COGNITIVE PSYCHOLOGY STUDY AND MATHEMATICAL PROCESS SKILLS ON STUDENTS' ANSWERS IN MATHEMATICS LEARNING IN COMPARATIVE MATERIAL

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| **Article Info**  Received:  Revised:  Accepted:  OnlineVersion: | **Abstract**  This research explores the differences between the two schools regarding three key variables: students' cognitive psychology, mathematical processing skills, and responses to mathematics learning, specifically within the context of comparative material in Grade VII. Additionally, it seeks to compare these three variables to understand how they vary across the two institutions. The study adopts a quantitative approach, with purposive sampling used to select a sample of 120 Grade VII students from two junior high schools. Data were gathered using a questionnaire based on a Likert scale, and analysis was conducted using comparison tests through specialized data processing software. The results revealed significant differences in students' cognitive psychology, mathematical processing skills, and responses to mathematics learning between the two schools. These variations suggest underlying factors related to the learning environment, teaching strategies, or institutional differences that influence student performance and engagement in mathematics. What sets this study apart is its comprehensive comparison of cognitive and skill-based factors in mathematics learning across different school settings. Unlike previous research that examines these variables in isolation, this study integrates cognitive psychology and mathematical processing skills with student feedback, providing a holistic view of the learning experience. Doing so offers more profound insights into how school-specific conditions can shape students’ cognitive and mathematical abilities, thereby informing more tailored educational strategies to improve mathematics learning outcomes across diverse educational contexts.  Keywords: Cognitive Psychology, Comperative Material, Mathematical Process Skills, Student Responses  [Creative Commons License](https://creativecommons.org/licenses/by/4.0/)  © 2024 by the author(s)  This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>). |

INTRODUCTION

Learning is a complex and dynamic process that implies the acquisition of knowledge, skills, attitudes and values through diverse experiences (Dierks et al., 2016; Warfa et al., 2018; Azis & Clefoto, 2024; Nuraeni & Inthaud, 2024). This process is not limited to formal classes, but also occurs through social interactions, observations and personal experiences. Learning is an essential basis for individual development and social progress (Everingham et al., 2017; Gersch, 2018; Lavega et al., 2018; Badiah, Saefullah, & Antarnusa, 2024; Fitriana & Waswa, 2024). Through learning, people can develop the ability to think critically, solve problems and make informed decisions. In the current digital era, technology has become an important component in the learning process, providing a wide access to information and educational resources that enrich the learning experience (Piercey & Militzer, 2017; Craig et al., 2021; Gürsoy, 2021; Asamoah et al., 2024). Therefore, understanding various aspects of learning is the key to diseñar estratégias educativas que sean effective y relevante a las necesidades de los tiempos.

The learning of mathematics plays a crucial role in the educational system because mathematics is a universal language used to understand and interpret the world around us (Della Purba & Kohlhoff, 2022; Theis & Rohana, 2022; Rosa et al., 2023). The process of learning mathematics implies developing analytical and logical skills through numerical, geometric and algebraic concepts. It is not only about memorizing formulas and procedures, but also about understanding the basic principles that support these concepts and how to apply them in various situations (Renties et al., 2018; Kjeldsen, 2019; Sukamdi, S., Lepik & Denkovski, 2023). The main challenge in mathematics learning is that abstract concepts are relevant and interesting for students (Zappone et al., 2019; Christidamayani & Kristanto, 2020; Nuryadi et al., 2020; Leekhot, Payougkiattikun, & Thongsuk, 2024). The use of visual aids, educational technology and contextual approaches can help students to see the importance of mathematics in everyday life and in their future careers.

Cognitive psychology is a branch of psychology that studies internal mental processes that include perception, memory, thinking, and problem-solving (Agbi & Yuangsoi, 2022; Mahanani, 2017; Zysberg & Schwabsky, 2021). In an educational context, understanding how the brain processes information is fundamental to design effective teaching strategies (Azizah et al., 2023; Dias et al., 2021; Loudon, 2019). Cognitive psychology helps teachers understand how they learn students, how to retrieve information and how to solve problems. It also includes research on cognitive load, which refers to the mental effort required to process information at the same time (Ahn & Kwon, 2020; Verschaffel et al., 2020). Al comprender estos principios, los profesores pueden diseñar materiales de aprendizaje que optimicen la capacidad cognitiva de los estudiantes, reducquer la confusión y aumenten la retención de información. Por ejemplo, dividir información compleja en partes más pequeñas y proporcionar ejemplos concretos puede ayudar a los estudiantes a procesar y comprender conceptos difíciles.

The skills of mathematical processes are essential skills that include analysis, reasoning and problem solving in a mathematical context. This capability implies a series of systematic steps that are used to understand and solve mathematical problems (Banks et al., 2018; Li & Dong, 2019; Suryawati & Osman, 2018). Students who master this ability to identify problems, choose appropriate methods to solve them and evaluate their results (Papyrina et al., 2021; Vartiainen & Kumpulainen, 2020). Mathematical process skills in the soil are important for academic success in mathematical subjects, but also for the development of critical and logical thinking skills that can be applied in various situations of life (Kleij, 2019; Sauvé et al., 2018). The development of these skills can be strengthened through regular practice, real problem solving and the use of visual aids that help students visualize abstract concepts. Therefore, mathematical process skills play an important role in the formation of a critical and adaptive analytical mentality.

This study offers a new contribution in the context of the application of KPMPSCHYCO-TECHNOLOGY (Technology-Based Mathematical Process Skills and Cognitive Psychology) which has not been widely applied in the education system in Indonesia, especially at the junior high school level. Most previous major studies (e.g., Daniel, 2016; Souad & Korti, 2018) have shown that the application of cognitive psychology principles can improve the ability to retain and transfer knowledge across disciplines. However, this study focuses on the integration of local wisdom through the traditional game Hadang from Jambi province in technology-based learning, which has never been widely explored before. By combining technology and local elements, this study aims to not only improve mathematical process skills but also foster cultural awareness in students.

This study was conducted in Jambi province, Indonesia, involving junior high school students as the main subjects. The integration of traditional games in technology-based learning designs creates a locally relevant and unique approach, which has never been studied in depth in this area. This provides a rich new context and potential for educational innovation that focuses on developing students' mathematical process skills and cognitive psychology while taking into account local cultural backgrounds.

RESEARCH METHOD

***Research Design***

This research applies quantitative methods with a comparative methodological approach. A comparative type of quantitative approach is used to compare the most variables or groups in research (Palermo et al., 2019; Şahintepe et al., 2020; Wahjusaputri & Bunyamin, 2022). In the context of this studio, se utiliza un enfoque comparativo para investigar diferencias o correlaciones entre determinadas variables. Este método generalmente implica recopilar datos de base numerérica y aplicar análisis estadístico para probar hypotésis o identificar posibles patrones en los datos.

***Research Target/Subject***

The population of this studio was 120 students from two schools, namely, SMPN 7 Muaro Jambi and SMPS Elhafidziyah. La técnica de muestreo es el muestreo aleatorio. The sample for this research came from class VII, totaling 4 classes, with 30 students being the subjects studied. The reason to select research subjects of VII is because the school has realized much learning of mathematics so that the variables of cognitive psychology of students can identify themselves in the learning of mathematics.

***Instruments, and Data Collection Techniques***

The instruments of this study used cognitive psychology cuestionarios para estudiantes y cuestionarios de aprendizagem de matemáticas. Hence, the table used consists of 36 items valid in this instrument using a Likert scale. La escala consta de 4 puntos con un valor de muy bien siendo 4, bien siendo 3, no bien siendo 2, muy mal siendo 1. Cada afirmación es representativa de cada indicador de caracter independiente y comprensión de conceptos. The focus of this investigation is in 36 indicators.

Table 1. Cuadrícula de instrumentos de psicología cognitiva estudiantil.

|  |  |  |
| --- | --- | --- |
| Variables | Indicators | Total Items |
| Cognitive Psychology | Attention | 1,2,3 ,4,5 |
| Memory | 6,7,8,9,10 |
| Problem Solving | 11,12,13,14 |
| Critical Thinking | 15,16,17,18,19 |
| Decision Making | 20,21,22,23,24 |
| Information Processing | 25,26,27,28,29 |
| Metacognition | 30,31,32,33 |
| Creativity | 34,35,36 |
| Total | | 36 |

Esta investigación utiliza una escala Likert que consta de 4 categorías, por lo que hay intervals en cada categoría, y los intervals en cada categoría se pueden ver en la siguiente tabla. Las categorías de habilidades de procesos matemáticos para el aprendizaje de las matemáticas se muestran en la Tabla 2.

Table 2. Cuadrícula de instrumentos de las habilidades de procesamiento matemático de los estudiantes para el aprendizaje de las matemáticas.

|  |  |  |
| --- | --- | --- |
| variables | Indicators | No hay artículos |
| Mathematical process skills. | Observation capacity | 1 |
| Calculation capacity | 2 |
| Measurement capacity | 3 |
| Capacity of classification | 4 |
| capacidad de encontrar relaciones | 5 |
| capacidad de hacer predicciones | 6 |
| capacidad para realizar investigaciones | 7 |
| capacidad de recopilar y analizar datos | 8 |
| capacidad de interpreting datos | 9 |
| ability to communicate results | 10 |
| Total | | 10 |

After explaining the grill of instruments of indicators of cognitive psychology of students, measurements were carried out through descriptive statistical tests. Categoría de psicología cognitiva estudiantil. The categories of answers of students to learning mathematics are shown in Table 3.

Table 3. Cuadrícula de instrumentos de respuesta de los estudiantes al aprendizaje de matemáticas

|  |  |  |
| --- | --- | --- |
| variables | Indicators | Total articles |
| Response to the student | Respuesta | 1,2,3 ,4 |
| Relevance | 5,6,7,8,9 |
| Atención | 10,11,12,13 |
| Satisfaction | 14,15,16,17 |
| sure of itself | 18,19,20,21 |
| Total | | 21 |

After explaining the grill of instruments of indicators of cognitive psychology of students, measurements were carried out through descriptive statistical tests. Categoría de psicología cognitiva estudiantil.

Table 4. Categorías de psicología cognitiva de los estudiantes

|  |  |  |  |
| --- | --- | --- | --- |
| Categories | Range of variables | | |
| Generic skills of the student | Mathematical process skills. | Estudiantes encuestado |
| Muy no bueno | 36.0 – 63.0 | 10.0-17.5 | 21.0-36.75 |
| No es bueno | 63.1 – 90.0 | 17.6-25.0 | 36.85-52.75 |
| Bien | 90.1 – 117.0 | 25.1-32.5 | 52.85-68.25 |
| No es bueno | 117.1 – 144.0 | 32.6-40.0 | 68.35-84.0 |

*Data analysis technique*

Esta investigación comenzó con la distribución de cuestionarios, seguido del análisis de datos cuantitativos y la identificación de hallazgos para futura investigaciones. During the stage of data collection, 120 students were killed by two schools who completed a body. Los datos recolectados fueron luego analizados mediante un proceso de codificación, selección de datos relevantes y análisis mediante el software SPSS con pruebas estadísticas descriptivas e inferenciales. Firstly, descriptive statistics are used to provide a general view of the cognitive psychology of students (Amrhein et al., 2019; Ghavifekr & Rosdy, 2015). Luego se realizan pruebas de supuestos como pruebas de normalidad, homogeneidad y linealidad. La prueba de normalidad evalúa si los datos siguen una distribución normal, la prueba de homogeneidad examina la igualdad de varianza entre dos grupos diferentes de datos y la prueba de linealidad evalúa la relación lineal entre dos variables. A continuación se realizó la prueba de hypothesis mediante la prueba t y la prueba post hoc. La prueba t compara dos grupos de datos, mientras que la prueba de regresión evalúa la relación entre dos variables. El análisis de datos mediante el programa SPSS implica el cálculo de frecuencias, promedios y desviaciones estándar. The data collection process was carried out by selecting the students as a second research categories and delivering cuestionarios on their cognitive psychology. La Figura 1 shows the procedures for recopilating data used in this study.

Figure 1. Research procedure

RESULTS AND DISCUSSION

The results of the descriptive cognitive psychology of students in mathematics learning are presented.

Table 5. Descripción de las pruebas de psicología cognitiva de los estudiantes

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Response to the student | | Intervals | F | Porcentaje | Categories | Mean | Median | Min | Max |
| SMPN 7 Muaro Jambi | VIIA | 36.0 – 63.1 | 0 | 0% | Muy no bueno | 3.20 | 3.00 | 2.00 | 4.00 |
| 63.1 – 90.0 | 2 | 10% | No es bueno |
| 90.1 – 117.0 | 11 | 55% | Bien |
| 117.1 –144.0 | 7 | 35% | Muy bien |
| VIIB | 36.0 – 63.1 | 0 | 0% | Muy no bueno | 3.10 | 3.00 | 2.00 | 4.00 |
| 63.1 – 90.0 | 4 | 20% | No es bueno |
| 90.1 – 117.0 | 9 | 45% | Bien |
| 117.1 –144.0 | 7 | 35% | Muy bien |
| Elhafidziyah Middle School | VIIA | 36.0 – 63.1 | 2 | 10% | Muy no bueno | 2.85 | 3.00 | 1.00 | 4.00 |
| 63.1 – 90.0 | 3 | 15% | No es bueno |
| 90.1 – 117.0 | 8 | 40% | Bien |
| 117.1 –144.0 | 7 | 35% | Muy bien |
| VIIB | 36.0 – 63.1 | 3 | 15% | Muy no bueno | 2.75 | 3.00 | 1.00 | 4.00 |
| 63.1 – 90.0 | 4 | 20% | No es bueno |
| 90.1 – 117.0 | 7 | 35% | Bien |
| 117.1 –144.0 | 6 | 30% | Muy bien |

Según los resultados de la tabla anterior, se puede decir que SMPN 7 Muaro Jambi y SMPS Elhafidziyah clases VII A, VII B son superiores en la categoría buena. En la siguiente tabla se presenta una descripción de las pruebas estadísticas descriptivas sobre las habilidades de procesamiento matemático de los estudiantes.

Table 6. Descripción de la prueba de las habilidades de proceso matemático de los estudiantes

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Response of the student | | Intervals | f | Percentage | Categories | mean | Median | Min | max |
| smpn 7 Muaro Jambi | viia | 10.0-17.5 | 0 | 0% | muy no bueno | 3.10 | 3.00 | 2.00 | 4.00 |
| 17.6-25.0 | 4 | 20% | No es bueno |
| 25.1-32.5 | 9 | 45% | Bien |
| 32.6-40.0 | 7 | 35% | muy bien |
| viib | 10.0-17.5 | 2 | 10% | muy no bueno | 3.25 | 3.00 | 1.00 | 4.00 |
| 17.6-25.0 | 3 | 15% | No es bueno |
| 25.1-32.5 | 9 | 45% | Bien |
| 32.6-40.0 | 6 | 30% | muy bien |
| Elhafidziyah Middle School | viia | 10.0-17.5 | 1 | 5% | muy no bueno | 3.15 | 3.00 | 1.00 | 4.00 |
| 17.6-25.0 | 4 | 20% | No es bueno |
| 25.1-32.5 | 8 | 40% | Bien |
| 32.6-40.0 | 7 | 35% | muy bien |
| viib | 10.0-17.5 | 6 | 30% | muy no bueno | 2.85 | 3.00 | 1.00 | 4.00 |
| 17.6-25.0 | 4 | 20% | No es bueno |
| 25.1-32.5 | 5 | 25% | Bien |
| 32.6-40.0 | 5 | 25% | muy bien |

Según los resultados de la tabla anterior, se puede decir que SMPN 7 Muaro Jambi y SMPS Elhafidziyah clases VII A, VII B son superiores en la categoría buena. En la siguiente tabla se presenta una descripción de la prueba de descripción de respuestas de los estudiantes en el aprendizaje de matemáticas.

Table 7. Descripción de la prueba de las respuestas de los estudiantes al aprendizaje de matemáticas

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Response of the student | Intervals | | | f | Percentage | Categories | mean | Median | Min | max |
| smpn 7 Muaro Jambi | | viia | 21.0-36.75 | 0 | 0% | muy no bueno | 2.85 | 3.00 | 2.00 | 4.00 |
| 36.85-52.75 | 3 | 15% | No es bueno |
| 52.85-68.25 | 10 | 50% | Bien |
| 68.35-84.0 | 7 | 35% | muy bien |
| viib | 21.0-36.75 | 2 | 0% | muy no bueno | 2.75 | 3.00 | 1.00 | 4.00 |
| 36.85-52.75 | 3 | 15% | No es bueno |
| 52.85-68.25 | 8 | 40% | Bien |
| 68.35-84.0 | 7 | 45% | muy bien |
| Elhafidziyah Middle School | | viia | 21.0-36.75 | 1 | 5% | muy no bueno | 3.15 | 3.00 | 1.00 | 4.00 |
| 36.85-52.75 | 4 | 20% | No es bueno |
| 52.85-68.25 | 8 | 40% | Bien |
| 68.35-84.0 | 7 | 35% | muy bien |
| viib | 21.0-36.75 | 2 | 10% | muy no bueno | 3.25 | 3.00 | 1.00 | 4.00 |
| 36.85-52.75 | 4 | 20% | No es bueno |
| 52.85-68.25 | 8 | 45% | Bien |
| 68.35-84.0 | 6 | 30% | muy bien |

Según los resultados de la tabla anterior, se puede decir que SMPN 7 Muaro Jambi y SMPS Elhafidziyah clases VII A, VII B son superiores en la categoría buena. En la siguiente tabla se presenta una descripción de la prueba de normalidad.

Table 8. Prueba de normalidad de la psicología cognitiva, las habilidades del proceso matemático y las respuestas de los estudiantes al aprendizagem de las matemáticas



Con base en los resultados de la tabla se puede conclude que los datos se distribuyen normalmente, la prueba de normalidad se obtiene con la prueba de Kolmogorov-Smirnov, el valor de significancia es > 0,05. The following table presents a study of the cognitive psychological line of students, their mathematical processing skills and their answers to mathematical learning.

Table 9. Prueba de linealidad de la psicología cognitiva de los estudiantes y sus respuestas al aprendizagem de matemáticas



Based on the results of the table, it can be concluded that the data are lineales, the line study is obtained with the Kolmogorov-Smirnov rule, the significance value is > 0.05. The following table presents a study of the cognitive psychological homogeneity of students, their mathematical processing skills and their answers to mathematical learning.

Table 10. Prueba de homogeneidad de la psicología cognitiva, las habilidades del proceso matemático y las respuestas de los estudiantes al aprendizaje de las matemáticas



Based on the results of the table, it can be concluded that the data are homogeneous, the homogeneity test is obtained through the Kolmogorov-Smirnov rule with a significance value > 0.05. The following is a table of the cognitive psychology of students, the mathematical process skills and the answers of the students to the learning of mathematics.

Table 11. Study of Cognitive Psychology for Students, Mathematical Process Skills and Answers of Students to Mathematics Learning



Based on the previous table, it can be interpreted that there is a comparison between the cognitive psychology of students and the answers of students in both schools, as seen in the results sig. (of the colas) less than 0.05. The following table presents a post hoc study of the cognitive psychology of students, its mathematical processing skills and its answers to mathematical learning. The following table presents the interpretation of the cognitive psychology of the students, the skills of the mathematical processes and the answers of the students to the learning of mathematics in SMPN 7 Muaro Jambi and SMPS Elhafidziyah.

Table 12. Interpretación de la psicología cognitiva de los estudiantes, las habilidades de proceso matemático y las respuestas de los estudiantes al aprendizaje de matemáticas en SMPN 7 Muaro Jambi y SMPS Elhafidziyah



The continuation is a post hoc study that uses Tukey to interpret cognitive psychology, mathematical process skills and the answers of students to learning mathematics in SMPN 7 Muaro Jambi and SMPS Elhafidziyah.

Table 13. Post hoc study that uses Tukey to interpret cognitive psychology, mathematical process skills and student responses to mathematical learning in SMPN 7 Muaro Jambi and SMPS Elhafidziyah



In the results of descriptive statistical research, the researchers probaron the learning model for students implemented in SMPN 7 Muaro Jambi and SMPS Elhafidziyah. There are 2 classes in each school, namely, VII A, VII B with 30 students for a total of 120 in each class. With studies that have been carried out on descriptive statistics, there are 36 indicators of cognitive psychology, 10 indicators of mathematical process skills, 21 indicators of answers from students to the learning of mathematics that needs attention. The results of descriptive statistical tests are used to measure the process skills of students in relation to problem-based learning and problem-solving as a learning paradigm (Fuad et al., 2017; Molefe & Aubin, 2021; Astalini et al., 2024). According to the previous indicators, SMPN 7 Muaro Jambi has a higher percentage of cognitive psychology, mathematical processing skills and responses from the students that SMPS Elhafidziyah, how it detaches from the results of the studies that have been carried out. This shows that cognitive psychology in SMPN 7 Muaro Jambi is superior to that applied in SMPS Elhafidziyah.

Based on the results of the normality study presented in Table 8, it can be concluded that the cognitive psychology data of the students, the mathematical process skills and the answers of the students to the learning of mathematics in the schools are distributed normally. This can be seen in the Kolmogorov-Smirnov significance value, which is greater than 0.05. La prueba de linealidad que se muestra en la Tabla 9 muestra que los datos de las dos escuelas tienen una relación lineal. The significance value of the linealidad sample is higher than 0.05, which indicates that there is a linear relationship between the variables that are measured (Kuhfeld & Soland, 2021). The results of the homogeneity study presented in Table 10 show that the analized data are homogeneous. This is evidenced by a significance value greater than 0.05 in the Kolmogorov-Smirnov practice, which means that the varianza entre grupos de datos es similar.

The results of the study have been shown in Table 11 that there are significant differences between the cognitive psychology of the students and the answers of the students to the learning of mathematics in the schools. El valor de significancia (de dos colas) es menor que 0.05, lo que indica que existe una diferencia significativa entre los grupos de datos comparados. In addition, post hoc studies were also carried out to evaluate the relationship between the cognitive psychology of students and their answers to mathematics learning (Piercey & Militzer, 2017; Warfa et al., 2018). These results show a significant difference, which indicates that the variables of cognitive psychology influence the responses of students in mathematics learning.

In general, the results of this investigation show that both SMPN 7 Muaro Jambi and SMPS Elhafidziyah have students with good categories of cognitive psychology and mathematical process skills. This is reflected in the results of descriptive tests, normality, lineality, homogeneity, practice and regression tests carried out. These results provide important information about the state of the cognitive psychology and mathematical skills of the students, which can be used to develop teaching strategies that are more effective and respond to the needs of the students.

This research is in line with research (Cantor et al., 2019) that considers aspects of cognitive psychology, but the difference is rooted in the focus that involves the schools, an aspect in the cubierto in previous investigations. Cognitive psychology provides a deep understanding of how humans process information, make decisions and solve problems in an efficient way. By using concepts of cognitive psychology, we can develop strategies and techniques to improve cognitive performance, overcome mental disorders and improve the quality of life in general.

The implications of this research indicate that a deep understanding of cognitive psychology and the mathematical process skills of students are very important to increase the effectiveness of mathematical learning. The results of the investigations that show a significant relationship between cognitive psychology and the responses of students in mathematics learning indicate that teachers should pay attention to the cognitive aspects of students when planning and implementing learning. By integrating teaching strategies that support cognitive development and mathematical thinking processes, such as deeper problem solving and project-based approaches, teachers can increase student participation and learning outcomes (Argaw et al., 2017; Gersch, 2018; Hidayati et al., 2020; Prambanan, Yathasya, & Anwar, 2023; Astalini et al., 2023). In addition, these hallazgos alienate the need for a teacher training that focuses on teaching techniques that support the skills of mathematical processing and cognitive development, which in turn can result in a higher academic performance and a better understanding of mathematical concepts among students.

One of the important contributions of this investigation is the enfasis in the mathematical process skills of students and cognitive psychology in the context of learning mathematics, which is a relatively new point of view in the educational literature. This research provides a deeper understanding of how aspects of the cognitive psychology of students can influence their answers in mathematics learning, as well as how the skills of mathematical processes can play a role in the understanding of mathematical concepts (Banks et al., 2018; Misastri, Wirayuda, & Syarbaini, 2023). Focusing on these aspects, this research provides a solid basis for the development of more holistic and effective teaching strategies, which can improve the quality of mathematics learning and enrich the general learning experience of students (Khotimah & Mahmudah, 2021; Sherif et al., 2021). By broadening the understanding of the importance of cognitive psychology and the skills of mathematical processes in the context of mathematical learning, this research provides significant new contributions to the development of teaching practices oriented to a better understanding and academic performance of students***.***

CONCLUSION

Based on the results of hypothesis studies, research studies and data analysis, the conclusion of this research is 120 samples of learning models based on problems of classes VII A, VII B. This research was carried out by SMPN 7 Muaro Jambi and SMPS Elhafidziyah. From the results of the study of description it can be concluded that SMPN 7 Muaro Jambi is more superior and superior in comparison with SMPS Elhafidziyah. Based on the results of the research and post hoc, it can be concluded that there are differences and comparisons in the three variables, namely, cognitive psychology, mathematical process skills and answers from students to learning mathematics in the schools. The researchers believe that they carry out more research to explore the effectiveness of various cognitive-based teaching methods, such as cooperative learning, problem-based learning or the use of educational technology to improve students' understanding of comparative material.

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