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Journal of General Education and Humanities Vol. 5, No. 1, February 2026, pp. 797 – 803, https://doi.org/10.58421/gehu.v5i1.1004 ISSN 2963-7147 797 Journal homepage: https://journal-gehu.com/index.php/gehu The Influence of Mother Tongue-Based Learning on Cognitive Learning Outcomes of Fifth Grade Students at SDN 27 Sungai Sepan in IPAS Lesson Aprilia Tresa Wulandari1, Samsul Bahri2 1Program Studi Pendidikan Guru Sekolah Dasar, STKIP Melawi Wilayah Perbatasan Entikong, Indonesia 2Program Studi Pendidikan Fisika, STKIP Melawi Wilayah Perbatasan Entikong, Indonesia Article Info ABSTRACT Article history: Received 2025-12-24 Revised 2026-01-13 Accepted 2026-01-14 This study aims to determine 1 the effect of mother-tongue-based learning on the learning outcomes of fifth-grade students in the IPAS subject at SDN 27 Sungai Sepan, specifically in the topic of human body anatomy. The research used a quantitative approach with a OneGroup Pretest-Posttest design and involved all 11 fifth-grade students as a saturated sample. The research instruments consisted of a cognitive learning-outcome test and a questionnaire to identify students' responses toward mother-tongue-based learning through the following indicators: (1) Students can connect everyday experiences with IPAS concepts through logical reasoning expressed in their mother tongue. (2) Students can understand more complex IPAS concepts with teacher support when explanations are delivered in their mother tongue. (3) Students actively participate in discussions and ask questions in their mother tongue to clarify IPAS concepts. Data analysis techniques included a normality test and the Wilcoxon test for non-normal data to determine whether the effect on cognitive learning outcomes was significant. The results showed that students' cognitive learning scores improved from a pre-test average of 3.84 to a post-test average of 3.90. The Wilcoxon test results for pre-test and post-test (T table: 0 < 8) indicated that the null hypothesis (H_0) was rejected. Student responses to mother-tongue-based learning were as follows: Indicator I: 81.8%, Indicator II: 100%, Indicator III: 92.7%. It can be concluded that mother-tongue-based learning has a positive effect; 1 the use of the Iban Sebaruk language helps students better understand IPAS concepts, demonstrating that mother-tongue-based instruction positively influences the cognitive

learning outcomes of fifth-grade students at SDN 27 Sungai Sepan. Keywords: Cognitive Learning Outcomes IPAS Mother Tongue This is an open-access article under the CC BY-SA license. Corresponding Author: Aprilia Tresa Wulandari Program Studi Pendidikan Guru Sekolah Dasar, STKIP Melawi Wilayah Perbatasan Entikong Email: aprilliatresawulan@gmail.com

https://doi.org/10.58421/gehu.v5i1.1004 798 1. INTRODUCTION Indonesia, as a multilingual country, has more than 700 regional languages used in daily life. This linguistic diversity influences the learning process, particularly when the language of instruction used in schools differs from students' mother tongue. In primary education, the use of Indonesian as the instructional language can pose challenges for students who have not yet fully mastered it, thereby affecting their conceptual understanding and cognitive learning outcomes. This condition is evident among fifth-grade students at SDN 27 Sungai Sepan, where most students use Iban Sebaruk as their mother tongue, while IPAS learning, particularly on human respiratory anatomy, relies heavily on scientific terminology in Indonesian. As a result, students' understanding of the material remains low, indicating the need for a learning model that is more relevant and closely aligned with students' linguistic experiences. In line with this, the Indonesian Dictionary defines a mother tongue as the first language an individual acquires and consistently uses in communication with family and the surrounding environment [1]. Fifth-grade students at SDN 27 Sungai Sepan have difficulty understanding teachers' explanations, particularly in natural and social science learning, especially in the topic of human respiratory anatomy, which often involves complex and unfamiliar scientific terms. To address this issue, this study applies mother–tongue–based learning as a cognitive bridge to help students connect new knowledge with their daily experiences, thereby improving cognitive learning outcomes in IPAS. The mother tongue is the first language acquired by children through natural interaction with their family environment [2]. Also known as the first language, it is learned from birth and taught by parents or close family members. This

language serves as a primary tool for developing understanding and forming basic concepts about the surrounding world [3]. Thus, the mother tongue plays a central role in cognitive development. Cognitive learning outcomes refer to students' abilities to understand, remember, and apply knowledge after participating in learning activities [4]. According to Anderson and Krathwohl, the learning outcome indicators in this study include C1 (remembering), C2 (understanding), and C3 (applying) [5]. Jean Piaget's theory of cognitive development outlines several stages: the sensorimotor stage (ages 0–2), the preoperational stage (ages 2– 7), the concrete operational stage (ages 7–11), and the formal operational stage (ages 11–15) [6]. This aligns with Purnasari's findings, who explains that at this age, children are capable of reasoning like adults, although still limited to concrete realities [7]. 2 The respiratory system is responsible for taking in oxygen, releasing carbon dioxide, and utilizing the energy produced [8]. 1 The respiratory system consists of two main parts: (1) the upper respiratory tract, where incoming air is warmed, filtered, and humidified, and (2) the lower respiratory tract (lungs), which functions as the site of gas exchange [9]. The organs of the mammalian respiratory system include the nose (nasal cavity or nares), pharynx, larynx, trachea, bronchi and bronchioles, lungs (pulmo), mouth (buccal cavity), and diaphragm [10].

https://doi.org/10.58421/gehu.v5i1.1004 799 The purpose of this study is to describe the effect of mother tongue–based learning in IPAS subjects, specifically on respiratory anatomy material, for fifth-grade students at SDN 27 Sungai Sepan through the implementation of mother tongue–based instruction. 2. METHOD This study employed a quantitative approach using a pre-experimental One-Group Pre-test–Post-test design to assess 1 the effect of mother–tongue–based learning on the IPAS learning outcomes of fifth-grade students at SDN 27 Sungai Sepan [11]. The independent variable was the use of the Iban Sebaruk mother tongue in the learning process, while the dependent variable was students' learning outcomes. The research was conducted at SDN 27 Sungai Sepan, Malenggang Village, Sekayam District, Sanggau Regency. The study was conducted from

November 2025 to completion. The research population consisted of all students at SDN 27 Sungai Sepan, with a saturated sample of all fifth-grade students totaling 11 participants. The research instruments included multiple-choice tests to measure cognitive abilities before and after the intervention, as well as a closed-ended questionnaire to assess students' responses to mother tongue–based learning. The questionnaire statements included: (1) students can connect daily experiences with IPAS concepts through logical reasoning expressed in their mother tongue; (2) students can understand more complex IPAS concepts with teacher assistance when explanations are delivered in the mother tongue; and (3) students actively engage in discussions and ask questions in their mother tongue to clarify IPAS concepts [12]. Data collection techniques represent the most strategic step in research, as the primary objective of research is to obtain data that meet established standards [13]. Data were collected through pre-tests, treatment implementation, post-tests, questionnaires, and school documentation archives. Data analysis was conducted using the Wilcoxon test for non-normally distributed data to determine the significance of differences in learning outcomes before and after the intervention. 3. RESULTS AND DISCUSSION Results Data collection was conducted by distributing 11 closed-ended questionnaires to fifth-grade students at SD Negeri 27 Sungai Sepan. The questionnaires were designed to measure students' responses to the implementation of mother tongue–based learning, focusing on three main indicators related to comprehension, reasoning, and active participation in IPAS learning. The analysis of questionnaire responses showed that the overall achievement percentage reached 91.5%. This result indicates that students responded very positively to the use of the mother tongue during the learning process. The high percentage reflects students' improved ability to understand learning materials, actively engage in classroom discussions, and relate IPAS concepts to their daily experiences through their mother tongue. Since the obtained percentage exceeded the predetermined effectiveness threshold, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. This finding confirms that mother tongue–based learning effectively supports students' comprehension and

engagement in IPAS instruction. To determine the appropriate statistical analysis, a Chi-

https://doi.org/10.58421/gehu.v5i1.1004 800 square test of normality was conducted on the pre-test and post-test scores. The results of the normality test are presented in Table 1. Table 1. Chi-Square Normality Test of Pre-Test and Post-Test Data Pre-Test Pos-Test Class Interval fo fh $(fo - fh)2/fh$ Class Interval fo fh $(fo - fh)2/fh$ 30-42 5 2.17 3.74 50–62 5 3.11 3.57 43-55 3 3.24 0.018 63–75 1 3.06 4.24 56-68 0 2.82 2.82 76–88 4 3.09 0.83 69-81 3 2.77 0.019 89–101 1 2.74 3.03 Based on the Chi-square test results, the calculated χ^2 value for the Pre-Test was 6.597, while the χ^2 table value at a significance level of 0.05 was 3.84. Since the calculated χ^2 value exceeded the χ^2 table value, the Pre-Test data were not normally distributed. Furthermore, the Post-Test data yielded a calculated χ^2 value of 3.90, which was also 1 greater than the χ^2 table value of 3.84. Thus, the Post-Test data were likewise not normally distributed. This non-normality is indicated by χ^2 values exceeding the critical value at the 0.05 significance level, suggesting that the data distribution deviates from normality. Based on these results, the use of parametric statistical tests was not recommended, and further analysis required a non-parametric approach. Table 2. Non-Parametric Test (Pre-Test and Post-Test) Name Cognitive (Number) Pre-Test Cognitive (Number) Pos-Test Differences d Rank A O 50 60 10 1.5 A D 30 50 20 6 A R 70 80 10 1.5 A C 80 100 20 6 B B 70 90 20 6 C D 40 50 10 1.5 F E 40 60 20 6 S 40 70 30 9.5 V 50 80 30 9.5 P F 30 50 20 6 R M 80 80 0 Based on the results of the Wilcoxon Signed-Rank Test applied to the Pre-Test and Post-Test data, the calculated T value was 0, while the critical T value at a 5% significance level for n = 10 was 8. Since the calculated T value was smaller than the table value (0 < 8), the null hypothesis (H_0) was rejected. These findings indicate a statistically significant difference between students' Pre-Test and Post-Test scores. The Post-Test scores were consistently higher than the Pre-Test scores, demonstrating that the implemented learning intervention improved students' cognitive abilities.

https://doi.org/10.58421/gehu.v5i1.1004 801 Discussions The findings of this study demonstrate that implementing mother tongue–based learning in Iban Sebaruk has a significant positive effect on the cognitive learning outcomes of fifth-grade students at SDN 27 Sungai Sepan, particularly in IPAS material on human respiratory anatomy. This improvement is evident in the increase in post-test scores relative to pre-test scores and is statistically supported by the Wilcoxon Signed-Rank Test, which showed a significant difference after the intervention. The positive impact of mother tongue–based learning can be explained by language's role as a cognitive tool that mediates understanding. According to sociocultural learning theory, language functions as a primary medium through which learners construct meaning and internalize new concepts [14]. When instructional language aligns with students' linguistic backgrounds, learners are better able to connect new scientific concepts with prior knowledge and everyday experiences [15]. In this study, the use of Iban Sebaruk enabled students to understand better abstract and technical IPAS terminology, especially unfamiliar anatomical terms in Indonesian. These findings are consistent with previous studies showing that learning in the mother tongue enhances comprehension, participation, and conceptual clarity in primary education [16], [17]. Students taught in their first language tend to demonstrate higher levels of engagement and confidence, as they are not cognitively burdened by the need to mentally translate information before understanding the content [18]. This condition is particularly crucial in science-based subjects such as IPAS, which require conceptual understanding rather than rote memorization. From a cognitive development perspective, fifth-grade students are generally in the concrete operational stage, where learning is most effective when concepts are linked to concrete experiences and familiar contexts [19]. Mother–tongue–based learning facilitates this process by allowing students to reason logically using linguistic structures they already master. This aligns with constructivist views of knowledge as actively constructed by learners through the interaction of new information with existing cognitive schemas [20]. The questionnaire results, which showed a Very Good category with an overall percentage of 91.5%, further

support the effectiveness of this learning approach. Students reported that they could relate IPAS concepts to daily life experiences, actively engage in discussions, and ask questions more confidently when the mother tongue was used. This finding reinforces the idea that mother tongue–based instruction promotes active learning and meaningful classroom interaction [21], [22]. Moreover, using the mother tongue as a cognitive bridge does not hinder the acquisition of Indonesian as the national language. Instead, it supports gradual bilingual development, where conceptual understanding is first established in the mother tongue before being transferred to the second language [23]. This approach is widely recommended in multilingual education contexts to ensure equitable access to learning and to reduce learning gaps among students from diverse linguistic backgrounds [24]. However, despite its positive outcomes, this study is limited by its small sample size and its pre-experimental design without a control group. Therefore, while the results indicate a strong positive effect, they should be interpreted with caution. Future research is

https://doi.org/10.58421/gehu.v5i1.1004 802 recommended to employ quasi-experimental or experimental designs with larger samples to validate the effectiveness of mother tongue-based further learning across different IPAS topics and educational settings [25]. Overall, the findings of this study confirm that mother tongue–based learning is an effective instructional strategy for improving cognitive learning outcomes in IPAS, particularly in linguistically diverse primary school contexts. The integration of students' linguistic identities into classroom instruction not only enhances understanding but also fosters inclusive and meaningful learning experiences. 4. CONCLUSION Based on the study conducted in fifth grade at SDN 27 Sungai Sepan regarding the implementation of mother tongue–based learning using the Iban Sebaruk language in IPAS materials, it can be concluded that this approach has a significant positive impact on students' cognitive learning outcomes. The use of the mother tongue helps students understand scientific concepts that were previously considered difficult, particularly in anatomical topics that involve numerous technical terms in Indonesian. The questionnaire results showed an

achievement percentage of 91.5%, which falls into the Very Good category, indicating that students responded positively to the use of the mother tongue in the learning process. Accordingly, the research hypothesis is accepted, confirming that mother tongue– based learning has a positive effect on the IPAS learning outcomes of fifth-grade students. Mother tongue–based instruction has been proven effective as a cognitive bridge, facilitating students' understanding of learning materials and enhancing their cognitive achievement. Future studies are recommended to examine other aspects that may be improved through mother tongue–based learning beyond cognitive learning outcomes.

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