrast, syntax and pragmatics require internalization of grammatical rules and social norms, which takes longer, in line with Vygotsky's (1978) theory of language development regarding the zone of proximal development.

The finding that mild cases showed the best response (26.9%) compared to moderate (23.8%) and severe (20.0%) confirms Zubrick et al.'s (2012) theory of language development regarding a negative correlation between severity and prognosis.(Farrant & Zubrick, 2012)However, it is encouraging that even severe cases showed significant improvement (20%), higher than the general expectation for short-term interventions, demonstrating the model's sensitivity in identifying specific needs and designing targeted interventions. A practicality T-score of 67.7 (Very Practical), with 80% of assessors rating it as very practical, confirms the model's success in accommodating the limitations of early childhood education teachers. These results align with Murniati et al. (2020) who emphasized practicality as a determining factor in instrument adoption. The highest user satisfaction aspect (T-score 72.6) reflects the successful integration between assessment and intervention recommendations, addressing Amaliah et al.'s (2023) criticism of the discontinuity between diagnosis and follow-up in conventional instruments.(Amaliah et al., 2023). The relatively lower time efficiency (T-Score 64.2) is in line with Yudha's (2024) findings that comprehensive instruments require adaptation.(Yudha & Ayuni, 2024)However, qualitative feedback indicates that time decreases significantly with experience—from 60 minutes on initial use to 35-40 minutes after several implementations, indicating an acceptable learning curve.

The MAP-ASD model presents several significant innovations that distinguish it from existing instruments. First, the integration of a multilingual approach that is sensitive to code-switching and mixing—a common phenomenon in West Jakarta—addresses the limitations of the DDST II and CELF, which are based on a monolingual paradigm. This aligns with Andini's (2014) recommendation regarding the need for assessment instruments that accommodate Indonesia's multilingual reality.(Andini, 2014)Second, the integrated framework of diagnostic assessment, specific intervention recommendations, and a longitudinal monitoring system represents a breakthrough that bridges the theory-practice gap. As Khairunnisa (2022) points out, most conventional instruments stop at diagnosis without providing concrete guidance for intervention.(Khairunnisa AP & Mahyuddin, 2022)MAP-ASD addresses this by providing a recommendation matrix based on individual language ability profiles. Third, its user-friendly design with visual guides, simple language, and structured procedures increases accessibility for teachers from diverse backgrounds. This innovation accommodates the reality that the majority of early childhood education (PAUD) teachers in Indonesia have not received specific training in language development assessment, in line with findings(Dyah Ayu Rahmawati et al., 2024).

CONCLUSION

This study successfully developed the Language Development Assessment Model for Children with Speech Delay (MAP-ASD) that meets psychometric standards with very good validity (CVI=0.97), high reliability (Kappa=0.77; ICC=0.81), proven effectiveness in improving children's language skills (22.7%), and very good practicality (T-Score=67.7). This model provides a significant contribution by filling the crucial gap in contextual assessment instruments in Indonesia, particularly through an innovative approach that integrates multilingual sensitivity, an integrated assessment-intervention-monitoring framework, and a user-friendly design that accommodates the limited capacity of PAUD teachers. The finding of a high prevalence of speech delay (23.3%) in West Jakarta, far above the global average, emphasizes the urgency of systematic implementation of this model as a standard assessment in PAUD institutions to facilitate early detection and timely intervention. Based on the research results, it is recommended: (1) the adoption of MAP-ASD as a standard instrument for speech delay assessment in PAUD through the Education Office policy; (2) providing ongoing training for PAUD teachers to improve their language development assessment competencies; (3) developing an integrated referral system between PAUD, speech therapy services, and health services for continuity of care; (4) allocating a dedicated budget for the provision of assessment instruments and intervention materials in PAUD institutions; and (5) conducting longitudinal research to evaluate long-term impacts and exploring the digitalization of models to expand accessibility and efficiency of implementation across various geographic and socio-cultural contexts in Indonesia.

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