THE INFLUENCE OF SPATIAL-VISUAL INTELLIGENCE ON THE ABILITY OF STUDENTS' MATHEMATICAL CONNECTION AT 8th GRADE IN SMP N 1 PEKUNCEN, BANYUMAS REGENCY

AN UNDERGRADUATE THESIS

Submitted to the Faculty of Tarbiya and Teacher Training of
State Islamic University Prof. K.H. Saifuddin Zuhri Purwokerto
as a Partial Fulfilment of Requirement for *Sarjana Pendidikan* (S.Pd.) Degree

by:
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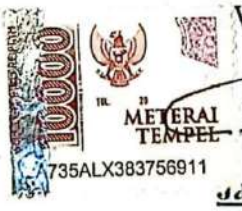

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Assalamu'alaikum Wr. Wb

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THE INFLUENCE OF SPATIAL-VISUAL INTELLIGENCE ON THE ABILITY OF STUDENTS' MATHEMATICAL CONNECTION AT 8TH GRADE IN SMP N 1 PEKUNCEN, BANYUMAS REGENCY

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Abstract: This study aims to determine whether there is a significant influence between spatial-visual intelligence variables on the mathematical connection ability of students in class VIII SMP N 1 Pekuncen. The type of research used is quantitative with survey research methods. The population of this study was 238, while the sample used was 149 students. The sampling technique in this study used simple random sampling with the Slovin formula. The data collection technique used tests to measure spatial-visual intelligence and mathematical connection ability which had previously passed the validity and reliability test stages. In this study, hypothesis testing was carried out using the regression significance test. The data analysis technique used in this research is simple linear regression. The results of this study found that there was a positive influence of spatial-visual intelligence on students' mathematical connection ability with a large influence of 5.8%. Therefore, it is known that spatial-visual intelligence has a positive effect on mathematical connection ability.

Keywords: Mathematical Connection Ability, Spatial-visual Intelligence, Survey Research.

MOTTO

"Old ways will not open new doors"

(Maudy Ayunda)

DEDICATION

Alhamdulillahirobbil'alamin

I am grateful to Allah who has given blessings and ease in every step, so that I can complete this research.

I dedicate this simple work to:

myself, Jangky Dausat Basilludin Al Kholdan,

thank you for putting aside and choosing to get back up and finish all this. Thank you for controlling yourself from various pressures of circumstances and never deciding to give up.

My beloved parents, Mr. Kholid Kamal and Mrs. Ani Susanti, who always pray, guide, and support the author wholeheartedly.

My brother, Agil Mujadid Syaiful Adli who always gives prayers and encouragement to the author.

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There are not many words that the author can say to repay the kindness to all parties but only prayers and may the blessings of Allah SWT always accompany each of our activities and goodness. The author realizes that this thesis still has many shortcomings. For that, it is hoped that input, criticism and suggestions from readers so that this thesis can be a reference and be useful for all parties.

Purwokerto, 19 September 2024

Author,

Jangky Dausat Basilludin A.K

S.N. 2017407073

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CHAPTER 1
INTRODUCTION

A. Background of the Study

Education is the deliberate, systematic, and sustained effort to transmit, provoke or acquire knowledge, values, attitudes, skills or sensibilities as well as any learning that results from the effort[1]. According to Republic of Indonesia Law Number 20 of 2003 concerning the national education system, it is explained that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious and spiritual strength, self-control, personality, intelligence, noble morals, and the skills needed by themselves, society, nation, and state[2]. This definition understands education as a process that has purposes and is not a place. However, contemporary societies have denoted schools as the institutions responsible for education that can equip students with skillsets that are then regarded as contents critical related to their lives, such as mathematics.

Mathematics has been defined in a variety of ways throughout history; it is an indispensable component of science and is utilized in virtually every discipline, including natural science, engineering, art, and economics[3]. It highlights how mathematics is connected to other disciplines. Therefore, students must have adequate mathematical connection abilities to solve problems because mathematics is an interconnected scientific discipline. According to NCTM, there are five mathematical abilities that students must have in order to learn mathematics: (1) Mathematical communication ability, (2) Mathematical reasoning ability, (3) Mathematical problem-solving ability,

[1] David Matheson, 'What Is Education?', *An Introduction to the Study of Education, Fourth Edition*, 2022, 1–18 <https://doi.org/10.1017/s0034670500025936>.

[2] Peraturan Pemerintah RI, 'Peraturan Pemerintah Republik Indonesia Tentang Pendidikan (PP Nomor 20 Tahun 2003)', *Zitteliana*, 2003, 159–70.

[3] Pranshi Sharma, 'Importance and Application of Mathematics in Everyday Life', *International Journal for Research in Applied Science and Engineering Technology*, 9.11 (2021), 868–79 <https://doi.org/10.22214/ijraset.2021.38869>.

(4) Mathematical connection ability, and (5) Mathematical representation ability[4]. Hence, mathematical connection ability is one of the basic mathematical abilities that students need to achieve in learning mathematics.

Mathematical connection ability is students' ability to connect between mathematical topics, mathematics with other disciplines and associate mathematics with the real world or in everyday life[5]. Saleh & Warsito emphasized the ability to connect these ideas can be done orally, in writing, with pictures, diagrams, using mathematical symbols, or using real objects[6]. This means that human life cannot be separated from the role of mathematics because the ability of mathematical connections is very closely related to real life. Therefore, mathematical connections are very important to develop in students' minds because it stimulates students' thinking abilities. This will create a broader meaning for students obtained from learning[7].

Mathematics learning, as defined by Bruner, is learning about mathematical concepts and structures contained in the material being studied and looking for connections between mathematical concepts and structures in it[8]. Turner and Mc Coulouch explain that learning will be more meaningful and optimal in students' minds if they make more connections in mathematics[9]. This demonstrate the importance of student mathematical connection ability that the more frequently students make connections in mathematics, the easier it is for them to recall mathematical concepts, formulas, and principles. Students can apply previously learned principles to learn new topics and solve problems

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[4] National Council of Teachers of Mathematics, *Principles and Standards for School Mathematics* (Key Curriculum Press, 2000).

[5] Ifada Novikasari, *Keterampilan Berpikir Matematika* (Saizu Publisher, 2022).

[6] Firliani and Iik Nurhikmayati, 'Hubungan Kemampuan Koneksi Dan Kemandirian Belajar Siswa', *Papanda Journal of Mathematics and Science Research*, 1.1 (2022), 1–9 <https://doi.org/10.56916/pjmsr.v1i1.125>.

[7] Karunia Eka Lestari, 'Implementasi Brain-Based Learning Untuk Meningkatkan Kemampuan Koneksi Dan Kemampuan Berpikir Kritis Serta Motivasi Belajar Siswa Smp Karunia', *Jurnal Pendidikan Unsika*, 2.1 (2019), 36–46.

[8] Ping Wen, 'Application of Bruner's Learning Theory in Mathematics Studies', 283.Cesses (2019), 234–37.

[9] Marlin Barcelona Panjaitan, 'Kesulitan Koneksi Matematis Siswa Dalam Penyelesaian Soal Pada Materi Lingkaran Di SMP', *Penelitian, Artikel*, 2019, 1–14.

linked to their life, making mathematics more meaningful to them. Learning mathematics will be more challenging for students who lack the ability of mathematics connection since they must recall numerous separate concepts and are unable to perceive how these concepts relate to one another. One of the materials in mathematics learning that is abstract but the concepts are interrelated is geometry.

Geometry has been defined as the study of abstract spaces in which points, lines, and planes may be represented in many ways[10]. Geometry is a study in mathematics that studies points, lines, planes, geometric figures and their properties, sizes and relationships with each other. The study of geometry, which is abstract and interrelated with two-dimensional and third-dimensional shapes, requires children to be able to use their imagination skills to determine the position and size of an object in space. Apart from that, it also requires children's ability to visualize geometric objects and connect them to their surrounding[11]. This highlights that students must master their abilities in mathematical connections in order to solve geometry problems linked to their life, making mathematics more meaningful to them.

Based on the findings of preliminary observations conducted by researchers at SMPN 1 Pekuncen in class VIII E with 35 students, data and information were obtained that students have different mathematical connection abilities. Some are included in the high, medium, and low groups. This group is formed based on the results of student scores, which have been converted to a scale of 0-100, and classified as a high group, medium group, and low group. The high group is the group that obtained scores in the interval 76.15 to 100 consisting of 5 students. The medium group is the group that obtained scores in the interval 39.2 to 76.15 consisting of 16 students. The low group is the group that obtained scores in the interval 0 to 39.2 consisting of 14

[10] Bruce E. Meserve, *Fundamental Concepts of Geometry* (Reading, 2014).

[11] Luqman Fathoni, Madrasah Tsanawiyah, and Negeri Bangsal, 'Profil Kecerdasan Visual-Spasial Siswa Dalam', *Jurnal Gematika*, III.2 (2013), 155–61.

students. This difference in ability is very natural because each child has their own factors that influence the level of their mathematical connection abilities.

There are factors that influence both external and internal factors in improving students' mathematics connection ability. External factors are factors that come from outside the student, such as teachers, administrative staff, and classmates, that can influence the student's learning process. Meanwhile, internal factors include the psychological factors of students, who basically have different conditions, which also influence student learning outcomes. Several psychological factors include intelligence, talent, and the motivation of students[12]. Based on the explanation above, it demonstrates that intelligence, as an internal factor, may increase students' mathematical connection ability.

The study of intelligence is often associated with the work of Charles spearman, who studied intelligence and described intelligence as a general ability that pervaded all intellectual tasks and specific abilities that were unique to each particular intellectual task[13]. Gardner argues that intelligence is not singular, i.e. there is no broadly construed general intelligence, but rather multiple intelligences. There are at least nine multiple intelligences stored in a person's brain based on Gardner's theory, including linguistic intelligence, mathematical logical intelligence, visual spatial intelligence, kinesthetic intelligence, musical intelligence, interpersonal intelligence, naturalistic intelligence and intrapersonal intelligence[14].

According to previous definition of mathematical connection abilities, these abilities focus on students' capacity to connect mathematical concepts, mathematics with other fields, and mathematics with real world. This definition is comparable to one of the intelligences that has a similar definition, namely visual-spatial intelligence. Visual-spatial intelligence is the ability related to understanding, manipulating, reorganizing, or interpreting relationships

[12] Slameto, Belajar Dan Faktor-Faktor Yang Mempengaruhinya (Jakarta: Rineka Cipta, 2013).

[13] Robert J Sternberg, 'Intelligence', Dialogues in Clinical Neuroscience, 2022.

[14] Anita Indria, 'Multiple Intelegency', Pendidikan Anak Usia Dini, 2.1 (2020), 235.

visually. In this case, the ability to concentrate is the ability to represent and interpret relationships in geometric shapes. Students who have good visual-spatial intelligence are able to capture the visual-spatial world accurately. This can be one of the factors that influences the ability to make mathematical connections, namely the ability to associate or relate. When students have good spatial-visual intelligence, they are able to develop their mathematical connection abilities.

This is in accordance with the statement of R. Udhaya Mohan Babu and G. Kalaiyarasan, explaining that spatial-visual intelligence concepts and representations could help students' better understanding of numbers concepts while being particularly well suited for addressing the Standards: problem solving, reasoning and making connections[15]. Research conducted by Windy Fitri Damayanti, Ratu Sarah Fauziah Iskandar, and Prahesti Tirta Safitri, proving that spatial-visual intelligence has an influence on mathematical problem-solving ability[16].

Based on the background of this problem, spatial-visual intelligence has an important role in the learning process, especially geometry. In this study specifically the researcher took geometry material that is three-dimensional objects that has been taught in class VIII. Low spatial-visual intelligence will make it difficult for students to visualize and understand the relationships between concepts in three-dimensional objects material, thus becoming a contributing factor to students' low mathematical connection abilities. Therefore, researchers are interested in conducting research on the influence of spatial-visual intelligence on the mathematical connection abilities of class VIII students at SMP N 1 Pekuncen.

[15] R Udhaya, Mohan Babu, and G Kalaiyarasan, 'Visual-Spatial Intelligence-a Best Creativity Agency', 1983, 1–7.

[16] Windy Fitri Damayanti, Ratu Sarah Fauziah Iskandar, and Prahesti Tirta Safitri, 'Pengaruh Kecerdasan Visual-Spasial Dan Kreativitas Siswa Terhadap Kemampuan Pemecahan Masalah Matematis', *Seminar Nasional Pendidikan Matematika UMT*, 33, 2022, 22–29.

B. Operational Definition

This study focused on the influence of Spatial-Visual Intelligence and Ability of Students' Mathematics Connections. To ensure that there are no errors in interpreting the terms used in this research, the researcher describes the research variables as follows:

1. Spatial-Visual Intelligence

   Spatial-visual intelligence refers to the ability to generate, recall, maintain, and manipulate visual-spatial images and solutions. It involves the capacity to mentally visualize and manipulate objects, shapes, and spatial relationships[17]. Individuals with spatial visual intelligence have a strong ability to learn and understand through visual images, and they excel in tasks that involve visual forms and objects[18]. Spatial-visual intelligence referred to this research is an intelligence that includes the ability to visualize and represent spatial-visual ideas that can stimulate students' understanding of spatial relationships in the concept of geometric shapes.

   According to Maier there are five characteristics of visual-spatial intelligence: spatial perception, visualization, mental rotation, spatial relation, and spatial orientation[19]. This type of intelligence is closely related to mathematical thinking. Individuals with high spatial-visual intelligence may demonstrate strengths particularly in the field of geometry.

2. Ability of Students' Mathematics Connection

   Mathematical connection ability refers to the understanding of students in connecting mathematical ideas, facilitating the ability to formulate and verify assumptions between topics deductively[20]. According

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[17] Zachary Hawes and Daniel Ansari, 'What Explains the Relationship between Spatial and Mathematical Skills? A Review of Evidence from Brain and Behavior', *Psychonomic Bulletin and Review*, 27.3 (2020), 465–82.

[18] Tabita Wahyu Triutami and others, 'Visual-Spatial Intelligence Level of Junior High School Students: What Difficulties Are Experienced by the Students', *Journal of Physics: Conference Series*, 1776.1 (2021).

[19] Hubert Maier, 'Analisis Kemampuan Spatial Siswa SekolaH', 6, 236–45.

[20] A. Pranawestu, Masrukan, and Isti Hidayah, 'Analysis of Mathematical Connection Ability in Geometry at MEA Learning Based on Spatial Intelligence', *Unnes Journal of Mathematics Education Research*, 7.1 (2018), 86–93.

to Ifada emphasizes that mathematical connection involves the ability to connect between mathematical topics, mathematics with other disciplines and associate mathematics with the real world or in everyday life[21].

Indicators of mathematical connection ability include the ability to apply the relationship between mathematical ideas; apply the relationship between mathematics and other disciplines; apply the relationship between mathematics and daily life [22].

C. Research Question

Based on the background problem above, the research question is formulated as follow:

"Is there any significant influence of spatial-visual intelligence toward ability of students' mathematics connections at 8th grade in SMP N 1 Pekuncen?"

D. Objective and Significance of the Research

1. The Objective of the Research

   Based on the research question above, the objective of the research is to find out whether there is any significant influence or not between spatial-visual intelligence toward ability of students' mathematics connection at 8th grade in SMP N 1 Pekuncen.

2. The Significances of the Research

   This research is expected to be able to give significant contribution both in theoretically and practically.

   1. Theoretical significance

      The researcher extremely expect that this research could be useful in order to develop knowledge about the influence of spatial-visual intelligence toward ability of students' mathematics connection.

   2. Practical significance

      1) For the teacher

         This research will hopefully give reference to the teacher to improve teachers' abilities, by utilizing students' spatial-visual intelligence, in

[21] Novikasari.
[22] Novikasari.

teaching contextual mathematics learning so that students are able to connect it with their daily lives.

2) For the student

This research can hopefully give the student motivation to pay attention to visual spatial intelligence, making it easier for students to connect mathematics with their daily lives.

3) For the school

This research could help the school to give references to the school on improving mathematics learning in schools so that it can be used as a joint study to improve school quality.

4) For the other researcher

This research could help the other researcher whom conduct further research on the similar topic as reference.

E. Structure of the Research

The systematics of this thesis discussion is divided into three parts, which are the initial part, the content part, and the final part. At the beginning of the thesis is an introductory part that contains a title page, a statement of authenticity page, an approval page, a supervisor's official note page, an abstract, a motto page, a dedication page, a preface, a table of contents, and a list of attachments. Then, the content of this thesis consists of five chapters. The following are the details of the contents of the thesis:

Chapter I presents the introduction. In this chapter the researcher describes the urgency behind this research being carried out in the background of the study. This chapter also explains the operational definitions of the selected variables, research questions, objectives and significance of the research.

Chapter II contains a literature review. In this chapter the theories of spatial-visual intelligence on students' mathematical connection skills at SMP N 1 Pekuncen are explained, which consists of two subchapters, namely spatial-visual intelligence and students' mathematical connection skills. Researchers also presented previous research as a reference for this study.

Chapter III present the research methodology. This chapter consist of the type of research, time and location of research, population and sample, technique of data collection, and technique of data analysis. Chapter IV consists of results and discussion. In this chapter, descriptive statistics of questionnaires and tests, data analysis, hypothesis testing, and spatial-visual influence on students' mathematical connection skills are presented. This chapter presents research findings to be associated with research theory.

Chapter V contains conclusions. In this chapter the researcher concludes and provides suggestions related to the research. Conclusions are drawn from the previous chapter based on the research findings obtained. Furthermore, the final part of this thesis consists of a bibliography, appendices, and a curriculum vitae of the researcher.

CHAPTER II
LITERATURE REVIEW

A. Literature Review

1. Ability of students' mathematics connection

   a. Definition of Mathematical Connection Ability

      One of the mathematical skills that all students must have is the ability of mathematical connection. According to NCTM, it emphasizes the important of the ability of mathematical connections as an important part that must be mastered by students at every level of education[23]. Mathematical connection ability refers to the understanding of students in connecting mathematical ideas, facilitating the ability to formulate and verify assumptions between topics deductively[24]. Ifada explains that mathematical connection is the ability of students to connect between mathematical topics, mathematics with other disciplines and associate mathematics with the real world or in everyday life[25].

      Based on the definition of mathematical connection given above, it has similar characteristics, including the existence of connections between ideas, concepts, principles, processes, content and mathematical theorems, and the connection of mathematical content with content in other fields of study or everyday problems. In general, mathematical connection abilities include three types of connections: the ability to connect mathematical concepts, mathematical concepts with other scientific disciplines, and mathematical concepts of real-world phenomena.

      Mathematical connections are a skill that must be developed and taught since they will assist students in understanding the relationship

[23] National Council of Teacher of Mathematics.

[24] Eva Thanheiser, 'What Is the Mathematics in Mathematics Education?', *Journal of Mathematical Behavior*, 70.March 2022 (2023), 101033 <https://doi.org/10.1016/j.jmathb.2023.101033>.

[25] Novikasari.

between various ideas in mathematics and applying mathematics in everyday life. With the ability to connect mathematics, students will feel the benefits of learning mathematics, and students' understanding of the concepts they are studying will last longer[26].

b. Factors Influencing Mathematical Connection Ability

The factors that affect students' mathematical connections consist of internal factors and external factors. Internal factors are factors that come from within a person or the individual himself, while external factors come from outside a person or individual[27].

1) Internal Factors

Internal factors are factors that come from within students that affect their learning outcomes. Internal factors include physical factors and psychological factors:

a) Physical Factors

The sufficient physical condition, both congenital and acquired, can affect the enthusiasm and intensity in participating in lessons and learning outcomes. This includes healthy senses, not having defects (disorders) of the body, illness, or imperfect development.

b) Psychological Factors

The number of factors that include psychological aspects that can affect the quality of the learning process and results of students include: intelligence, interest, motivation, independence, attitude, talent, and attention of the students themselves.

2) External Factors

External factors are factors that come from outside students that affect learning outcomes, including family, school and society:

[26] Hardi and others, 'Connection Ability in Learning Mathematics in Indonesia', 443.Iset 2019 (2020), 275–78.

[27] Avida Fitri Amalia and others, 'Description of Factors Affecting Students Mathematical Connection', *International Conference on Educational Studies in Mathematics (ICoESM 2021*, 611.February (2022), 138–44.

a) Family Factors

Learners who learn will receive influence from the family in the form of: the way parents educate, the relationship between family members, family circumstances, parents' understanding, the family's economic situation, cultural background and home atmosphere.

b) School Factors

School factors that affect learning include teaching methods, curriculum, teacher-student relations, student-student relations, school discipline, lessons and school time, lesson standards, building conditions, learning methods and home assignments.

c) Society Factors

Society is an external factor that also affects student learning. This influence occurs because of the existence of learners in society, such as socializing friends, other activities outside of school, and the way of life in the community.

c. Indicators of Mathematical Connection Ability

According to NCTM there are three indicators of students' mathematical connection ability as follows[28]:

1) Apply the relationship between mathematical ideas

In learning mathematics, students perform learning activities such as receiving, processing and expressing mathematical ideas. In order to connect various kinds of mathematical ideas received by students, mathematical connection skills are needed. Students who have good mathematical connections will find it easy to understand interrelated mathematics.

2) Apply the relationship between mathematics and other disciplines

Mathematics as a discipline, in addition to being useful for the development of the discipline of mathematics itself, can also be useful

[28] National Council of Teacher of Mathematics.

for solving problems related to other fields of study. Students can realize that there is a connection between mathematics and topics outside of mathematics or with other fields of science so that the problem can be found using mathematics.

3) Apply the relationship between mathematics and daily life.

Indicators of mathematical connections with daily life, showing that mathematics is related to problems in real life so that mathematics is not only a subject that is learned at school but also useful in real life.

2. Spatial-visual intelligence

a. Definition of Spatial-visual Intelligence

The theory of multiple intelligence has been explained in Gardner's theory which divides intelligences into 8 intelligences, one of which is spatial-visual intelligence. Gardner explains that spatial-visual intelligence is the capacity to perceive the visual world accurately, and/or perform transformations and modifications on perceptions, construct mental representations of visual information, and use the representations to perform activities[29]. This emphasizes that students who have high spatial-visual intelligence will be able to represent spatial problems in their lives more quickly than students with low spatial-visual intelligence because of their ability to visualize ideas and thoughts.

According to Lohman, spatial-visual intelligence defined as the ability to generate, recall, maintain, and manipulate visual-spatial images and solutions. It involves the capacity to mentally visualize and manipulate objects, shapes, and spatial relationships[30]. Individuals with spatial visual intelligence have a strong ability to learn and understand through visual images, and they excel in tasks that involve visual forms and objects[31].

[29] Sternberg.
[30] Hawes and Ansari.
[31] Triutami and others.

Concepts and representations of visual-spatial intelligence could help students better understand of mathematical concepts while being particularly well suited for addressing problem solving, reasoning and connection ability. Students who have spatial-visual intelligence will help them to perceive dynamically important roles in their environment, they should explore and investigate problems in two or three dimensions, make and test conjectures, construct and use models, drawings, and computer technology, develop spatial sense, use inductive and deductive reasoning, and communicate their results with confidence and conviction[32].

b. Factors Influencing Spatial-visual Intelligence

There are three factors that relate to whether or not intelligence develops, which are[33]:

1) Biological factors

Factors include genetics or heredity and trauma or brain damage before, during, and after birth.

2) Personal Life Story

Experiences that can stimulate and can inhibit the growth of this intelligence include parents, teachers, peers.

3) Cultural-historical context

The formation process of Multiple Intelligence can be influenced by historical and cultural developmental conditions, such as time and place of birth.

c. Indicators of Spatial-visual Intelligence

According to Maier there are five indicators of spatial-visual intelligence as follows[34]:

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[32] Udhaya, Babu, and Kalaiyarasan.

[33] Alia Rohani, Nurhalizah Nurhalizah, and Seprina Ritonga, 'Perkembangan Kecerdasan Majemuk Pada Peserta Didik', *Pema (Jurnal Pendidikan Dan Pengabdian Kepada Masyarakat)*, 2.3 (2023), 221–29 <https://doi.org/10.56832/pema.v2i3.309>.

[34] Peter Herbert Maier, 'Spatial Geometry And Spatial Ability - How To Make Solid Geometry Solid', 1991, 69–81.

1) Spatial perception

The first spatial-visual indicator is Spatial perception ability. This represents an individual's ability to acquire, recognize, and understand visual information related to the perception and understanding of space, relationships between objects, and geometric shapes. This ability involves the interpretation and organization of visual information about the relative position, distance, size, and orientation of objects in the surrounding environment.

2) Visualization

The next indicator is visualization, this ability describes an individual's ability to form and manipulate visual mental representations of objects, shapes, and spatial relationships in space. It involves the ability to mentally imagine, visualize, and operate on objects or concepts without their physical presence. In the context of visualization, individuals can form clear and detailed mental images of objects or situations in three-dimensional space. They are able to mentally manipulate, rotate, invert or change the perspective of objects, without having to physically see them.

3) Mental rotation

This indicator refers to an individual's ability to mentally imagine and manipulate objects in the process of rotating or changing the orientation of objects in three-dimensional space without changing their shape. It involves the ability to imagine and visualize objects or images in a variety of different positions or viewpoints. In this spatial rotation, individuals can imagine objects or geometric shapes in different positions, such as rotating, flipping, or spatially reorienting objects.

4) Spatial relation

This indicator refers to an individual's ability to understand and recognize spatial relationships between objects or shapes in space. It involves the ability to perceive and understand how objects or

shapes interact with each other in the context of three-dimensional space. In spatial relation ability, individuals can recognize and describe geometric relationships between objects, such as relative position, distance, direction, size comparison, or symmetry.

5) Spatial orientation

The last element is spatial orientation, spatial orientation ability refers to an individual's ability to understand and operate in space, including in terms of understanding direction, location, and orientation of objects in the context of three-dimensional space. It involves the ability to navigate, recognize direction, and orient oneself in the environment. Individuals who have spatial orientation are able to recognize the location of objects or places in the context of space and understand spatial relationships between different objects or places.

B. Previous Study

Researchers use library research to compare, contrast, and position each study in the context of the problem being discussed. This research also provides a brief explanation of the similarities and differences between the current research and previous research. The following are some previous studies that have been conducted before this research:

First, the results of the study had been conducted by Hendra Alvianto Tarigan, Muhammadiyah University of North Sumatra, with the title of the thesis "The Influence of Visual Spatial Intelligence on Mathematical Learning Results of Private Middle School Students of Muhammadiyah 03 Medan". The aim of this study was to find out whether there was an influence of spatial visual intelligence on the mathematical learning outcomes students of Muhammadiyah Private Middle School 03 Medan and to know how great the impact of spatial visual intelligence on the mathematical learning outcomes students. The results of this study indicate that there is a relationship between visual spatial intelligence and math learning outcomes with a coefficient of determination of 13.1%. This research has similarities with research that will

be conducted on independent variables using visual-spatial intelligence. Meanwhile, the difference is that previous research used mathematical learning results as the dependent variable and the research that will be carried out uses mathematical connection abilities as the dependent variable[35].

Second, the results of the study had been conducted by Destiana Herawati, State Islamic University Prof. K.H. Saifuddin Zuhri Purwokerto, with the title of the thesis "The Influence of Mathematical Logical Intelligence and Learning Independence on The Mathematical Connection Ability of Class VII Students at Mts Negeri 1 Purbalingga". The aim of this study was to find out the influence of mathematical logical intelligence and learning independence both individually and simultaneously on the mathematical connection abilities of class VII students at MTs Negeri 1 Purbalingga. The results of this study simultaneously showed that mathematical logical intelligence and learning independence provide an influence on mathematical connection skills by 17.4%. Partially, mathematical logical intelligence gives an influence of 12.6% and learning independence of 16.5%. The similarities between this research and the research that will be carried out on the dependent variable using mathematical connection capabilities. Meanwhile, the difference is that previous research used mathematical logical intelligence and learning independence as an independent variable and this research will use spatial-visual intelligence as an independent variable[36].

Third, the results of the study had been conducted by Nofia Afriyanti, Walisongo State Islamic University Semarang, with the title of the thesis "The Relationship of Visual Spatial Intelligence to Mathematics Learning Outcomes of Flat Build Material Students of Class IV MI Al Khoiriyyah 01 Semarang Academic Year 2018 / 2019 ". The aim of this study was to find out whether there was an influence of spatial visual intelligence on the mathematical

[35] Hendra Alvianto Tarigan, 'Pengaruh Kecerdasan Visual Spasial Terhadap Hasil Belajar Matematika Siswa Smp Swasta Muhammadiyah 03 Medan T.P 2020/2021' (Universitas Muhammadiyah Sumatera Utara, 2021).

[36] Destiana Herawati, 'Pengaruh Kecerdasan Logis Matematis Dan Kemandirian Belajar Terhadap Kemampuan Koneksi Matematis Siswa Kelas Vii Mts Negeri 1 Purbalingga', 2023.

learning outcomes students of Students of Class IV MI Al Khoiriyyah 01 Semarang and to know how great the impact of spatial visual intelligence on the mathematical learning outcomes students. The results of this study indicate that there is a relationship between visual spatial intelligence and math learning outcomes with a coefficient of determination of 39.1%. This research has similarities with research that will be conducted on independent variables using visual-spatial intelligence. Meanwhile, the difference is that previous research used mathematical learning results as the dependent variable and the research that will be carried out uses mathematical connection abilities as the dependent variable[37].

Fourth, the study was conducted by Sri Desi Rahmawati, Fauzi Mulyatna, and Mira Gusniwati, with the journal was titled "The Influence of Visual Spatial Intelligence and Self Concept on Creative Thinking Ability". This study aims to determine the effect of visual-spatial intelligence and self-concept on creative thinking skills. The results of this study simultaneously showed that spatial visual intelligence and self-concept influenced creative thinking ability by 24.54%. Partially, spatial visual intelligence gives an influence of 15.39% and self-concept of 16%. The similarity between this research and the research to be conducted is the independent variable that uses visual-spatial intelligence. Meanwhile, the difference is that previous research used creative thinking abilities as the dependent variable and the research that will be carried out uses mathematical connection abilities as the dependent variable[38].

C. Conceptual Framework

One of the abilities in mathematics that is important for every student to master is the ability of mathematical connections. Mathematical connection ability is students' ability to connect mathematical ideas, mathematics with other

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[37] Nofia Afriyanti, 'Hubungan Kecerdasan Visual Spasial Terhadap Hasil Belajar Matematika Materi Bangun Datar Siswa Kelas IV MI Al Khoiriyyah 01 Semarang Tahun Ajaran 2018/2019', 2019, 1–83.

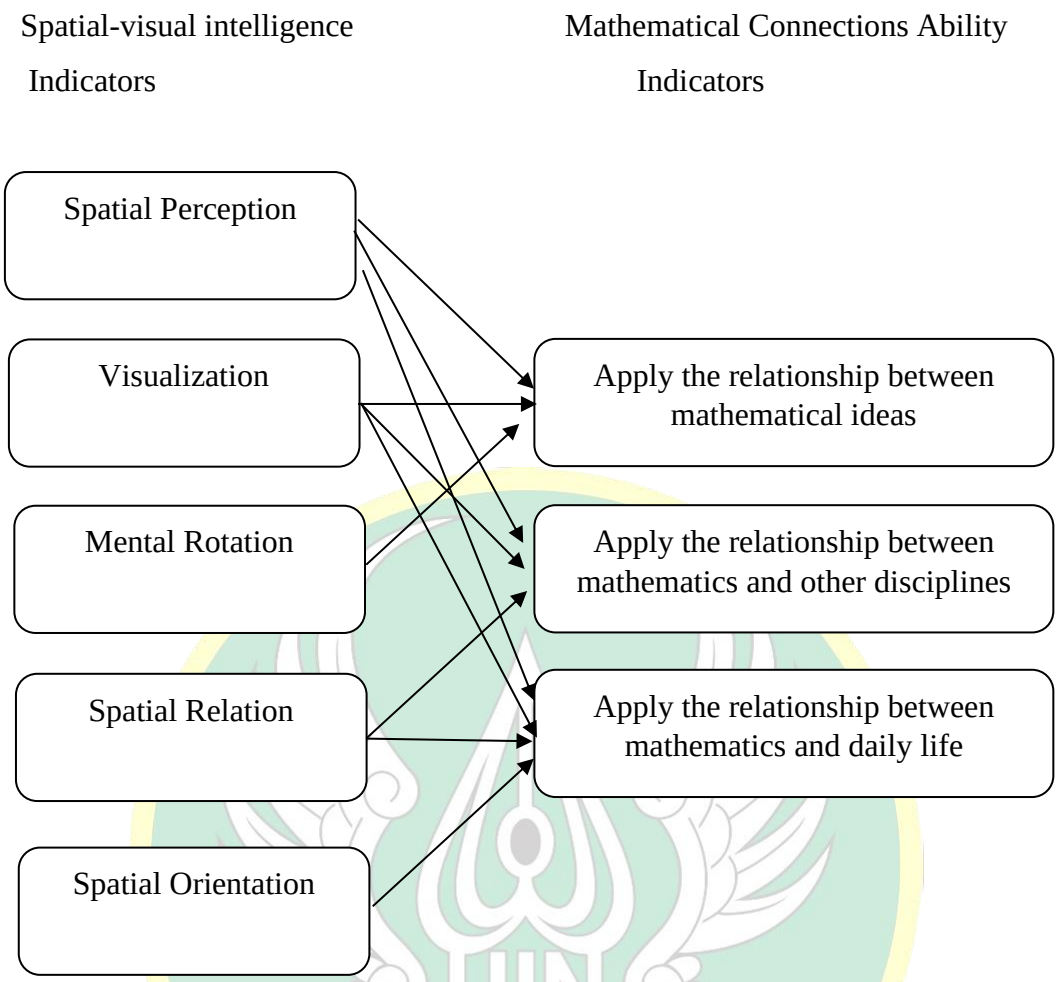
[38] Sri Desi Rahmawati, Fauzi Mulyatna, and Mira Gusniwati, 'Pengaruh Kecerdasan Visual Spasial Dan Self Concept Terhadap Kemampuan Berpikir Kreatif', *Jurnal Cartesian (Jurnal Pendidikan Matematika)*, 2.1 (2022), 144–55.

disciplines, and mathematics with real life. In learning mathematics, there is material that has many and interrelated concepts, namely geometry. Geometry is an abstract and interrelated study with two-dimensional and third-dimensional shapes. It requires students to be able to use their imagination skills to determine the position and size of an object in space. This imaginative intelligence is called spatial-visual intelligence. Therefore, students' spatial-visual intelligence influences students' geometry learning outcomes, which means that students with high visual spatial intelligence tend to have good geometry scores, and vice versa[39].

Visual-spatial intelligence is the ability related to understanding, manipulating, reorganizing, or interpreting relationships visually. In this case, the ability to concentrate is the ability to represent and interpret relationships in geometric shapes. Students who have good visual-spatial intelligence are able to capture the visual-spatial world accurately. This can be one of the factors that influences the ability to make mathematical connections, namely the ability to associate or relate. When students have good spatial-visual intelligence, they are able to develop their mathematical connection abilities.

Based on the description above, researchers suspect that spatial-visual intelligence can influence the level of students' mathematical connection abilities. Researchers want to know the mathematical connection abilities of class VIII students at SMP N 1 Pekuncen in terms of the students' spatial-visual intelligence. The following is the framework of thinking in this research which is described using a scheme.

[39] Ais Nuraini and others, 'Analisis Karakteristik Kecerdasan Visual Spasial Siswa Dalam Menyelesaikan Soal Pisa Konten Shape and Space Ditinjau Dari Tipe Kepribadian Menurut David Keirsey', *KadikmA*, 13.1 (2022), 88.



Based on the scheme above, it can be explained that:

1. The spatial perception indicator has a relationship with the three indicators of mathematical connection ability because this indicator involves many specific abilities such as finding points in space, determining the orientation of lines and objects, and appreciating the relationship between objects.
2. The visualization indicator also has a relationship with the three indicators of mathematical connection ability because this indicator involves visual abilities that are widely studied in other disciplines such as science, education and cognitive psychology.
3. Mental rotation has a relationship with apply the relationship between mathematical ideas because this indicator is usually used to imagine how an object will look in a different orientation.

4. Spatial relation has a relationship with the indicators apply the relationship between mathematics and other disciplines and apply the relationship between mathematics and daily life, because this indicator is the ability to represent spatial information using high-level concepts.
5. Spatial orientation has a relationship with the apply the relationship between mathematics and daily life indicator, because this indicator refers to a person's ability to organize orientation with the surrounding environment.

D. Hypothesis

The researcher formulated the hypothesis as follow:

H_0 : There is no influence of spatial-visual intelligence on the ability of students' mathematics connections grade VIII SMP N 1 Pekuncen

H_1 : There is an influence of spatial-visual intelligence on the ability of students' mathematics connections grade VIII SMP N 1 Pekuncen

CHAPTER III
RESEARCH METHODOLOGY

A. Type of the Research

This research used quantitative research. Quantitative research assumes that the construct under study can be measured. Thus, quantitative research is an approach method that aims to process numerical data (or numbers), to identify trends and relationships, and verify measurements made to answer research questions and test hypotheses[40]. This type of research often uses statistical methods to draw conclusions from the data collected. In quantitative research, the emphasis is on measurement and quantification, and the findings are often summarized using quantitative language and statistical analyses[41]. This research method is appropriate for this research because the purpose of this research is to measure whether there is any significant influence or not between spatial-visual intelligence toward ability of students' mathematics connection.

The method used in this research is a survey method. Survey method is defined as the collection of information from a sample of individuals through their responses to question[42]. This method allows for a variety of approaches to recruit participants, collect data, and utilize various methods of instrumentation. According to Singleton and Straits survey research is also commonly used to describe and explore human behavior and it is frequently employed in social and psychological research[43]. Related to this research problem, the use of the survey method aims to describe students' visual-spatial intelligence and to collect data on students' mathematical connection abilities of class VIII students at SMP N 1 Pekuncen

[40] Grigorios Kotronoulas and others, 'An Overview of the Fundamentals of Data Management, Analysis, and Interpretation in Quantitative Research', *Seminars in Oncology Nursing*, 39.2 (2023), 1–9.

[41] Colin Foster, 'Methodological Pragmatism in Educational Research: From Qualitative-Quantitative to Exploratory-Confirmatory Distinctions', *International Journal of Research and Method in Education*, May, 2023, 1–16.

[42] Julie Ponto, 'Understanding and Evaluating Survey Research', *Journal of the Advanced Practitioner in Oncology*, 6.2 (2015), 168–71.

[43] Ponto.

B. Time and Location of the Research

This research was conducted at the SMP N 1 Pekuncen, Banyumas Regency, which was conducted in the 2023/2024 academic year.

C. Population and Sample of the Research

1. Population

The population is a general field consisting of subjects/objects with certain qualities and characteristics determined by the reviewer to be studied and then conclusions drawn[44]. The population of this research is the students of the class VIII SMP N 1 Pekuncen which is class of VIII A, VIII B, VIII C, VIII D, VIII E, VIII F, and VIII G. The total number of students in the class of VIII SMP N 1 Pekunecen is 238 students.

Table 1. Population of Class VIII Students at SMP N 1 Pekuncen

No	Class	Number of Student
1	VIII A	33
2	VIII B	34
3	VIII C	33
4	VIII D	32
5	VIII E	35
6	VIII F	35
7	VIII G	36
Total Number of Students		238

2. Sample

The sample is any part of the fully defined population[45]. In order to make valid judgments, the population has a rule in sampling, which is that the sample can describe the actual or representative state of the population. A representative sample is one in which each member of the population has an equal and mutually exclusive probability of being chosen.

[44] Sukmawati, Salmia, and Sudarmin, 'Population, Sample (Quantitative) and Selection of Participants/Key Informants (Qualitative)', *Edumaspul Jurnal Pendidikan*, 7.1 (2023), 131–40.

[45] Amitav Banerjee and Suprakash Chaudhury, 'Statistics without Tears: Populations and Samples', *Industrial Psychiatry Journal*, 19.1 (2010), 60.

Sampling on this research is done in random sampling method. Random sampling is the basis of all good sampling techniques and disallows any method of selection based on volunteering or the choice of groups of people. Hence, the quality of the sample is not affected as every member has an equal chance of being selected in the sample[46]. Determining sample member from the population in this research uses the lottery method. In this method, it is done by writing the student's number on a paper and keep it in a box. Then we will take out any chit and the number on that chit is a random sample.

To determine the number of samples used in this research, the author used the Yamane formula. Yamane provides a simple formula for calculating sample size with a confidence level of 95% and assumes P = 0.5. The Yamane formula is as follows[47]:

$$n = \frac{N}{1+N\,(e)^2}$$

Where:

n : The sample size

N : The population size

e : The level of precision

By using the Yamane formula, if the population is known to be as many as 237 students with a presentation allowance of 5% or 0.05, then the sample calculation must be taken as follows:

$$n = \frac{N}{1+N\,(e)^2}$$

$$n = \frac{238}{1+238\,(0{,}05)^2}$$

$$n = \frac{238}{1+238\,x\,0.0025}$$

$$n = \frac{238}{1+0{,}595}$$

[46] Pooja Bhardwaj, 'Types of Sampling in Research', *Journal of the Practice of Cardiovascular Sciences*, 5.3 (2019), 157.

[47] Ajay S Singh and Micah B Masuku, 'Sampling Techniques & Determination Of Sample Size In Applied Statistics Research: An Overview', *International Journal of Economics, Commerce and Management*, II.11 (2014), 1–22.

$n = \frac{238}{1{,}595}$

n = 149,216

$n \cong 149$

From this calculation, the number of samples in this research is 149 students. Since the population in this research is divided into 7 groups class of students, the sampling calculations for each class are as follows:

Table 2. Research Sample

No	Class	Number of Sample
1	VIII A	$\frac{33}{238} x$ 149 = 20,6 = 21 students
2	VIII B	$\frac{34}{238} x$ 149 = 21,2 = 21 students
3	VIII C	$\frac{33}{238} x$ 149 = 20,6 = 20 students
4	VIII D	$\frac{32}{238} x$ 149 = 20 = 20 students
5	VIII E	$\frac{35}{238} x$ 149 = 21,9 = 22 students
6	VIII F	$\frac{35}{238} x$ 149 = 21,9 = 22 students
7	VIII G	$\frac{36}{238} x$ 149 = 22,5 = 23 students
Total Number of Sample		149 students

D. Variable and Indicator of the Research

A variable is a characteristic, number, or quantity that can be measured or counted, and it can vary or change over time or in different situations. In the context of research, variables are used to represent different attributes or characteristics that can be studied and analyzed[48]. This research has two variables: the independent variable and the dependent variable.

1. Independent Variable

An independent variable is a variable that is manipulated or controlled by the researcher in order to study its effects on the dependent

[48] Magnus Söderlund, 'Moderator Variables in Consumer Research: A Call for Caution', *Journal of Retailing and Consumer Services*, 73.March (2023).

variable[49]. The independent variable in this research is spatial-visual intelligence. Indicators for measuring spatial-visual intelligence used in this research, as follows[50]:

a) Spatial perception
b) Visualization
c) Mental rotation
d) Spatial relation
e) Spatial orientation

2. Dependent Variable

A dependent variable is a variable that is being measured or observed in an experiment or study[51]. It is the variable that is expected to be influenced by changes in the independent variable. In other word, the dependent variable is the variable that is affected by the independent variable[52]. The dependent variable in this research is students' mathematical connection ability. Indicators for measuring students' mathematical connection ability used in this research, as follows[53]:

a) Apply the relationship between mathematical ideas
b) Apply the relationship between mathematics and other disciplines
c) Apply the relationship between mathematics and daily life

E. Technique of Data Collection

Data collection is the process of collecting data with the aim of gaining insights regarding the research topic[54]. In this research, the data collection techniques used is test. Test as instruments for data collection are a series of questions or exercises that are used to measure knowledge, intelligence,

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[49] Erich Grädel and Jouko Väänänen, 'Dependence and Independence', *Studia Logica*, 101.2 (2013), 399–410.

[50] Peter Herbert Maier, 'Spatial Geometry And Spatial Ability - How To Make Solid Geometry Solid', 1991, 69–81.

[51] Söderlund.

[52] Jay Gould, 'Variables in Research Designs', *Concise Handbook of Experimental Methods for the Behavioral and Biological Sciences*, 3.4 (2001), 75–110.

[53] National Council of Teacher of Mathematics.

[54] Hamed Taherdoost, 'Data Collection Methods and Tools for Research; A Step-by-Step Guide to Choose Data Collection Technique for Academic and Business Research Projects', *International Journal of Academic Research in Management (IJARM)*, 10.1 (2021), 10–38.

abilities, or talents possessed by individuals or groups[55]. In this research tests are used to measure the level of students' spatial-visual intelligence and mathematical connection ability.

The test used to measure spatial-visual intelligence uses an instrument from Ardhi Prabowo and Eri Ristiani[56]. In this case the author adopted the research instrument. Meanwhile, to measure mathematical connection ability, the researcher adapted the previous test instrument, then adjusted it to the material taught to the research subject. The test carried out is a written test, consisting of several questions or questions arranged according to indicators of mathematical connection ability.

F. Instrument of the Research

In research, instruments are tools that are specifically used for research purposes. Research instrument should be conceptualized as a device for measuring the present value of the quantity under observation[57]. The instruments use to collect data in this research are questionnaire and test. Such techniques should be acknowledged as processes that comply with research ethics guidelines and the results must be accepted by the scientific community, implying that they are valid and reliable[58]. To fulfill these requirements, the instrument must first undergo both validity and reliability tests. The following are the methods for testing the validity and reliability of the instruments in this research:

1. Validity test

[55] Qurotul Aini, Zaharuddin Zaharuddin, and Yuliana Yuliana, 'Compilation of Criteria for Types of Data Collection in Management of Research Methods', *Aptisi Transactions on Management (ATM)*, 2.2 (2018), 97–103.

[56] Ardhi Prabowo and Eri Ristiani, 'Rancang Bangun Instrumen Tes Kemampuan Keruangan Pengembangan Tes Kemampuan Keruangan Hubert Maier Dan Identifikasi Penskoran Berdasar Teori Van Hielle', *Kreano, Jurnal Matematika Kreatif-Inovatif*, 2.2 (2011), 72–87 <http://journal.unnes.ac.id/nju/index.php/kreano/article/view/2618>.

[57] Offor Moses, 'Selecting Appropriate Instruments for Data Collection', April, 2022.

[58] Sukmawati, Sudarmin, Salmia, 'Development of Quality Instruments and Data Collection Techniques', *Jurnal Pendidikan Dan Pengajaran Guru Sekolah Dasar (JPPGuseda)*, 6.1 (2023), 119–24.

Validity test is a test that functions to see whether a measuring instrument is valid or invalid[59]. The measuring instruments referred to here are both questions in the questionnaire and the test. In this research, to test the validity of the spatial-visual intelligence questionnaire and the mathematical connection ability test, it was carried out by calculating the Pearson Product Moment correlation coefficient using the following formula:

$$r_{xy} = \frac{N(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[N(\sum X^2) - (\sum X)^2]\,[N(\sum Y^2) - (\sum Y)^2]}}$$

Where:

r_{xy} : The correlation coefficient between the (X) item score and the total score

N : Many subjects

X : Question element score or statement/question item score

Y : Total score

The validity criterion in this research is the r_{xy} value which will be compared with the Pearson r table. If $r_{xy} \geq$ Pearson table then the instrument is declared valid, and conversely if r_{xy} < Pearson table then the instrument is invalid [60]. The following criteria serve as a guideline for interpreting the instrument's degree of validity.

Table 3. Validity Correlation Coefficient Criteria

Correlation Coefficient	Correlation
0,90 ≤ r < 1,00	Very High
0,70 ≤ r < 0,90	High
0,40 ≤ r < 0,70	Medium
0,20 ≤ r < 0,40	Low
r < 0,20	Very Low

[59] Lütfi Sürücü and Ahmet Maslakçi, 'Validity and Reliability in Quantitative Research', *Business & Management Studies: An International Journal*, 8.3 (2020), 2694–2726.

[60] Nilda Miftahul Janna and Herianto, 'Konsep Uji Validitas Dan Reliabilitas Dengan Menggunakan SPSS', *Jurnal Darul Dakwah Wal-Irsyad (DDI)*, 18210047, 2021, 1–12.

a) Validity Test Results of Spatial-visual Intelligence Test Instrument

The instrument was tested on 30 respondents and the significance level was 0.05. based on the r_{table} it is known that the $_{rtablepearson}$ value is 0.361. This validity test uses IBM SPSS 25 software. The following are the results of the validity test analysis of spatial-visual intelligence:

Table 4. Validity Test Results of Spatial-visual Intelligence Test Instrument

Number	Validity		Description
	r_{xy}	r_{tabel}	
1	0,702	0,361	Valid
2	0,719	0,361	Valid
3	0.430	0,361	Valid
4	0.093	0,361	Invalid
5	0,512	0,361	Valid
6	0,065	0,361	Invalid
7	0,433	0,361	Valid
8	0,702	0,361	Valid
9	0,535	0,361	Valid
10	0,402	0,361	Valid
11	-0,060	0,361	Invalid
12	0,472	0,361	Valid
13	0,348	0,361	Invalid
14	0,702	0,361	Valid
15	0,402	0,361	Valid

Based on the results of the validity test above, it shows that of the 15 items of the spatial-visual intelligence test instrument, 4 items are declared invalid and 11 items are declared valid. Furthermore, 4 test items that are declared invalid cannot be used as measuring instruments in further research. So that 11 items that are declared valid can be used as measuring instruments in this study.

b) Results of the Validity Test of the Mathematical Connection Ability Test Instrument

The instrument was tested on 30 respondents and the significance level was 0.05. based on the r_{table} it is known that the $r_{tablepearson}$ value is 0.361. This validity test uses IBM SPSS 25 software. The following are the results of the validity test analysis of Mathematical Connection Ability:

Table 5. Results of Validity Test of Mathematical Connection Ability Test Instrument

Number	**Validity**		**Description**
	r_{xy}	**r_{tabel}**	
1	0,857	0,361	Valid
2	0,691	0,361	Valid
3	0.546	0,361	Valid

Based on the results of the validity test above, it shows that the 3 items of the mathematical connection ability test instrument are declared completely valid. Each question already contains all indicators of mathematical connection ability. Furthermore, the test that has been declared valid can be used as a measuring instrument in this study.

2. Reliability Test

Reliability concerns the extent to which a measurement of a phenomenon provides a stable and consistent result. Reliability is also concerned with repeatability, where a test is said to be reliable if repeated measurements made under constant conditions will give the same result[61]. In this research, to test the reliability of the spatial-visual intelligence questionnaire and the mathematical connection ability test, it was carried out using the Cronbach's Alpha formula, as follows:

$$r = \left[\frac{n}{n-1}\right]\left[1 - \frac{\sum Si^2}{St^2}\right]$$

[61] Hamed Taherdoost and Hamta Group, 'Validity and Reliability of the Research Instrument ; How to Test the Validation of a Questionnaire, *International Journal of Sport, Exercise & Training Sciences*, 2020.

Where:

r : Reliability coefficient

n : Lots of questions

Si^2 : Variance of scores for the i^{th} item

St^2 : Total score variance

The reliability decision criteria in this research are, if Cronbach's Alpha reliability coefficient (r) > 0.6 means the instrument is declared reliable. The following criteria serve as a guideline for interpreting the instrument's degree of reliability:

Table 6. Reliability Correlation Coefficient Criteria

Correlation Coefficient	Correlation
0,90 ≤ r < 1,00	Very High
0,70 ≤ r < 0,90	High
0,40 ≤ r < 0,70	Medium
0,20 ≤ r < 0,40	Low
r < 0,20	Very Low

a) Reliability test results of the spatial-visual intelligence test instrument

The following are the results of the reliability test analysis of the spatial-visual intelligence test instrument:

Table 7. Reliability Test Results Spatial-visual intelligence

Reliability Statistics	
Cronbach's Alpha	N of Items
.814	11

Based on the reliability test above, the Cronbach's Alpha value is 0.814 which can be declared reliable. So, it can be concluded that the spatial-visual intelligence test instrument is reliable.

b) Reliability test results of mathematical connection ability test instrument

The following are the results of the reliability test analysis of the mathematical connection ability test instrument:

Table 8. Reliability Test Results of Mathematical Connection Ability

Reliability Statistics	
Cronbach's Alpha	N of Items
.730	3

Based on the reliability test above, the Cronbach's Alpha value is 0.730 which can be declared reliable. So, it can be concluded that the spatial-visual intelligence test instrument is reliable.

G. Technique of Data Analysis

Data analysis is a research procedure that occurs after all of the data required to answer the problem under study has been completely collected[62]. There are various techniques that can be used to process and analyze data that are tailored to the problem formulation and research objectives. As for the data analysis used in this study, it includes the testing of the prerequisites of the analysis and the testing of the hypothesis.

1. The prerequisites of the analysis test
   a. Normality test

      A normality test is a statistical method used to determine if a given sample of data comes from a normally distributed population[63]. The normality test is one of the important tests in regression analysis and is one of the requirements that must be met in parametric statistics. It is used to find out whether the independent variable and dependent variable are normally distributed or not.

      In testing data normality, researcher uses the Kolmogorov-Smirnov test. The Kolmogorov-Smirnov test is used to test whether two independent samples come from the same population or from populations

[62] Muhson Ali, 'Teknik Analisis Kuantitatif', *Makalah Teknik Analisis II*, 2006, 1–7.

[63] Zvi Drezner and others, 'Munich Personal RePEc Archive A Modified Kolmogorov-Smirnov Test for Normality A Modified Kolmogorov-Smirnov Test for Normality', 14385, 2008.

that have the same distribution[64]. The hypothesis used in the normality test is as follows:

H_0: Data is normally distributed.

H_1: Data is not normally distributed.

Whether or not a data is normal we can see the probability value (Asymtotic Significance). The criteria for making normality test decisions are:

1) If the probability > 0.05 then H_0 is accepted because the regression is normally distributed;
2) If the probability ≤ 0.05 then H_0 is rejected because the regression is not normally distributed[65].

b. Linearity Test

A linearity test in the context of regression models is a statistical procedure used to determine whether the relationship between the independent and dependent variables is linear[66]. This test is important for assessing the appropriateness of using a linear regression model to analyze the data.

The linearity test is carried out using the deviation from linearity test. The hypothesis used in the linearity test is as follows:

H_0: The regression model is linear.

H_1: The regression model is not linear.

Whether or not a data is linear can be seen from the value of deviation from linearity. The decision-making criteria for the linearity test are:

1) If the significance value > 0.05 then H_0 is accepted because the variables have linear relationship;

[64] Nalom Siagian, *Statistik Dasar : Konseptualisasi Dan Aplikasi*, 2021.

[65] Drezner and others.

[66] Djaballah Djeddour Khedidja and Tazerouti Moussa, 'Test for Linearity in Non-Parametric Regression Models', *Austrian Journal of Statistics*, 51.1 (2022), 16–34.

2) If the significance value ≤ 0.05 then H_0 is rejected because the variables have not linear relationship[67].

c. Regression Significance Test

This regression significance test is performed prior to performing simple regression analysis. The goal of this regression significance test is to determine whether the generated regression equation is meaningful enough to be used as a forecasting tool. The hypotheses including:

H_0: $\beta = 0$ (There is no significant influence)

H_1: $\beta \neq 0$ (There is significant influence)

Decisions can be made by considering the significance value in the ANOVA table. If the significance value is > 0.05 then the regression is not meaningful and if the significance value is ≤ 0.05 then the regression is meaningful[68].

The regression significance test is used to evaluate whether the relationship between the independent variable and the dependent variable in the simple linear regression equation is significant or not[69]. The simple linear regression equation is used to model the relationship between the two variables which will be applied for hypothesis testing.

2. Hypothesis Testing

In this research, hypothesis testing is carried out using simple linear regression analysis. Simple linear regression is based on the functional or causal relationship of one independent variable with one dependent variable. In general, the form of a simple linear regression equation is as follows:

$$\hat{Y} = a + bX$$

Information:

$\hat{Y}$: Subjects in the predicted dependent variable

a : Price of Y when price of X = 0 (Constant Price)

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[67] Khedidja and Moussa.
[68] Siagian.
[69] Muhson Ali, 'Teknik Analisis Kuantitatif', *Makalah Teknik Analisis II*, 2006, 1–7.

b : Direction number or regression coefficient, which shows the increase ate or dependent variable based on the independent variable. If (+) the line direction is up, and if (-) then the line direction is down.

X : Subject to the independent variable that has a certain value

The formula used to find the values a and b can be found by applying the formula below:

$$a = \frac{(\sum Y)(\sum X^2) - (\sum X)(\sum XY)}{n(\sum X^2) - (\sum X)^2}$$

$$b = \frac{n\sum XY - (\sum X)(\sum Y)}{n(\sum X^2) - (\sum X)^2}$$

To determine the magnitude of the influence of the independent variable on the dependent variable, it is determined by the coefficient of determination (R^2) by determining the percentage. The coefficient of determination is a coefficient that takes into account the amount of variation caused by the independent variable.

This variation shows the magnitude of the influence of the independent variable on the dependent variable, where the independent variable in this research is spatial-visual intelligence and the dependent variable is the ability of students' mathematics connections. So, in this research, we will look for how much influence spatial-visual intelligence has on the ability of students' mathematics connections in class VIII at SMP N 1 Pekuncen, with the magnitude of the influence determined by the value R^2 obtained from the output of the SPSS application.

CHAPTER IV
RESULT AND DISCUSSIONS

A. Data Description

After the research was conducted, data were obtained from research instruments consisting of two variables, namely spatial-visual intelligence and mathematical connection ability. The data is described based on the tests that have been obtained from respondents in the 8th grade of SMP N 1 Pekuncen. The data would explain below:

1. Description of Spatial-visual Intelligence

In this study, data on the spatial-visual intelligence of students in class VIII of SMP N 1 Pekencen was obtained from a test that had been conducted by 149 students who were the research sample. The spatial-visual intelligence test consisted of multiple-choice questions that had been previously validated and tested for reliability. From the test items obtained 11 questions, where each correct question has a score of 1 and the wrong question has a score of 0. Researcher described the results of students' spatial-visual intelligence using SPSS 25 for Windows. The following results had been obtained:

Table 9. Descriptive Statistics of Spatial-visual Intelligence

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Spatial-visual Intelligence	149	9	91	57.68	18.473
Valid N (listwise)	149				

From the table above, it is known that the spatial-visual intelligence score of 149 samples of students in class VIII of SMP N 1 Pekuncen has an average of 57.68 with a maximum score of 91, a minimum score of 9 and a standard deviation of 18.473.

Data of students' spatial-visual intelligence will be categorized based on the average value and standard deviation known from the description table. The data will be divided into high, medium, low categories. The details are as follows:

Table 10. Calculation Details of Spatial-visual Intelligence Categories

Categories	Formula
Low	$X \leq$ mean – std. deviation $X \leq 57{,}68 - 18{,}473$ $X \leq 39{,}207$
Medium	Mean – std. deviation $< X \leq$ mean + std. deviation $57{,}68 - 18{,}473 < X \leq 57{,}68 + 18{,}473$ $39{,}207 < X \leq 76{,}153$
High	$X >$ mean + std. deviation $X > 57{,}68 + 18{,}473$ $X > 76{,}153$

Based on the table above, then by using IBM SPSS 25 software, the frequency and percentage of each category of spatial-visual intelligence of students in class VIII SMP N 1 Pekuncen will be calculated. The data obtained are as follows:

Table 11. Frequency and Percentage of Spatial-visual Intelligence

Category					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	26	17.4	17.4	17.4
	Medium	102	68.5	68.5	85.9
	High	21	14.1	14.1	100.0
	Total	149	100.0	100.0	

The table above shows that 26 students are in the low category, 102 students are in the medium category, and 21 students are in the high category, each with a percentage of 17,3%, 68,5%, and 14,1%. Therefore, it can be concluded that the average level of students' spatial-visual intelligence in class VIII of SMP N 1 Pekuncen is moderate.

2. Description of Mathematical Connection Ability

The data of mathematical connection ability of VIII grade students of SMP N 1 Pekencen were obtained from the test that had been conducted by 149 students who were the sample of the research. The mathematical connection ability test consists of 3 items that had previously been validated and tested for reliability. Researcher described the results of students' spatial-visual intelligence using SPSS 25 for Windows. The following results had been obtained:

Table 12. Descriptive Statistics of Mathematical Connection Ability

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Mathematical Connection Ability	149	25	92	60.81	17.615
Valid N (listwise)	149				

Based on the table above, from 149 students, data on mathematical connection ability is obtained with an average of 60,81 and the maximum and minimum values of 92 and 25, respectively. In addition, there is a standard deviation result of 17,615.

Furthermore, the data on students' mathematical connection ability is categorized based on the average value and standard deviation that has been known. The data will be divided into three categories, which are categories of high, medium, and low. The details are as follows:

Table 13. Calculation Details of Mathematical Connection Ability Categories

Categories	Formula
Low	$X \leq$ mean – std. deviation $X \leq 60{,}81 - 17{,}615$ $X \leq 43{,}195$
Medium	Mean – std. deviation $< X \leq$ mean + std. deviation $60{,}81 - 17{,}615 < X \leq 60{,}81 + 17{,}615$ $43{,}096 < X \leq 78{,}425$

High	X > mean + std. deviation X > 60,81 + 17,615 X > 78,425

Based on the table above, then by using IBM SPSS 25 software, the frequency and percentage of each category of students' mathematical connection ability of in class VIII SMP N 1 Pekuncen will be calculated. The data obtained are as follows:

Table 14. Frequency and Percentage of Mathematical Connection Ability

Category					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	36	24.2	24.2	24.2
	Medium	89	59.7	59.7	83.9
	High	24	16.1	16.1	100.0
	Total	149	100.0	100.0	

The table above shows that 36 students are in the low category, 89 students are in the medium category, and 24 students are in the high category, each with a percentage of 24,2%, 59,7%, and 16,1%. Therefore, it can be concluded that the average level of students' mathematical connection ability in class VIII of SMP N 1 Pekuncen is moderate.

B. Data Analysis

1. The Prerequisites of the Analysis Test
   a. Normality Test

      Normality testing in this study used the Kolmogorov-Smirnov test. Researchers performed calculations with the help of SPSS version 25 by looking at the value in the Kolmogorov-Smirnov table. The hypothesis used in the normality test is as follows:

      H_0: Data is normally distributed.

      H_1: Data is not normally distributed.

Whether or not a data is normal we can see the probability value (Asymtotic Significance). The criteria for making normality test decisions are:

1) If the probability > 0.05 then H_0 is accepted because the regression is normally distributed;
2) If the probability ≤ 0.05 then H_0 is rejected because the regression is not normally distributed[70].

The results of the normality test calculation on the data obtained, then were analyzed with the Kolmogorov-Smirnov test on SPSS 25 for Windows which is presented as follows:

Table 15. Kolmogorov-Smirnov Normality Test Results of Spatial-visual Intelligence on Mathematical Connection Ability

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		149
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	13.50712876
Most Extreme Differences	Absolute	.057
	Positive	.046
	Negative	-.057
Test Statistic		.057
Asymp. Sig. (2-tailed)		.200[c,d]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		
d. This is a lower bound of the true significance.		

In accordance with the table above, the Kolmogorov-Smirnov test results show that the data of unstandardized residual are normally distributed (significance value (2-tailed) ≥ 0.05) where 0.200 > 0.05. Thus, the overall data is normally distributed.

[70] Drezner and others.

b. Linearity Test

The significance value of deviation from linearity in the ANOVA table is used to determine whether the relationship formed is linear. If the results indicate that it is not linear then the regression analysis cannot be continued. The hypothesis used in the linearity test is as follows:

H_0: The regression model is linear.

H_1: The regression model is not linear.

Whether or not a data is linear can be seen from the value of deviation from linearity. The decision-making criteria for the linearity test are:

3) If the significance value > 0.05 then H_0 is accepted because the variables have linear relationship;
4) If the significance value ≤ 0.05 then H_0 is rejected because the variables have not linear relationship[71].

The results of the linearity test calculation between spatial-visual intelligence and mathematical connection ability using SPSS 25 For Windows are as follows:

Table 16: Linearity Test Results of Spatial-visual Intelligence on Mathematical Connection Ability

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Mathematical Connection Ability * Spatial-visual Intelligence	Between Groups	(Combined)	10399.538	10	1039.954	6.389	.829
		Linearity	5860.197	1	5860.197	36.003	.352
		Deviation from Linearity	4539.341	9	504.371	1.045	.583
	Within Groups		22462.154	138	162.769		
	Total		32861.691	148			

The table above shows the results of the linearity test of spatial-visual intelligence and mathematical connection ability with a

[71] Khedidja and Moussa.

significance value of deviation from linearity of 0,583. This significance value indicates that the relationship between the two variables is said to be linear (significance value of deviation from linearity ≥ 0.05) where 0,583 > 0.05. In other words, there is a linear relationship between spatial-visual intelligence and mathematical connection ability.

c. Regression Significance Test

The regression significance test between spatial-visual intelligence and mathematical connection ability was conducted by utilizing SPSS 25 for Windows with the hypotheses including:

H_0: $\beta = 0$ (There is no significant influence)

H_1: $\beta \neq 0$ (There is significant influence)

Decisions can be made by considering the significance value in the ANOVA table. If the significance value is less than 0.05 then H_0 is rejected and H_1 is accepted[72]. The following are the results of the regression significance test between spatial-visual intelligence and mathematical connection ability.

Table 17: Regression Significance Results of Spatial-visual Intelligence and Mathematical Connection Ability

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5860.197	1	5860.197	31.904	.000[b]
	Residual	27001.494	147	183.684		
	Total	32861.691	148			
a. Dependent Variable: Mathematical Connection Ability						
b. Predictors: (Constant), Spatial-visual Intelligence						

The table above shows a significance value of 0,000, meaning that the significance value is less than 0.05. This means that the regression model is meaningful. Thus, there is an influence of spatial-visual intelligence on students' mathematical connection skills.

[72] Siagian.

2. Hypothesis Testing

In this research, a simple linear regression equation is used to determine the relationship of spatial-visual intelligence to mathematical connection ability. Based on the results of simple linear regression analysis for spatial-visual intelligence and mathematical connection ability conducted with the help of SPSS 25 for Windows is as follows.

Table 18. Regression Test Results of Spatial-visual Intelligence and Mathematical Connection Ability

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	44.651	3.977		11.227	.000
	Spatial-visual Intelligence	.355	.063	.422	5.648	.000
a. Dependent Variable: Mathematical Connection Ability						

Seen in the table above, in the unstandardized coefficients column, B, the value of a is obtained 44,651 and the value of b is 0.355. Thus, the regression equation can be written as follows:

$$\hat{Y} = a + bX$$

$$\hat{Y} = 44{,}651 + 0{,}355X$$

The regression equation above means that between the spatial-visual intelligence variable (X) and the mathematical connection ability variable (Y) has a positive correlation. This is because the value of b = 0,355 > 0. So that if the value of X is increased by 1 unit, the value of Y will increase by 0,355 units and if the value of X = 0 then the value of Y = 44,651.

After fulfilling all the prerequisite tests of analysis, it can be concluded that the regression equation $\hat{Y} = 44{,}651 + 0{,}355X$ can be used as a basis for predicting students' mathematical connection skills based on the level of spatial-visual intelligence of the students.

Then to determine the magnitude of the influence of spatial-visual intelligence on mathematical connection skills, this is determined by the coefficient of determination (R) by determining the percent. Based on simple linear regression analysis for spatial-visual intelligence and connection ability conducted with SPSS 25 for Windows is as follows:

Table 19: Test Results of Determination Coefficient R Spatial-visual Intelligence and Mathematical Connection Ability

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.422[a]	.178	.173	13.553
a. Predictors: (Constant), Spatial-visual Intelligence				

In accordance with the table above, it can be seen that the magnitude of the coefficient of determination between spatial-visual intelligence (X) on mathematical connection ability (Y) is 0,178. The coefficient of determination shows the amount of influence between the two research variables. With a coefficient of determination ($Rsquare$) of 0,178, the strong influence of spatial-visual intelligence on connection ability in percentage form is 17,8%. This can be interpreted that the connection ability is influenced by 17,8% by spatial-visual intelligence and the remaining 82,2% is influenced by other factors.

C. Discussion

In this discussion, the results of research that have been conducted by researchers while in the field will be presented. This research was conducted with the aim of knowing the influence of spatial-visual intelligence on the mathematical connection ability of VIII grade students of SMP N 1 Pekuncen. The subjects of this study were a population of 245 students with a research sample of 149 students.

The research analysis confirmed a significant relationship between spatial-visual intelligence and mathematical connection ability at SMP N 1 Pekuncen, Banyumas Regency. A high level of spatial-visual intelligence can help students

handle mathematical connection difficulties. Conversely, students with low spatial-visual intelligence may also have low mathematics connection skills.

The following is a description of the results of research conducted at SMP N 1 Pekuncen using a quantitative approach with a survey method. Based on the results of the study, it shows that spatial-visual intelligence affects the mathematical connection skills of students at SMP N 1 Pekuncen with the results of the significance value of simple linear regression analysis of 0.000 where the significance value is smaller than 0.05. Therefore, it can be concluded that H_0 is rejected and H_1 is accepted.

In addition, the regression equation $\hat{Y} = 44{,}651 + 0{,}355X$ is obtained, which means that the spatial-visual intelligence variable and the mathematical connection ability variable have a positive correlation. If the value of spatial-visual intelligence is increased by 1 unit, the value of mathematical connection ability will increase by 0.355 units. So that the higher the level of spatial-visual intelligence of a student, the higher the mathematical connection ability. In additional, the coefficient of determination of 0.178 was also obtained, the strength of the influence of spatial-visual intelligence on connection skills in percentage form is 17.8%. This can be interpreted that the connection ability is influenced by 17.8% by spatial-visual intelligence and the remaining 82.2% is influenced by other factors.

Based on the results of research conducted by Destiana Herawati with the thesis title "The Effect of Mathematical Logical Intelligence and Learning Independence on Mathematical Connection Ability of Class VII Students at Mts Negeri 1 Purbalingga", found that other factors that affect mathematical connection ability are mathematical logical intelligence and learning independence. The results of this study partially found that mathematical logical intelligence had an influence of 12.6% and learning independence of 16.5%. while simultaneously showing that mathematical logical intelligence and

learning independence had an influence on mathematical connection skills by 17.4%[73].

The magnitude of the influence of spatial-visual intelligence individually on mathematical connection ability is relatively small and is below the expected value of 17.8%. This occurs allegedly because of the level of spatial-visual intelligence tends to be moderate as evidenced by the acquisition of spiritual intelligence test scores with an average score of 57.68 out of 100. Then the mathematical connection ability also tends to be moderate as evidenced by the acquisition of an average score of 60.81 out of 100. So that the relationship between spatial-visual intelligence and mathematical connection skills is still low.

Moreover, mathematical connection ability itself is influenced by many factors such as learning motivation, learning environment, social support, teaching methods, and other intellectual aspects. If these other factors are more dominant in influencing mathematical connection ability than spatial-visual intelligence, then the contribution may appear small. Although the results of data analysis show a small effect, the development of spatial-visual intelligence still contributes to the development of mathematical connection skills. Therefore, other factors that influence mathematical connection skills from both cognitive and affective aspects need to be considered to develop students' mathematical connection skills.

The results of this study are also in line with research conducted by Ana Fikri Fitriasa and Fitria Zana Kumala with the title “The Effect of Pair Check Learning Model on Mathematical Connection Ability of Class X Students of MAN1 Banyumas” in 2023. This research aims to determine the influence of the pair check learning model on the mathematical connection ability of class X MAN 1 Banyumas students. From the result, it can be inferred that class X MAN 1 Banyumas' ability to make mathematical connections is impacted by the

[73] Herawati.

application of the pair check learning model[74]. As well as the result research conducted by Hendra Alvianto Tarigan with the title "The Influence of Visual Spatial Intelligence on Mathematical Learning Results of Private Middle School Students of Muhammadiyah 03 Medan" in 2020. From this study it was concluded that there was a positive and significant effect of spatial-visual intelligence on mathematical learning outcomes[75]. As well as the results of research conducted by Nofia Afriyanti with the title "The Relationship of Visual Spatial Intelligence to Mathematics Learning Outcomes of Flat Build Material Students of Class IV MI Al Khoiriyyah 01 Semarang" in 2019. This study aims to determine the effect of spatial-visual intelligence on student math learning outcomes. The results of this study indicate that the effect of spatial-visual intelligence on math learning outcomes is 39.1%[76].

[74] Ana Fikri Fitrias and Fitria Zana Kumala, 'Pengaruh Model Pembelajaran Pair Check Terhadap Kemampuan Koneksi Matematis Siswa Kelas X MAN 1 Banyumas', *Absis: Mathematics Education Journal*, 5.1 (2023), 18–26 <https://doi.org/10.32585/absis.v5i1.3511>.

[75] Tarigan.

[76] Afriyanti.

CHAPTER V
CONCLUSION

A. Conclusion

Based on the research that has been conducted on the influence of spatial-visual intelligence on the mathematical connection skills of 8th grade students of SMP N 1 Pekuncen, it can be concluded that there is an influence of spatial-visual intelligence on students' mathematical connection skills.

The amount of influence can be seen in the coefficient of determination (R Square) which is 0,178 or 17,8%. Therefore, it can be concluded that the magnitude of the influence of spatial-visual intelligence on students' mathematical connection skills at SMP N1 Pekuncen is 0,178 or 17,8% and the rest 82,2% is influenced by other variables outside of spatial-visual intelligence.

Therefore, students who have strong spatial-visual intelligence will be able to improve their mathematical connection skills and vice versa. The results showed that spatial-visual intelligence influences the mathematical connection ability of students in class VIII of SMP Negeri 1 Pekuncen, Banyumas Regency.

B. Research Limitation

In the process of conducting this research, there are limitations that may affect the results of the study, namely:

1. There are limitations in research time, energy, and research capabilities.
2. There is a lack of respondents' ability to understand the statements on the test and honesty in taking the test so that there is a possibility that the results will be less accurate.
3. This study only assessed the effect of spatial-visual intelligence on students' mathematical connection skills. So it is necessary to develop further research to examine the influence of other factors that have not been studied on students' mathematical concept understanding ability.
4. The conclusions drawn are only based on the acquisition of data analysis, so it is hoped that further research on mathematical connection skills with

different research methods, a wider sample, and the use of different and more complete instruments.

C. Suggestion

After conducting this research, the author provides several suggestions, among others:

1. For the Teacher

   Teachers need to consider and take into account spatial-visual intelligence as a factor in improving connection skills.

2. For the Student

   Students are expected to be better able to manage time to learn and practice their mathematical connection ability by increasing their work on problems related to mathematical connection ability and being enthusiastic when participating in mathematics learning at school.

3. For the School

   The findings of this study can be supporting information in improving the quality and quality of education in school.

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APPENDICES

Appendix 1. Spatial-visual Intelligence Test Instrument Grid

Aspek Kecerdasan Visual-spasial	**Indikator Kecerdasan Visual-spasial**	**Nomor Soal**
Spatial Perception	Kemampuan pandang ruang siswa untuk menanggapi suatu objek	1, 9, 15
Visualisation	Kemampuan siswa untuk memvisualisasikan suatu bentuk yang ingin dimanipulasi	2, 12
Mental Rotation	Kemampuan secara cepat dan tepat untuk memutar sebuah bangun dimensi 2 atau 3	3, 7
Spatial Relations	Kemampuan untuk memahami konfigurasi spasial suatu objek atau bagian dari objek dan hubungannya satu sama lain	10
Spatial Orientation	Kemampuan untuk menyesuaikan diri secara fisik maupun mental dalam situasi spasial tertentu	5, 8, 14

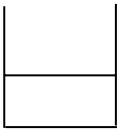
Appendix 2. Spatial-visual Intelligence Test Instrument

TES KECERDASAN VISUAL-SPASIAL

A. Petunjuk Pengerjaan

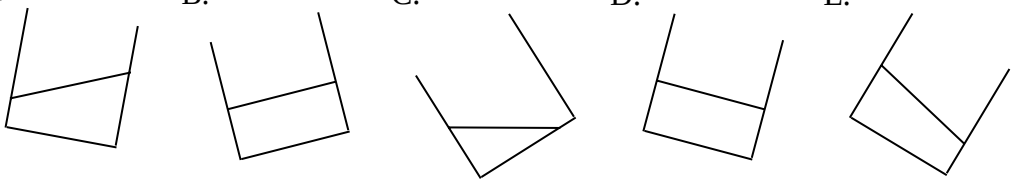
1. Bacalah pertanyaan-pertanyaan pada lembar berikut ini dengan cermat
2. Pilihlah salah satu jawaban yang menurut Anda paling sesuai dengan pendapatatau keadaan Anda, dengan cara memberikan tanda checklist (√) pada lembar jawaban yang telah disediakan

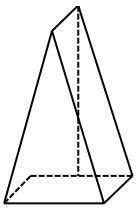
B. Tes Kecerdasan Spasial-visual

1. 

Diberikan gambar gelas berisi air. Manakah dari kelima gambar di bawah ini yang menunjukkan permukaan air yang benar dengan pengisian air yang sama banyak?

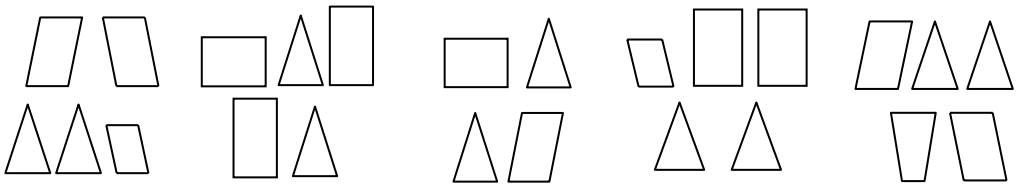
A. B. C. D. E.

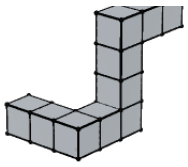


2. 

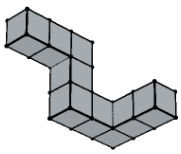
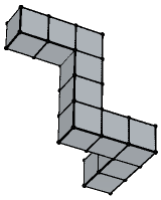
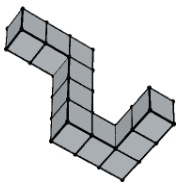
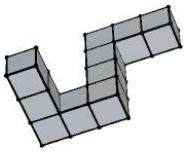
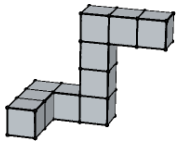
Kertas berbentuk apa sajakah yang diperlukan untuk menutup rangka kawat berikut ini?

A. B. C. D. E.



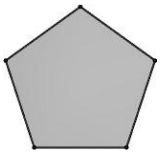
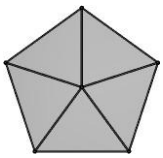
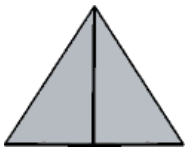
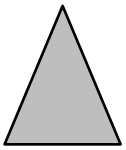
3. 

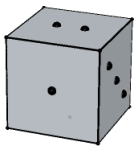
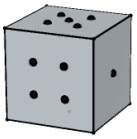
Gambar manakah di bawah ini yang identik dengan gambar di atas?

A. 
B. 
C. 
D. 
E. 

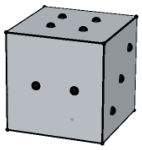
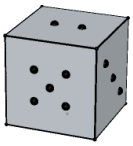
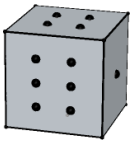
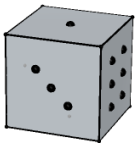
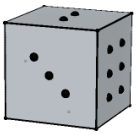
4. 

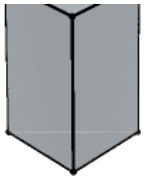
Gambar manakah yang bukan merupakan tampilan dari gambar limas tegak segilima beraturan
pada gambar di atas jika dilihat dari sudut pandang yang berbeda?

A. 
B. 
C. 
D. 
E. 

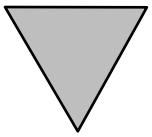
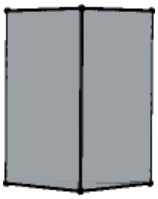
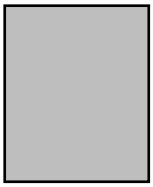
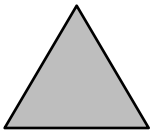
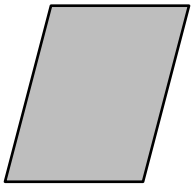
5.  dan 

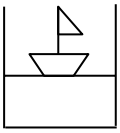
Diberikan dua gambar kubus yang identik. Manakah gambar kubus di bawah ini yang identik dengan dua gambar kubus tersebut?

A. 
B. 
C. 
D. 
E. 

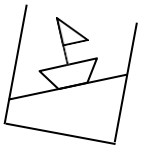
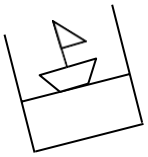
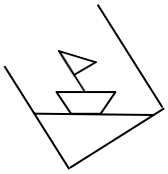
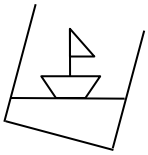
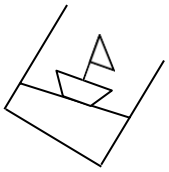
6. 

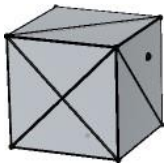
Gambar manakah yang bukan merupakan tampilan dari gambar prisma tegak segitiga pada gambar di atas jika dilihat dari sudut pandang yang berbeda?

A. 
B. 
C. 
D. 
E. 

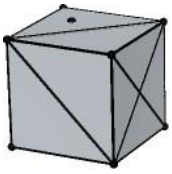
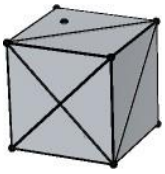
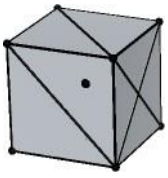
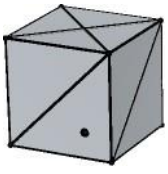
7. 

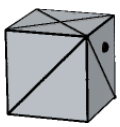
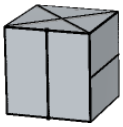
Diberikan gambar gelas berisi air yang di dalamnya diletakkan mainan perahu. Manakah dari kelima gambar di bawah ini yang menunjukkan posisi tiang perahu yangbenar?

A. 
B. 
C. 
D. 
E. 

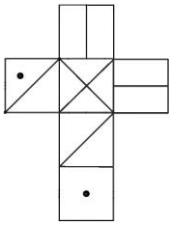
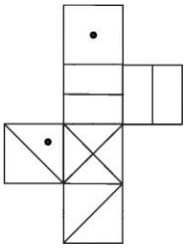
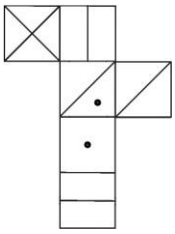
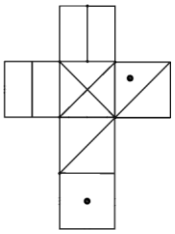
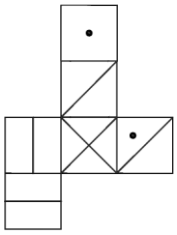
8. 

Gambar manakah yang identik dengan gambar di atas?

A. 
B. 
C. 
D. 
E. 

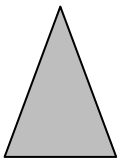
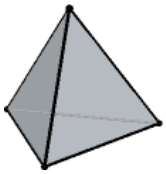
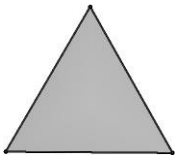
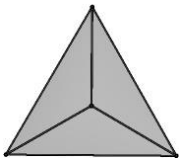
9.  Dan 

Jaring-jaring manakah di bawah ini yang dapat dibentuk menjadi kubus seperti yang
ditunjukkan pada gambar di atas?

A. 
B. 
C. 
D. 
E. 

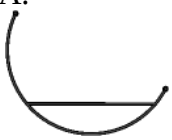
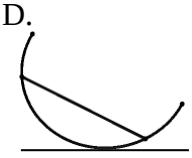
10 

Gambar manakah yang bukan merupakan tampilan dari gambar bidang empat beraturan pada
Gambar di atas jika dilihat dari sudut pandang yang berbeda?

A. 
B. 
C. 
D. 
E. 

11. 

Diberikan gambar mangkuk berisi air yang di dalamnya diletakkan sebuah gabus. Manakah dari kelima gambar di bawah ini yang menunjukkan posisi gabus yang benar?

A. 
B. 
C. 
D. 
E. 

Appendix 3. Mathematical Connection Ability Test Grid

Materi	**Indikator Kemampuan Koneksi Matematis**	**Indikator Soal**	**Bentuk Soal**	**Nomor Soal**
Bangun ruang	Menerapkan hubungan antar ide-ide matematika	Siswa mampu menentukan volume limas persegi apabila diketahui keliling alas dan tinggi	Uraian	1
	Menerapkan hubungan antara matematika dengan disiplin ilmu lain	Siswa mampu menganalisa permukaan sebuah kubus pejal jika diketahui massa jenis dan massa kubusnya	Uraian	2
	Menerapkan hubungan matematika dalam konteks kehidupan sehari-hari	Siswa mampu menyelesaikan permasalahan bangun ruang balok jika dikaitkan dengan kehidupan sehari-hari	Uraian	3

Appendix 4. Scoring Guidelines for Mathematical Connection Ability Test

No	Indikator KemampuanKoneksi Matematis	Respon Siswa	Skor
1	Memahami hubungan antar ide-ide matematika	Siswa tidak menuliskan jawaban.	0
		Siswa menuliskan jawaban, namun tidak dapat menghubungkan topik limas dengan keliling persegi pada soal.	1
		Siswa dapat menghubungkan topik limas dengan keliling persegi pada soal namun jawaban kurang lengkap dan terdapat kesalahan	2
		Siswa dapat menghubungkan topik limas dengan keliling persegi pada soal dengan benar, namun jawaban kurang lengkap. Siswa dapat menghubungkan topik limas dengan keliling persegi pada soal dengan lengkap namun jawaban terdapat kesalahan	3
		Siswa dapat menghubungkan topik limas dengan keliling persegi pada soal dengan lengkap dan jawaban benar	4
2	Memahami hubungan matematika dengan bidang studi lain	Siswa tidak menuliskan jawaban	0
		Siswa menuliskan jawaban, namun tidak dapat menghubungkan materi bidang studi lain (ipa) dengan materi matematika pada soal	1
		Siswa dapat menghubungkan materi bidang studi lain (ipa) dengan materi	2

		matematika pada soal namun jawaban kurang lengkap dan terdapat kesalahan	
		Siswa dapat menghubungkan materi bidang studi lain (ipa) dengan materi matematika pada soal dengan benar namun jawaban kurang lengkap. Siswa dapat menghubungkan materi bidang studi lain (ipa) dengan materi matematika pada soal dengan lengkap namun jawaban terdapat kesalahan.	3
		Siswa dapat menghubungkan materi bidang studi lain (ipa) dengan materi matematika pada soal dengan lengkap dan jawaban benar	4
3	Memahami hubungan matematika dengan kehidupan sehari-hari	Siswa tidak menuliskan jawaban.	0
		Siswa menuliskan jawaban, namun tidak dapat menghubungkan masalah kehidupan sehari-hari pada soal ke dalam materi matematika.	1
		Siswa dapat menghubungkan masalah kehidupan sehari-hari pada soal ke dalam materi matematika, namun jawaban kurang lengkap dan terdapat kesalahan	2
		Siswa dapat menghubungkan masalah kehidupan sehari-hari pada soal ke dalam materi matematika dengan benar, namun jawaban kurang lengkap.	3

		Siswa dapat menghubungkan masalah kehidupan sehari-hari pada soal ke dalam materi matematika dengan lengkap, namun terdapat kesalahan.	
		Siswa dapat menghubungkan masalah kehidupan sehari-hari pada soal ke dalam materi matematika dengan lengkap dan jawaban benar.	4

Appendix 5. Mathematical Connection Ability Test Instrument

TES KEMAMPUAN KONEKSI MATEMATIS

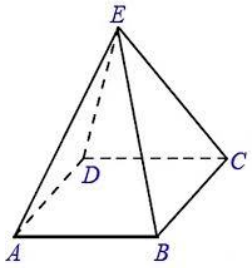
Mata Pelajaran	: Matemataika	Nama	:…….....
Materi	: Bangun Ruang	Kelas	:…….
Waktu	: 90 Menit	Sekolah	:…….

Petunjuk Pengerjaan Soal!

1. Berdoalah sebelum mengerjakan soal berikut
2. Kerjakan pada kertas yang telah disediakan dengan menuliskan identitas diri (nama,kelas, sekolah)
3. Bacalah permasalahan dengan hati-hati dan teliti
4. Kerjakan secara individu dan silahkan bertanya pada guru apabila terdapat soal yangkurang jelas.

Soal!

1. Perhatikan limas di bawah ini



   Diketahui keliling alas limas di atas adalah 72 cm dan tingginya adalah 12 cm. Hitunglah volume limas tersebut.
2. Sebuah kubus pejal memiliki massa jenis sebesar 8 gr/cm^3. Setelah ditimbang ternyata massa kubus pejal tersebut adalah 216 gr. Berapakah luas permukaan kubus pejal tersebut?
3. Sebuah kolam renang berbentuk balok dengan ukuran panjang 5 m, lebar 3 m, dan tinggi 2 m. Dinding bagian dalamnya akan dicat dengan biaya pengecatan Rp50.000,00/m^2. berapakah biaya pengecatan aula tersebut?

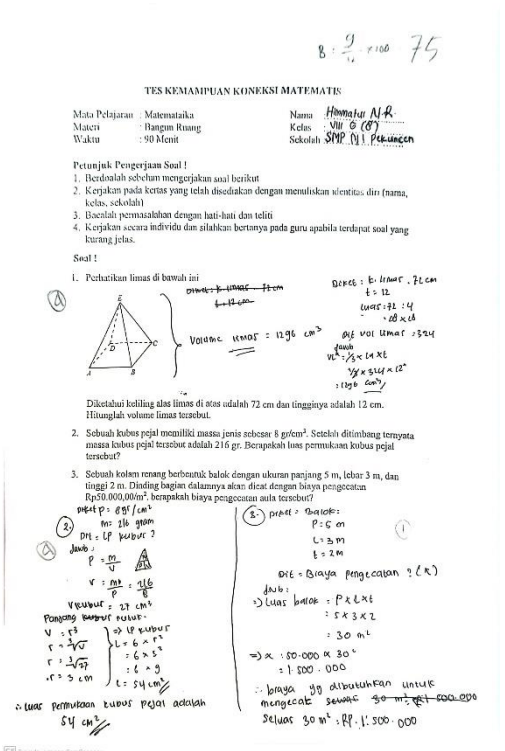
Appendix 6. Mathematical Connection Ability Test Answer Key

No Soal	Indikator Kemampuan Koneksi Matematis	Respon Siswa	Skor
1	Memahami hubungan antar ide-ide matematika	Diketahui: Keliling alas berbentuk persegi = 72 cm Tinggi segitiga = 12 cm Ditanya: Volume limas? Penyelesaian: - Menentukan panjang sisi alas s = K : 4 s = 72 : 4 s = 18 cm - Menentukan volume limas $V = \frac{1}{3}$ x s x s x t $V = \frac{1}{3}$ x 18 x 18 x 12 V = 1296 cm^3 Jadi volume limas adalah 1296 cm^3	4
2	Memahami hubungan matematika dengan bidang studi lain	Diketahui: Massa jenis (ρ) = 8 gr/cm^3 Massa kubus = 216 gr Ditanya: Luas permukaan kubus pejal? Penyelesaian: - Menentukan volume kubus $\rho = \frac{m}{V}$	4

		$V = \frac{m}{\rho}$ $V = \frac{216}{8}$ $V = 27\ cm^3$ - Menentukan sisi kubus $V = s^3$ $s = \sqrt[3]{27}$ $s = 3\ cm$ - Menentukan luas permukaan kubus L. P = 6 x s^2 L. P = 6 x 3^2 L. P = 6 x 9 L. P = 54 cm^2 Jadi luas permukaan kubus adalah 54 cm^2	
3	Memahami hubungan matematika dengan kehidupan sehari-hari	Diketahui: P = 5 m l = 3 m t = 2 m Biaya pengecatan = Rp50.000,00 Ditanya: Biaya pengecatan kolam renang? Penyelesaian: - Menentukan luas permukaan balok L. P = 2(pl x pt x lt) L. P = 2(5x3 + 5x2 + 3x2) L. P = 2(15 + 10 + 6) L. P = 2(32)	4

		L. P = 64 m^2 - Menentukan luas atap kolam renang L atap = p x l L atap = 5 x 3 L atap = 15 m^2 - Menentukan luas kolam renang yang dicat L = 64 – 15 = 49 m^2 - Menentukan biaya pengecatan 49 m^2 x Rp50.000,00 = Rp2.450.000,00 Jadi seluruh biaya pengecatan adalah Rp2.450.000,00	

Appendix 7. Evidence of Student Response Test



TES KEMAMPUAN KONEKSI MATEMATIS

Mata Pelajaran : Matematika
Materi : Bangun Ruang
Waktu : 90 Menit

Nama : Hannatul N.R
Kelas : VIII G (8)
Sekolah : SMP N 1 Petungkriyono

Petunjuk Pengerjaan Soal !
1. Berdoalah sebelum mengerjakan soal berikut
2. Kerjakan pada kertas yang telah disediakan dengan menuliskan identitas diri (nama, kelas, sekolah)
3. Buatlah permasalahan dengan hati-hati dan teliti
4. Kerjakan secara individu dan silahkan bertanya pada guru apabila terdapat soal yang kurang jelas.

Soal !

1. Perhatikan limas di bawah ini

Volume limas : 1296 cm³

Diketahui keliling alas limas di atas adalah 72 cm dan tingginya adalah 12 cm. Hitunglah volume limas tersebut.

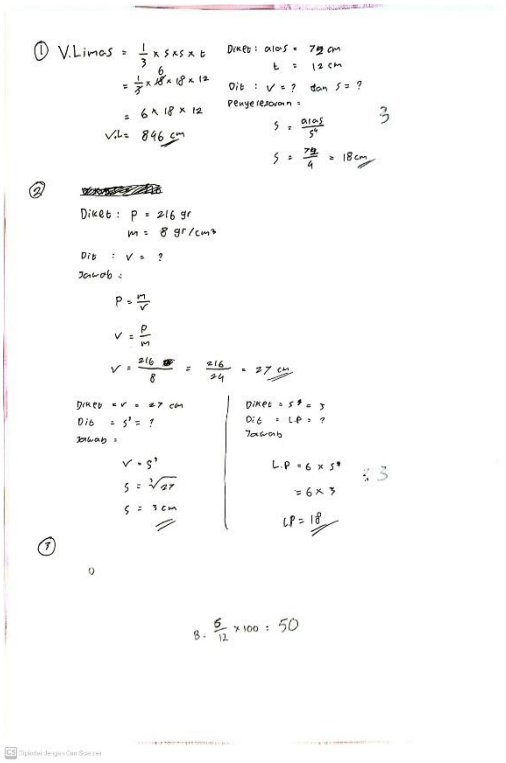
2. Sebuah kubus pejal memiliki massa jenis sebesar 8 gr/cm³. Setelah ditimbang ternyata massa kubus pejal tersebut adalah 216 gr. Berapakah luas permukaan kubus pejal tersebut?

3. Sebuah kolam renang berbentuk balok dengan ukuran panjang 5 m, lebar 3 m, dan tinggi 2 m. Dinding bagian dalamnya akan dicat dengan biaya pengecatan Rp50.000,00/m². berapakah biaya pengecatan satu tersebut?

∴ Luas permukaan kubus pejal adalah 54 cm²

∴ biaya yg dibutuhkan untuk mengecat seluas 30 m² : Rp. 1.500.000

B : 9/12 × 100 = 75



① V.Limas = 1/3 × 6 × 6 × t
= 1/3 × 6/1 × 18 × 12
= 6 × 18 × 12
= 846 cm

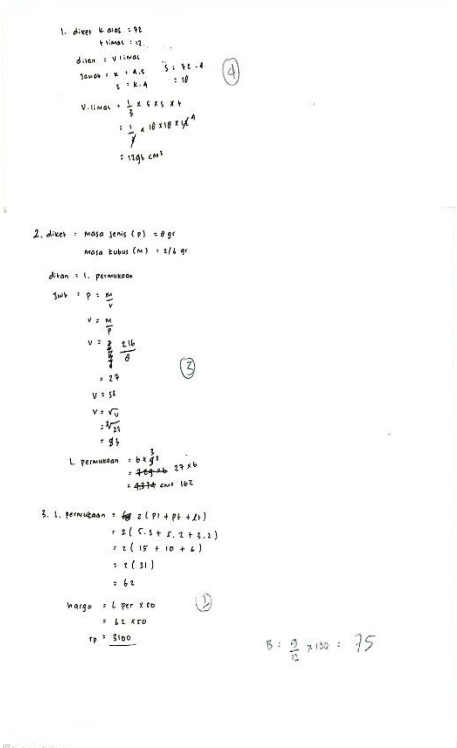
Diket : alas = 72 cm
t = 12 cm
Dit : V = ? dan s = ?
Penyelesaian :
s = alas / 4
s = 72/4 = 18 cm

②
Diket : p = 216 gr
m = 8 gr/cm³
Dit : V = ?
Jawab :
p = m/V
V = p/m
V = 216/8 = 216/24 = 27 cm

Diket : V = 27 cm
Dit : s³ = ?
Jawab :
V = s³
s = ∛27
s = 3 cm

Diket : s = 3
Dit : L.P = ?
Jawab
L.P = 6 × s²
= 6 × 3
L.P = 18

B : 5/12 × 100 = 50

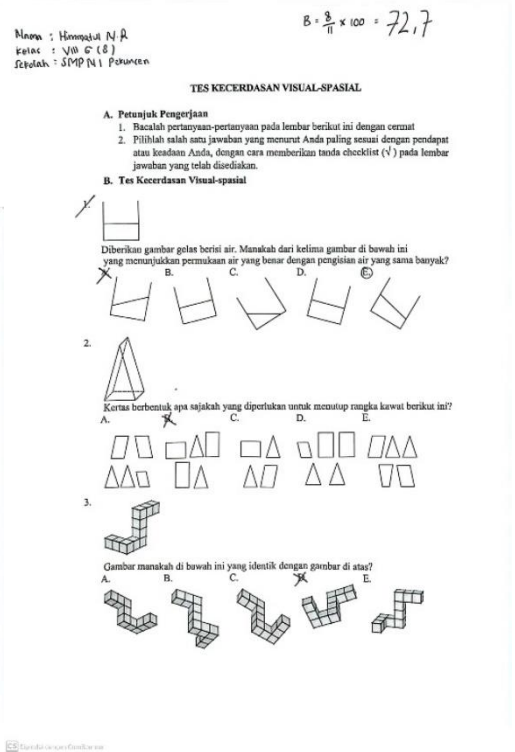


1. diket : K alas : 72
t limas : 12
ditan : V limas
jawab : K = 4 s
s = K/4
s = 72/4 = 18
V. limas = 1/3 × s × s × t
= 1/3 × 18 × 18 × 12
= 1296 cm³

2. diket : massa jenis (p) = 8 gr
massa kubus (m) = 216 gr
ditan : 1. permukaan
jawab : p = m/v
v = m/p
v = 216/8
= 27
v = s³
v = ∛27
= 3
L. permukaan = 6 × s²
= 6 × 3²
= 6 × 9
= 54 cm²

3. 1. permukaan = 2 (p l + p t + l t)
= 2 (5 . 3 + 5 . 2 + 3 . 2)
= 2 (15 + 10 + 6)
= 2 (31)
= 62
harga = L per x ro
= 62 x 100
rp = 6200

B : 9/12 × 100 = 75



Nama : Hannatul N.R
Kelas : VIII G (8)
Sekolah : SMP N 1 Petungkriyono

B = 8/11 × 100 = 72,7

TES KECERDASAN VISUAL-SPASIAL

A. Petunjuk Pengerjaan
1. Bacalah pertanyaan-pertanyaan pada lembar berikut ini dengan cermat
2. Pilihlah salah satu jawaban yang menurut Anda paling sesuai dengan pendapat atau keadaan Anda, dengan cara memberikan tanda checklist (√) pada lembar jawaban yang telah disediakan.

B. Tes Kecerdasan Visual-spasial

1. Diberikan gambar gelas berisi air. Manakah dari kelima gambar di bawah ini yang menunjukkan permukaan air yang benar dengan pengisian air yang sama banyak?
A. B. C. D. E.

2. Kertas berbentuk apa sajakah yang diperlukan untuk menutup rangka kawat berikut ini?
A. B. C. D. E.

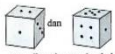
3. Gambar manakah di bawah ini yang identik dengan gambar di atas?
A. B. C. D. E.

4.

Gambar manakah yang bukan merupakan tampilan dari gambar limas tegak segilima beraturan pada gambar di atas jika dilihat dari sudut pandang yang berbeda?

A. B. C. D. E.

5.



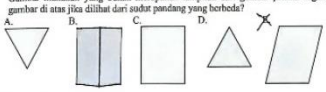
Diberikan dua gambar kubus yang identik. Manakah gambar kubus di bawah ini yang identik dengan dua gambar kubus tersebut?

A. B. C. D. E.

6.

Gambar manakah yang bukan merupakan tampilan dari gambar prisma tegak segitiga pada gambar di atas jika dilihat dari sudut pandang yang berbeda?

A. B. C. D. E.



7.

Diberikan gambar gelas berisi air yang di dalamnya diletakkan mainan perahu. Manakah dari kelima gambar di bawah ini yang menunjukkan posisi tiang perahu yangbenar?

A. B. C. D. E.

8.

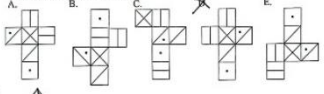
Gambar manakah yang identik dengan gambar di atas?

A. B. C. D.

9.

Jaring-jaring manakah di bawah ini yang dapat dibentuk menjadi kubus seperti yang ditunjukkan pada gambar di atas?

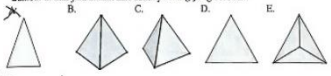
A. B. C. D. E.



10

Gambar manakah yang bukan merupakan tampilan dari gambar bidang empat beraturan pada Gambar di atas jika dilihat dari sudut pandang yang berbeda?

A. B. C. D. E.



11.

Diberikan gambar mangkuk berisi air yang di dalamnya diletakkan sebuah gabus. Manakah dari kelima gambar di bawah ini yang menunjukkan posisi gabus yang benar?

A. B. C. D. E.

Appendix 8. Recapitulation of Research Sample Work Results

No.	Respondents	Spatial-visual Intelligence	Mathematical Connection Ability
1	A1	91	92
2	A2	91	92
3	A3	64	67
4	A4	55	42
5	A5	36	50
6	A6	45	50
7	A7	64	67
8	A8	55	50
9	A9	55	42
10	A10	82	83
11	A11	55	67
12	A12	64	75
13	A13	73	67
14	A14	45	50
15	A15	27	42
16	A16	45	50
17	A17	36	42
18	A18	73	75
19	A19	73	83
20	A20	55	67
21	A21	55	67
22	B1	73	75
23	B2	82	75
24	B3	55	75
25	B4	55	58
26	B5	64	75
27	B6	73	75
28	B7	64	67
29	B8	73	75
30	B9	73	67
31	B10	55	67
32	B11	55	83
33	B12	45	58
34	B13	55	58
35	B14	55	58
36	B15	64	67

No.	Respondents	Spatial-visual Intelligence	Mathematical Connection Ability
37	B16	36	75
38	B17	64	75
39	B18	73	83
40	B19	64	67
41	B20	55	83
42	B21	45	75
43	C1	36	92
44	C2	55	92
45	C3	64	67
46	C4	64	42
47	C5	55	50
48	C6	64	50
49	C7	27	67
50	C8	45	50
51	C9	55	42
52	C10	36	83
53	C11	55	67
54	C12	55	75
55	C13	64	67
56	C14	36	50
57	C15	36	42
58	C16	73	50
59	C17	82	42
60	C18	64	75
61	C19	45	83
62	C20	45	67
63	D1	73	67
64	D2	82	83
65	D3	64	75
66	D4	45	50
67	D5	55	58
68	D6	64	67
69	D7	82	83
70	D8	73	75
71	D9	55	58
72	D10	82	75
73	D11	45	67

No.	Respondents	Spatial-visual Intelligence	Mathematical Connection Ability
74	D12	82	83
75	D13	45	58
76	D14	45	58
77	D15	73	75
78	D16	64	67
79	D17	73	75
80	D18	36	50
81	D19	91	92
82	D20	73	83
83	E1	55	92
84	E2	27	92
85	E3	45	67
86	E4	55	42
87	E5	27	50
88	E6	18	50
89	E7	45	67
90	E8	55	50
91	E9	64	42
92	E10	18	83
93	E11	36	67
94	E12	27	75
95	E13	45	67
96	E14	64	50
97	E15	73	42
98	E16	18	50
99	E17	45	42
100	E18	18	75
101	E19	36	83
102	E20	18	67
103	E21	9	33
104	E22	9	33
105	F1	27	58
106	F2	73	67
107	F3	55	58
108	F4	73	75
109	F5	64	75
110	F6	45	50

No.	Respondents	Spatial-visual Intelligence	Mathematical Connection Ability
111	F7	64	67
112	F8	55	75
113	F9	45	58
114	F10	27	67
115	F11	64	67
116	F12	73	75
117	F13	64	75
118	F14	73	83
119	F15	45	58
120	F16	36	42
121	F17	45	58
122	F18	81	83
123	F19	36	50
124	F20	45	42
125	F21	55	58
126	F22	81	92
127	G1	64	67
128	G2	73	75
129	G3	64	75
130	G4	64	50
131	G5	82	75
132	G6	73	75
133	G7	82	83
134	G8	73	75
135	G9	82	67
136	G10	64	67
137	G11	64	75
138	G12	73	58
139	G13	45	67
140	G14	82	42
141	G15	73	92
142	G16	64	50
143	G17	91	92
144	G18	64	58
145	G19	73	83
146	G20	82	92
147	G21	82	67

No.	Respondents	Spatial-visual Intelligence	Mathematical Connection Ability
148	G22	82	75
149	G23	91	92

Appendix 9. Documentation of Research Data Collection






Appendix 10. Proposal Seminar Certificate

KEMENTERIAN AGAMA REPUBLIK INDONESIA
UNIVERSITAS ISLAM NEGERI
PROFESOR KIAI HAJI SAIFUDDIN ZUHRI PURWOKERTO
FAKULTAS TARBIYAH DAN ILMU KEGURUAN
Jalan Jenderal A. Yani, No. 40A Purwokerto 53126
Telepon (0281) 635624 Faksimili (0281) 636553
www.uinsaizu.ac.id

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SEMINAR PROPOSAL SKRIPSI
No. No. B.1799Un.17/FTIK.JTMA/PP.00.9/4/2024

Yang bertanda tangan di bawah ini, Kordinator Program Studi Tadris Matematika pada Fakultas Tarbiyah dan Ilmu Keguruan (FTIK) IAIN Purwokerto menerangkan bahwa proposal skripsi berjudul :

"The influence of spatial visual intelligence on the ability of students mathematics connection at 8 grade in SMP N 1 Pekuncen"

Sebagaimana disusun oleh :

Nama	:	Jangky Dausat Basilludin Al Kholdan
NIM	:	2017407073
Semester	:	8
Jurusan/Prodi	:	Tadris Matematika

Benar-benar telah diseminarkan pada tanggal : Senin, 22 April 2024

Demikian surat keterangan ini dibuat dan dapat digunakan sebagaimana mestinya.

Purwokerto, 23 April 2024
Mengetahui,
Kordinator Prodi Matematika

Ulfa Zana Kumala, S.Si., M.Sc.
NIP. 19900501 201903 2 022

Appendix 11. Certificate of Preliminary Observation

PEMERINTAH KABUPATEN BANYUMAS
SMP NEGERI 1 PEKUNCEN
Jl. Karangklesem 477 Pekuncen, Banyumas Kode Pos 53164
Telepon (0281) 6439394, Faksimile-
Laman https://smpnegeri1pekuncen.sch.id , Pos-el espejipekuncen@yahoo.co.id

Pekuncen, 15 Maret 2024

Nomor : / 024 / 2024
Lamp : -
Hal : Balasan Ijin Penelitian/Observasi

Yth.
Katua Jurusan Tadris
Fakultas Tarbiyah dan Ilmu Keguruan
UIN SAIZU Purwokerto
Di
Purwokerto

Dengan hormat,

Seusai dengan surat dari Ketua Jurusan Tadris Nomor : B.m.699/Un.19/D.FTIK/PP.05.3/03/2024, tentang Permohonan Ijin Observasi Pendahuluan. Dengan ini SMP Negeri 1 Pekuncen Kec. Pekuncen Kab. Banyumas menerima Permohonan Observasi tersebut, oleh yang namanya tertera di bawah ini :

Nama : Jangky Dausat Basilludin Al Khodan
NIM : 2017407073
Jurusan/Prodi : Tadris Matematika
Tahun akademik : 2023/2024

Demikian surat ini kami sampaikan, agar dapat dipergunakan sebagaimana mestinya.

Kepala SMPN 1 Pekuncen

SLAMET RIYADI, S.Pd.
NIP. 19641214 199702 1 001

Appendix 12. Certificate of Having Conducted Individual Research

PEMERINTAH KABUPATEN BANYUMAS
SMP NEGERI 1 PEKUNCEN
Jl. Karangklesem 477 Pekuncen, Banysumas Kode Pos 53164
Telepon/Faksimile (0281) 6439394
Laman https://smpnegeri1pekuncen.sch.id , Pos-el espeijipekuncen@yahoo.co.id

SURAT KETERANGAN TELAH MELAKSANAKAN PENELITIAN
No : 423.4 / 050 / 2024

Yang bertanda tangan dibawah ini Kepala SMP Negeri 1 Pekuncen Kabupaten Banyumas menerangkan dengan sebenarnya bahwa Mahasiswa UIN SAIZU Purwokerto tersebut dibawah ini :

N a m a	: Jangky Dausat Basilludin Al Kholdan
NIPD	: 2017407073
Program Studi	: Tadris Matematik

Telah melaksanakan Penelitian dalam rangka Observasi Pendahuluan dengan Objek Guru dan Siswa di SMP Negeri 1 Pekuncen yang dilaksanakan pada tanggal 6 Mei 2024 s.d 20 Mei 2024.

Demikian surat keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

Pekuncen, 30 Mei 2024
Kepala SMP Negeri 1 Pekuncen

SLAMET RIYADI, S.Pd.
Pembina / IVa
NIP. 19691214 199702 1 001

Appendix 13. Certificate of Passing Comprehensive Examination

KEMENTERIAN AGAMA REPUBLIK INDONESIA
INSTITUT AGAMA ISLAM NEGERI (IAIN) PURWOKERTO
FAKULTAS TARBIYAH DAN ILMU KEGURUAN
Jalan Jenderal A. Yani, No. 40A Purwokerto 53126
Telepon (0281) 635624 Faksimili (0281) 636553 www.uinsaizu.ac.id

SURAT KETERANGAN
No. B-2514.Un.19/WD1.FTIK/PP.05.3/6/2024

Yang bertanda tangan di bawah ini Wakil Dekan Bidang Akademik, menerangkan bahwa :

N a m a	: Jangky Dausat Basilludin Al Kholdan
NIM	: 2017407073
Prodi	: TMA

Mahasiswa tersebut benar-benar telah melaksanakan ujian komprehensif dan dinyatakan ***LULUS*** pada :

Hari/Tanggal	: Jum'at, 7 Juni 2024
Nilai	: 71/ B

Demikian surat keterangan ini kami buat untuk dapat digunakan sebagaimana mestinya.

Purwokerto, 11 Juni 2024
Wakil Dekan Bidang Akademik,

Prof. Dr. Suparjo, M.A.
NIP. 19730717 199903 1 001

Appendix 14. Thesis Guidance Form

KEMENTERIAN AGAMA REPUBLIK INDONESIA
UNIVERSITAS ISLAM NEGERI
PROFESOR KIAI HAJI SAIFUDDIN ZUHRI PURWOKERTO
FAKULTAS TARBIYAH DAN ILMU KEGURUAN
Jalan Jenderal A. Yani, No. 40A Purwokerto 53126
Telepon (0281) 635624 Faksimili (0281) 636553
www.uinsaizu.ac.id

BLANGKO BIMBINGAN SKRIPSI

Nama : Jangky Dausat Basilludin Al Kholdan
NIM : 2017407073
Fakultas/ Jurusan : Tadris/Tadris Matematika
Nama Pembimbing : Dr. Maria Ulpah, S.Si., M.Si.
Judul Skripsi : The Influence of Spatial-visual Intelligence on the Ability of Students' Mathematical Connection at 8th Grade in SMP N 1 Pekuncen, Banyumas Regency

NO.	HARI / TANGGAL	MATERI BIMBINGAN	TANDA TANGAN	
			PEMBIMBING	MAHASISWA
1.	Selasa, 5 Maret 2024	Revisi Judul dan Latar Belakang		
2.	Rabu, 20 Maret 2024	Revisi Definisi Operasional dan Kajian Pustaka		
3.	Kamis, 21 Maret 2024	Revisi Rumusan Masalah dan Kerangka Berpikir		
4.	Jumat, 22 Maret 2024	Revisi Metode Penelitian, Populasi, dan Sampel		
5.	Selasa, 7 Mei 2024	Revisi Teknik Pengumpulan Data dan Teknik Analisis Data		
6.	Rabu, 8 Mei 2024	Revisi Instrumen Penelitian dan Penskoran		

KEMENTERIAN AGAMA REPUBLIK INDONESIA
UNIVERSITAS ISLAM NEGERI
PROFESOR KIAI HAJI SAIFUDDIN ZUHRI PURWOKERTO
FAKULTAS TARBIYAH DAN ILMU KEGURUAN
Jalan Jenderal A. Yani, No. 40A Purwokerto 53126
Telepon (0281) 635624 Faksimili (0281) 636553
www.uinsaizu.ac.id

7.	Rabu, 15 Mei 2024	Revisi Instrumen Penelitian		
8.	Selasa, 21 Mei 2024	Revisi Instrumen Penelitian		
9.	Senin, 27 Mei 2024	Validasi Instrumen Penelitian		
10.	Jumat, 13 September 2024	Bimbingan Bab I – IV		
11.	Rabu, 18 September 2024	Revisi Abstrak dan bab V		
12.	Kamis, 19 September 2024	Acc Skripsi		

Dibuat di : Purwokerto
Pada tanggal : 19 September 2024
Pembimbing,

Dr. Maria Ulpah, S.Si., M.Si.
NIP. 198011152005012004

Dipindai dengan CamScanner

Appendix 15. BTA/PPI Certificate

IAIN PURWOKERTO

KEMENTERIAN AGAMA REPUBLIK INDONESIA
INSTITUT AGAMA ISLAM NEGERI PURWOKERTO
UPT MA'HAD AL-JAMI'AH

Jl. Jend. A. Yani No. 40A Purwokerto, Jawa Tengah 53126, Telp:0281-635624, 628250 | www.iainpurwokerto.ac.id

SERTIFIKAT

Nomor: In.17/UPT.MAJ/19242/20/2020

Diberikan oleh UPT Ma'had Al-Jami'ah IAIN Purwokerto kepada:

NAMA	:	**JANGKY DAUSAT BASILLUDIN AL KHOLDAN**
NIM	:	**2017407073**

Sebagai tanda yang bersangkutan telah LULUS dalam Ujian Kompetensi Dasar Baca Tulis Al-Qur`an (BTA) dan Pengetahuan Pengamalan Ibadah (PPI) dengan nilai sebagai berikut:

# Tes Tulis	:	**87**
# Tartil	:	**80**
# Imla`	:	**80**
# Praktek	:	**80**
# Nilai Tahfidz	:	**80**

Purwokerto, 20 Okt 2020

ValidationCode

SIMA v.1.0 UPT MA`HAD AL-JAMI`AH IAIN PURWOKERTO - page1/1

Appendix 16. Arabic Language Certificate

MINISTRY OF RELIGIOUS AFFAIRS OF THE REPUBLIC OF INDONESIA
STATE ISLAMIC UNIVERSITY PROFESOR KIAI HAJI SAIFUDDIN ZUHRI PURWOKERTO
LANGUAGE DEVELOPMENT UNIT
Jl. Jend. A. Yani No. 40A Purwokerto, Jawa Tengah, Indonesia | www.uinsaizu.ac.id | www.bahasa.uinsaizu.ac.id | +62 (281) 635624

وزارة الشوون الدينية بجمهورية إندونيسيا
جامعة الأستاذ كياهي الحاج سيف الدين زهري الاسلامية الحكومية بوروكرتو
الوحدة لتنمية اللغة

CERTIFICATE
الشهادة
No.B-3386/Un.19/K.Bhs/PP.009/ 5/2024

This is to certify that — منحت إلى
Name : Jangky Dausat Basilludin Al Kholdan — الاسم
Place and Date of Birth : Banyumas, 20 Februari 2002 — محل وتاريخ الميلاد
Has taken : IQLA — وقد شارك/ت الاختبار
with Computer Based Test, — على أساس الكمبيوتر
organized by Language Development Unit on : 30 Mei 2024 — التى قامت بهاالوحدة لتنمية اللغة في التاريخ
with obtained result as follows : — مع النتيجة التى تم الحصول عليها على النحو التالي:

Listening Comprehension: 50 فهم المسموع
Structure and Written Expression: 50 فهم العبارات والتراكيب
Reading Comprehension: 54 فهم المقروء
Obtained Score : 513 المجموع الكلي :

The test was held in UIN Profesor Kiai Haji Saifuddin Zuhri Purwokerto. تم إجراء الاختبار بجامعة الأستاذ كياهي الحاج سيف الدين زهري الاسلامية الحكومية بوروكرتو.

Purwokerto, 30 Mei 2024
The Head of Language Development Unit,
رئيسة الوحدة لتنمية اللغة

Muflihah, S.S., M.Pd.
NIP.19720923 200003 2 001

EPTUS
English Proficiency Test of UIN PROF. K.H. SAIFUDDIN ZUHRI

IQLA
Ikhtibārāt al-Qudrah 'alā al-Lughah al-'Arabiyyah

Appendix 17. English Language Certificate

MINISTRY OF RELIGIOUS AFFAIRS OF THE REPUBLIC OF INDONESIA
STATE ISLAMIC UNIVERSITY PROFESOR KIAI HAJI SAIFUDDIN ZUHRI PURWOKERTO
LANGUAGE DEVELOPMENT UNIT
Jl. Jend. A. Yani No. 40A Purwokerto, Jawa Tengah, Indonesia | www.uinsaizu.ac.id | www.bahasa.uinsaizu.ac.id | +62 (281) 635624

وزارة الشؤون الدينية بجمهورية إندونيسيا
جامعة الأستاذ كياهي الحاج سيف الدين زهري الاسلامية الحكومية بوروكرتو
الوحدة لتنمية اللغة

CERTIFICATE
الشهادة

No.B-3385/Un.19/K.Bhs/PP.009/ 5/2024

This is to certify that — منحت إلى
Name : Jangky Dausat Basilludin Al Kholdan — الاسم
Place and Date of Birth : Banyumas, 20 Februari 2002 — محل وتاريخ الميلاد
Has taken : EPTUS — وقد شارك/ت الاختبار
with Computer Based Test, — على أساس الكمبيوتر
organized by Language Development Unit on : 30 Mei 2024 — التي قامت بها الوحدة لتنمية اللغة في التاريخ
with obtained result as follows : — مع النتيجة التي تم الحصول عليها على النحو التالي:

Listening Comprehension: 56	Structure and Written Expression: 54	Reading Comprehension: 62
فهم المسموع	فهم العبارات والتراكيب	فهم المقروء

Obtained Score : 576 — المجموع الكلي :

The test was held in UIN Profesor Kiai Haji Saifuddin Zuhri Purwokerto. — تم إجراء الاختبار بجامعة الأستاذ كياهي الحاج سيف الدين زهري الاسلامية الحكومية بوروكرتو.

Purwokerto, 30 Mei 2024
The Head of Language Development Unit,
رئيسة الوحدة لتنمية اللغة

EPTUS
English Proficiency Test of UIN PROF. K.H. SAIFUDDIN ZUHRI

IQLA
Ikhtibārāt al-Qudrah 'alá al-Lughah al-'Arabiyyah

Muflihah, S.S., M.Pd.
NIP.19720923 200003 2 001

Appendix 18. PPL Certificate

KEMENTERIAN AGAMA
UIN PROF. K.H. SAIFUDDIN ZUHRI PURWOKERTO
LABORATORIUM FAKULTAS TARBIYAH DAN ILMU KEGURUAN
Alamat : Jl. Jend. A. Yani No. 40A Telp. (0281). 635624 Psw. 121 Purwokerto 53126

Sertifikat

Nomor : B. 032 / Un.19/K. Lab. FTIK/ PP.009/ X / 2023
Diberikan Kepada :

JANGKY DAUSAT BA
2017407073

Sebagai bukti yang bersangkutan telah melaksanakan
kegiatan Praktik Pengalaman Lapangan (PPL) II Tahun Akademik 2023/2024
pada tanggal 4 September - 14 Oktober 2023

Purwokerto, 27 Oktober 2023
Laboratorium FTIK
Kepala,

Dr. Nurfuadi, M.Pd.I.
NIP. 19711021 200604 1 002

Appendix 19. KKN Certificate

Sertifikat

Nomor Sertifikat : 0141/K.LPPM/KKN.53/03/2024

Lembaga Penelitan dan Pengabdian kepada Masyarakat (LPPM)
Universitas Islam Negeri Prof. K.H. Saifuddin Zuhri Purwokerto menyatakan bahwa:

Nama Mahasiswa : **JANGKY DAUSAT BASILLUDIN AL KHOLDAN**
NIM : **2017407073**

Telah mengikuti Kuliah Kerja Nyata (KKN) Angkatan ke-53 Tahun 2024,
dan dinyatakan **LULUS** dengan nilai **91 (A)**.

Certificate Validation

Appendix 20. Curriculum Vitae

A. Self-identity

1. Name : Jangky Dausat Basilludin Al Kholdan
2. Student Number : 2017407073
3. Place, Date of Birth : Banyumas, 20 April 2002
4. Address : Banjaranyar 001/006 Pekuncen Banyumas
5. Father's Name : Kholid Kamal
6. Mother's Name : Ani Susanti

B. Educational History

1. Formal Education
   a. MI Ma'arif NU 1 Banjaranyar
   b. MTs Negeri 1 Banyumas
   c. MA Ali Maksum Yogyakarta
   d. UIN Prof. K.H. Saifuddin Zuhri Purwokerto
2. Informal Education
   a. Al Amien Islamic Boarding School Purwokerto Wetan
   b. Krapyak Islamic Boarding School Yogyakarta

C. Organizational Experience

1. Student Association of Tadris Mathematics Study Program Period 2022-2023