Prastuti, R., Yuliwati, Mansoer, Z.
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DOI 10.37640/ICE.04.1407-2025
In Proceedings of the 4th International Conference on Education (ICE 2025), pages 62-68
e-ISSN 2964-7479

Development of an Instrument for Assessing Cognitive and Language Abilities for Early Childhood Group B

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Abstract

The age of 0-6 years is a very important age for child development, so it is called *the golden age* .This study aims to develop a valid and standardized assessment instrument for cognitive and language abilities of early childhood group B. This study uses a research and development (R&D) method with the ADDIE model. The population of this study were PAUD level B children. The total sampling used was 30 children from 4 schools. Data collection techniques used interviews and questionnaires. The data analysis technique used in this study was descriptive statistical data analysis. This instrument was tested for validity and reliability by 2 education experts and 1 education practitioner. Invalid items were found. The instrument was revised and then tested on a small scale and a large scale test. The results of the study on the large scale test were an average validation between 0.6 - 0.9 and a reliability of 0.96, which is categorized as very high. The results of the study indicate a valid instrument and a high level of reliability. The researcher concluded that this instrument can be used by teachers to measure the cognitive and language abilities of children in group B.

Keywords:, Assessment Instruments, Cognitive and Language Abilities, Early Childhood.

1 INTRODUCTION

Cognitive development progresses rapidly during early childhood. Cognitive processes are related to intelligence levels, which characterize a person with diverse interests, particularly those focused on learning ideas. Cognitive behavior involves the ability to think creatively and solve new problems within routine processes . According to Piaget, cognition is a mental process involving reasoning, understanding, and knowledge (Novia & Maemunah, 2021).

According to Piaget, there are four stages of cognitive development: sensorimotor (02 years), preoperational (2-7 years), concrete operational (7-11 years), and formal operational (11 years to adulthood). Early childhood is in the preoperational stage. Children at this stage begin to use symbols such as language and images to represent objects. Children acquire knowledge through exploration, enabling them to discover new theories to support that knowledge.

According to V. Gotsky, each individual has a different function of the thinking tool *(tool of mind)* . It is through the thinking tool possessed by each individual that a person's cognitive development develops from an early age to adulthood (Yuliani Nurani Sujiono et al., 2007). According to him, children build their knowledge through collaboration and

guidance from adults or more expert peers. According to Jerome Bruner, intellectual maturation or a person's cognitive growth is indicated by the child's increasing independence from the nature of the stimuli provided by adults (Willis R, 2011). This growth depends on how a person internalizes events into a storage system that is appropriate to their environment. And expresses it to themselves or others what they have done.

Language is a symbol for expressing experiences, communicating, and also helping develop reading and writing skills . Hurlock (1988) defines language as "all forms of communication produced by thoughts and feelings to convey meaning to others . " Bromley defines language as an organized system of symbols for transferring various ideas and information, consisting of visual and verbal symbols. Language is also a communication tool used to convey ideas, intentions, or meaningful sentences (Afifah and Eva, 2021).

Cognitive and language development in children is one aspect of the stages of child development that should not be ignored by educators in general and parents in particular. Language development is positively correlated with their level of cognitive development (Aniswita Neviyarni, 2020). Therefore, a key finding can be drawn: the relationship between language ability and cognitive ability. Someone with cognitive intelligence also has good language skills, and vice versa. In other words, language development and cognitive development are positively correlated.

An instrument is something that can be used to facilitate someone's task or achieve a goal effectively or efficiently. Instruments are often referred to as tools. Therefore, an assessment instrument can be defined as an assessment tool (A Noviansyah and Istiqomah, 2020). Assessment is a series of systematically planned activities to obtain information from students' learning processes, so that the results can be used by educators to make decisions and improve the learning process and outcomes.

Researchers conducted interviews with the principal and teachers at the Tunas Harapan II Balekambang Early Childhood Education Center (BKB PAUD). They found a lack of standardized and valid assessment instruments for widespread use. Teachers only conducted assessments near the end of the semester, as they were required to submit Child Development Improvement Reports. Teachers only collected all portfolios and children's work for assessment. The lack of observation also resulted in narrow and incomplete assessments. Assessments could also be influenced by personal bias or expectations for the child.

Therefore, a valid and continuous assessment instrument is needed to produce an accurate assessment, so that children's development can be better monitored from the beginning of the semester to the end of the semester. Teachers can also provide information based on appropriate evidence "and standardized according to the developmental stage instrument for children aged 5-6 years" which can help parents in providing support for their children's development. Therefore, the researcher wants to conduct a study "Development of an assessment instrument for the cognitive and language abilities of early childhood group B at BKB PAUD Tunas Harapan II Balekambang, East Jakarta.

2 RESEARCH METHODS

This study aims to develop a cognitive and language assessment instrument for early childhood group B, resulting in a valid instrument that can be used by teachers as a basis for assessing cognitive and language abilities. This study uses a research and development (R&D) method using the ADDIE model with 5 stages: *Analysis, Design, Development, Implementation, and Evaluation* .

The subjects involved in this study were 15 students of BKB Tunas Harapan II, with 10 for the small-scale test. For the large-scale test, 15 children came from SPS Paud Mulia, Paud Anyelir 2, and TK Ratna Kusuma. The data collection technique involved distributing assessment instrument questionnaires to teachers and then testing them on students to

assess whether the instrument items were easy to understand and in accordance with STPPA.

The first stage, analysis, was conducted to identify real needs in the field. Researchers conducted field observations and interviews with school principals and teachers to obtain information on cognitive and language ability assessment instruments. They found that there was a lack of standardized assessment instruments, and subjective assessments were still common.

The second stage, Design, is creating a product design that contains a series of planning activities and developing the assessment instrument to be developed. The assessment instrument to be developed is an instrument to assess the cognitive and language abilities of early childhood group B. The instrument product to be developed is compiled based on indicators of achievement of cognitive and language abilities of early childhood group B.

The third stage, Development, involves validation by subject matter experts, evaluation experts, and teacher responses to the assessment instrument. During the validation process, teachers assess whether the instrument is suitable for use or whether it requires revision. This allows the validation results to be used as a basis for improvement in achieving a high-quality assessment instrument.

The fourth stage of implementation is the stage for implementing and using products that have been developed through small- scale and large-scale testing. This is done to determine the usefulness of the assessment instrument developed

The fifth stage is evaluation. Evaluation is conducted at each stage whenever an item is found to be invalid. If the results at the implementation stage are satisfactory, this indicates that the instrument is ready for use in schools.

Data obtained from the root expert questionnaire was assessed using Aiken validation. Data from the questionnaire distribution validated the instrument items using product moment and reliability calculations using Cronbach's alpha.

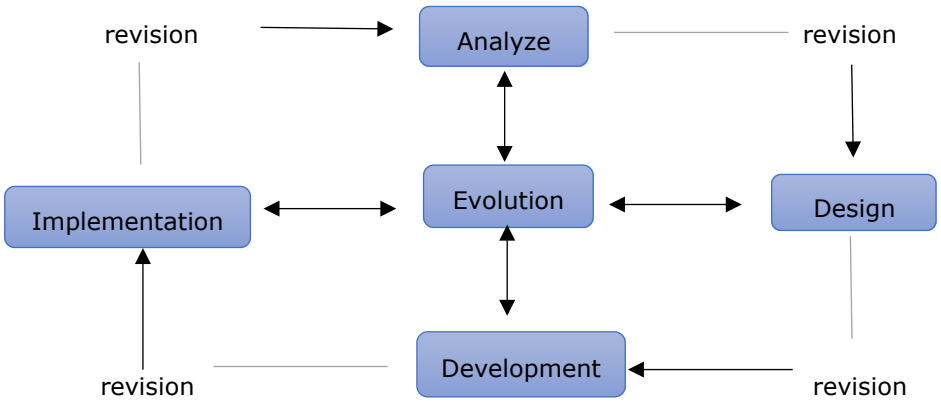

Figure 1. ADDIE Development Model

3 Result and Discussion

3.1 Result

The research results can be described in five stages that correspond to the process of developing an instrument for assessing children's cognitive and language abilities.

3.1.1 Needs Analysis

Based on field observations and interviews with the principal and teachers at BKB Paud Tunas Harapan II Balekambang, it was discovered that there was no standardized

assessment instrument. Teachers relied solely on assessments of student work, worksheets, and observations during class and outside activities, without any recording of the assessments. This lack of standardized assessments raised concerns about invalidity and the possibility of assessments being based on personal preferences. A material analysis was then conducted. This analysis was carried out by outlining and exploring the characteristics of the assessments in accordance with the Child Development Achievement Level Standards (STPPA).

3.1.2 Product Design

Based on the results of the needs analysis and material analysis, the researcher began to design an assessment instrument for the cognitive and language abilities of group B children. After collecting the data, the next step was to design a grid for the assessment instrument for the cognitive and language abilities of group B children in the form of a checklist assessment. The cognitive ability assessment instrument contains 6 variables, 14 dimensions, 18 indicators and 45 instrument items. In the language abilities of early childhood children aged 5-6 years, there are 4 variables, 9 dimensions, 23 indicators and 50 instrument items.

3.1.3 Expert Validation

The initial product was validated by two experts: a content expert, an evaluation expert, and one practitioner/user. The expert validation results indicated that the cognitive and language ability assessment instrument was suitable for use. The expert questionnaire assessment results were calculated using Aiken validation, showing high and moderate scores. The content expert suggested that several items were imprecise and ambiguous. The evaluation expert suggested streamlining the assessment items. Users also suggested reducing the number of items in the assessment instrument. To be more certain, the researcher conducted a validation test on each assessment instrument item and found invalid items that had to be removed. Of the 45 cognitive assessment items, 25 were found to be invalid, while 30 were found to be invalid in the language assessment instrument. Based on the expert suggestions and the validation test results, the researcher revised the assessment instruments to 20 items for each instrument. The validation test was in line with the experts' suggestions.

3.1.4 Small Scale Test and Large Scale Test

To determine whether the revised assessment instrument can be used or not, the researchers conducted small-scale and large-scale trials. The small-scale trial was attended by 10 students of BKB Paud Tunas Harapan II. From the trial, it was found that the assessment instrument items were valid with validation results above 0.7 and high reliability values, namely 0.98 for the cognitive assessment instrument and 0.955 for the language assessment instrument. Then, a large-scale trial was conducted involving 15 students from 3 different schools, namely SPS Paud Mulia, Paud Anyelir 2 and TK Ratna Kusuma. From the results of the large-scale trial, it was found that the instrument items tested showed high validation, namely above 0.7 and their reliability remained high, namely 0.964 for the cognitive ability instrument and 0.963 for the language ability instrument.

3.1.5 Evaluation

Evaluations are conducted at each level if the assessment instrument is found to be invalid and has low reliability. Large-scale testing shows high validation and reliability, meaning the instrument can be used by teachers to assess cognitive and language abilities.

3.2 Discussion

This research discussion describes the results of the development of an assessment instrument for the cognitive and language abilities of early childhood group B at BKB PAUD

Tunas Harapan II based on the **ADDIE development model** (*Analysis, Design, Development, Implementation, Evaluation*). The ADDIE model was chosen because it is organized, tends to be simple, and is widely used to create effective learning products.

3.2.1 Suitability of Instruments with Early Childhood Development Theory

In the **cognitive aspect** , indicators used include problem-solving skills, logical thinking, number understanding, memory and attention, and curiosity. In the **language aspect**, indicators include language reception, language expression, reading, and writing skills.

3.2.2 Instrument Validity

Instrument validity was tested through **Aiken validity** by experts (*expert judgment*) and **construct validity** through item analysis. From a total of 45 initial cognitive ability items, after a selection and revision process, 20 cognitive instrument items were obtained and from the initial 50 items, 20 language instrument items were declared valid.

These results align with **Arikunto's (2019) opinion** that content validity indicates the extent to which instrument items represent the aspects being measured. The absence of several instrument items does not indicate instrument failure, but rather a refinement process to ensure the items used truly align with development indicators.

Table 1. Validation of Large-Scale Test of Early Childhood Cognitive Abilities

	Instrument Items																				
Respondent	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Σ
Maheza	3	3	2	3	2	3	4	4	3	3	3	4	3	3	3	3	3	2	3	3	60
Adrian	3	4	3	4	3	3	3	4	4	4	4	4	4	4	4	4	3	3	4	4	73
Qiana	3	3	2	3	3	3	3	3	3	3	3	3	2	3	3	3	2	3	3	3	57
Catherina	3	3	2	3	3	3	3	3	3	3	3	3	2	3	3	3	2	2	2	2	54
Jabir	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	75
Jogu	3	3	2	3	3	3	3	3	3	3	3	2	3	3	3	2	2	2	2	2	53
Shabira	3	3	2	3	3	3	2	3	3	3	3	2	2	3	3	2	2	2	2	2	51
Kyra	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	54
Gavariel	2	1	2	2	1	2	1	1	1	1	1	2	1	2	3	1	1	1	1	1	28
Andara	3	2	2	3	3	3	3	3	2	3	4	3	3	3	3	2	2	2	3	2	54
Fathar	3	3	2	3	3	3	2	3	2	3	2	2	3	3	3	3	3	3	2	2	53
Felisha	3	2	2	3	2	2	2	2	3	3	2	2	3	2	3	3	2	2	3	3	49
Ramadhan	3	2	2	3	2	3	3	3	2	2	2	3	2	3	3	3	2	2	3	3	51
Ghaya	3	4	3	3	2	2	2	3	3	2	2	3	3	3	3	2	3	3	3	3	55
Zahrani	3	3	2	2	2	2	2	3	3	3	2	3	3	2	3	1	2	2	2	2	47
rhit	0,826	0,809	0,682	0,759	0,745	0,697	0,776	0,906	0,831	0,845	0,813	0,738	0,799	0,876	0,745	0,805	0,794	0,761	0,759	0,76	
rtab	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	
	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	

3.2.3 Instrument Reliability

The instrument's reliability was tested using **Cronbach's Alpha**. The results showed a high reliability value, namely: > 0.9. According to **Nunnally's (1978) criteria**, a reliability value ≥ 0.70 is considered adequate. With a value above 0.80, this instrument can be categorized as highly reliable. This means that the instrument is consistent when used repeatedly under the same conditions.

3.2.4 Practicality of Instruments for Early Childhood Education Teachers

The feasibility test showed that teachers could use the instrument easily. Teachers assessed that the instrument's wording was clear, the indicators were easy to observe, the assessment format was simple, and it was appropriate for daily learning activities. This practicality aligns with Sukardi's (2015) opinion that a good instrument is not only valid and reliable but also practical for users.

3.2.4 Effectiveness of Instruments in Assessing Child Development

The instrument has proven effective in providing a snapshot of child development. Teachers can quickly identify children who have achieved developmental milestones and those who

require additional stimulation. Thus, this instrument serves not only as a measuring tool but also as a basis for planning future learning.

Table 2. Reliabilitastion of Large-Scale Test of Early Childhood Cognitive Abilities

	Instrument Items																				
Respondent	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Σ
Maheza	3	3	2	3	2	3	4	4	3	3	3	4	3	3	3	3	3	2	3	3	60
Adrian	3	4	3	4	3	3	3	4	4	4	4	4	4	4	4	4	3	3	4	4	73
Qiana	3	3	2	3	3	3	3	3	3	3	3	3	2	3	3	3	2	3	3	3	57
Catherina	3	3	2	3	3	3	3	3	3	3	3	3	2	3	3	3	2	2	2	2	54
Jabir	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	75
Togu	3	3	2	3	3	3	3	3	3	3	3	2	3	3	3	2	2	2	2	2	53
Shabira	3	3	2	3	3	3	2	3	3	3	3	2	2	3	3	2	2	2	2	2	51
Kyra	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	54
Gavariel	2	1	2	2	1	2	1	1	1	1	1	2	1	2	3	1	1	1	1	1	28
Andara	3	2	2	3	3	3	3	3	2	3	4	3	3	3	3	2	2	2	3	2	54
Fathar	3	3	2	3	3	3	2	3	2	3	2	2	3	3	3	3	3	3	2	2	53
Felisha	3	2	2	3	2	2	2	2	3	3	2	2	3	2	3	3	2	2	3	3	49
Ramadhan	3	2	2	3	2	3	3	3	2	2	2	3	2	3	3	3	2	2	3	3	51
Ghava	3	4	3	3	2	2	2	3	3	2	2	3	3	3	3	2	3	3	3	3	55
Zahrani	3	3	2	2	2	2	2	3	3	3	2	3	3	2	3	1	2	2	2	2	47
rhit	0,826	0,809	0,682	0,759	0,745	0,697	0,776	0,906	0,831	0,845	0,813	0,738	0,799	0,876	0,745	0,805	0,794	0,761	0,759	0,76	
rtab	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	
	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	valid	

3.2.5 Research Implications

Based on the research results, this assessment instrument provides the following implications:

(1) For PAUD teachers: can be a tool to assist in assessing child development objectively and measurably, (2) For PAUD institutions: can be used as an internal standard for assessing early childhood development, (3) For further researchers: the results of this study can be used as a reference for developing assessment instruments for other developmental aspects such as social-emotional, physical-motor, artistic, and moralspiritual.

4 CONCLUSION

The development of the cognitive and language ability assessment instrument for early childhood group B using the ADDIE model has gone through 5 stages, namely analyzing (analyzing needs and analyzing materials that are appropriate to the cognitive and language aspects of early childhood group B), design (design in the form of variables, dimensions, indicators and instrument items), development (expert validation and instrument item validity), implementation (small-scale and large-scale tests) and then evaluation (evaluation carried out at each stage).

The validation level of the cognitive and language assessment instrument for early childhood group B has been declared valid according to the assessment results of material experts, evaluation experts, and practitioners/users. The validity level according to Aiken validity is in the medium to high range. The validity of the initial instrument contained 25 invalid items out of 45 cognitive ability items, and there were 30 invalid items out of 50 language assessment items. Therefore, the product underwent improvements and item reduction to 20 cognitive ability assessment items and 20 language ability items. In small and large scale implementations, it was seen that all instrument items were valid and had a reliability > 0.9, indicating a high level of reliability.

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