

Correlation Analysis of Emotional Intelligence and Mathematical Literacy of Junior High School Students on Pythagoras Theorem Material

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Abstract—Mathematical literacy refers to an individual's ability for formulating, applying, and interpreting in diverse contexts. This encompassed mathematical reasoning as well as the practical application of mathematical concepts, procedures, facts, and tools to clarify phenomena related to emotional intelligence. The research was conducted at SMPN 2 Suranenggala with 3 samples of grade VIII students. The effective emotional control fosters a more comfortable learning environment, improving students' understanding of mathematical materials. Establishing a connection between emotional intelligence and mathematical comprehension are essential for assessing students' abilities to grasp mathematical concepts represented by symbols, numbers, and complex operations. This study employs Emotional Quotient indicators, as outlined by Daniel Goleman, which includes self-awareness, self regulations, self-motivations, empathys, and social skills. Students with high emotional intelligence tend to manage stress and anxiety more effectively when tackling math tasks, enabling them to address problems related to the Pythagorean Theorem easily. As a result, learning strategies can greatly improve students' mathematical competencies. The indicators of emotional intelligence such as recognizing one's emotions, practicing self-management, and demonstrating social awareness are crucial in this process. Students with having heightened sense of emotional intelligence is better than equipped to cope with the stress and anxiety that may arise during mathematical tasks, allowing them to approach Pythagorean Theorem problems in a more focused and efficient manner.

Keywords— *Emotional intelligence; mathematical literacy; theorema pythagoras*

I. INTRODUCTION

Education at the junior high school level has a very important role in shaping students' character and abilities in various aspects, including mathematical skills. One of the materials that is commonly taught at this level is the Pythagorean Theorem, which is a basic concept of geometry used to calculate the length of the sides of a right triangle. In this material, students are required to understand the concepts of angles, lines and planes. The concept of theorema pythagoras is a mathematical basis that involves calculating, combining and comparing the results of different numbers and objects. Improving students' mathematical literacy skills is needed at all levels of education, especially in mathematics learning. The low level of mathematical literacy of students is one of them in the material of the phythagoras theorem in secondary schools where the material has many applications in daily life and becomes advanced material in further education. In learning the phythagorean theorem, students still have difficulty solving problems, difficulty operating algebra, determining hypotenus, and expressing an idea [1].

Emotional intelligence has been done in previous research by other researchers. [2] revealed that there is a relationship between epistemological beliefs about mathematics, emotional intelligence, and partial mastery of mathematical concepts [3] giving his research conclusion that emotional intelligence has a strong relationship with student learning achievement. [4] His research showed that there was a direct positive influence of emotional intelligence on mathematics learning outcomes of

68.60% and there was a direct positive influence of emotional intelligence on learning motivation of 81.60% [5].

Mathematical literacy skills that students must have so that in solving problems can be directed and measurable. Mathematical skills are the ability to understand, use and apply mathematical concepts to solve problems, reason logically and be able to communicate by explaining ideas, precisely both verbally and in writing. Improving students' mathematical literacy skills is needed at all levels of education, especially in mathematics learning [6]. The low level of mathematical literacy of students is one of them in the material of the pythagoras theorem in secondary schools where the material has many applications in daily life and becomes advanced material in further education. In learning the pythagorean theorem, students still have difficulty solving problems, difficulty operating algebra, determining hypotenues, and expressing an idea [1].

Many factors affect students in understanding the lessons delivered in school, both internal and external factors [7]. One of the internal factors is the emotional intelligence that each student has. Emotional intelligence here is defined by Peter Salovey and John Mayer, as "the ability to regulate the emotions of oneself and others which aims to distinguish between diverse emotions and label them appropriately, as well as to use emotional information to regulate thoughts and behaviors appropriately, and to use emotional information to regulate thoughts and behaviors [8].

Emotional intelligence is the ability to recognize one's own feelings or the feelings of others and be able to consciously motivate oneself and adjust spontaneously to achieve better results. However, this emotional intelligence needs to consider spiritual intelligence as an effort to build character and self-evaluation. Based on the results of previous research conducted [9] explained that the intelligence possessed by students is not only seen from their intellectual ability, but also the ability to control themselves and the ability to foster relationships with others. This is in line with research conducted [10] on There are several factors that affect students' mathematics learning outcomes. Daud (2012) stated that there are two common factors that cause low learning outcomes of junior high school students. First, internal factors (from within oneself). These factors are governed by the student's psychological state, such as self-concept and motivation to achieve, and by the student's ability, such as intelligence. For example, intelligence or intellectual intelligence. The second is external factors (factors from outside oneself), including the environment such as home, school, and society.

Students' mathematical literacy skills in solving problems are not only because they are not able to solve existing problems, but they need motivation in developing a better mathematical thinking process. The process of mathematical thinking by understanding all aspects of mathematical basics related to numbers and their operations. Such as addition, subtraction and others. Mathematical literacy skills are often considered difficult and require more precision. Mathematical concepts with various symbols and numbers have different characteristics are often associated with sciences that require

the logic of human reason [11]. Human logic comes from the human mindset itself which arises from the process of remembering, understanding and analyzing. Thinking patterns are a way for a person to evaluate and conclude the results obtained. Therefore, this process is very important for a person to gain a broad insight of knowledge.

Knowledge is the truth obtained from the process of learning experience and realized by a person [12]. Information that is known symptoms encountered through the observation of the common sense of new events that have never been felt before (Maier, 2007). According to Bloom, the process of knowing can produce knowledge of certain objects and occurs due to the process of observation, hearing, and stimulus [13]. Thus, knowledge is closely related to students' emotional and spiritual intelligence.

Bungati, Taiyeb, and Hartati [14] stated that most junior high school students are still indifferent to the learning process they experience and only focus on the final grades they receive. This is believed to be caused by a lack of emotional intelligence in students, as well as a lack of meaning in all activities, including in the learning process. Learning motivation Students have difficulty concentrating on understanding mathematics subjects that require reasoning and logic compared to other subjects. Based on previous research, there are differences in the learning process that only focuses on books without being balanced with the results of treatment, both in the form of attitudes and behaviors.

The role of emotional intelligence in the teaching and learning process is more important than intellectual skills [15]. Controlling emotions makes the learning environment more comfortable and helps students understand the learning material better. Spiritual intelligence is the highest intelligence, intelligence that can be intellectual intelligence [8]. The importance of understanding emotional intelligence is to develop the potential that students have, with emotional intelligence students can control their emotions by being strengthened with spiritual intelligence as an existing guideline or reference [16]. Thus, research by relating emotional and spiritual intelligence can be one of the important components to determine students' ability to understand mathematical concepts in the form of symbols, numbers and more complex operations. The purpose of this study is to determine the correlation between students' mathematical literacy ability and junior high school students' emotional intelligence in Pythagorean theorem material.

Butarbutar (2020) presents literature on the development of emotional understanding in the workplace (Freddy Butarbutar, 2020). Research shows that emotional intelligence can be trained and developed both in organizations and individuals. To develop emotional intelligence in work can be done through several stages, namely: (a) paving the way, (b) doing the work of change, (c) encouraging transfer and maintenance of change, (d) evaluating the change. Another study conducted by Habeahan, Saam, and Yakub on adolescent emotional intelligence (Habeahan et al., n.d.). Family, gender, and peers are components that influence emotional intelligence, according to the results of the study [1].

II. METHOD

This study uses a qualitative descriptive type of research. The subjects of the study were 3 grade VIII students who were declared by BK teachers as students who had high, medium, and low emotional intelligence, namely as evidenced by behavioral and attitude psychology tests. The object of the study, namely numeracy literacy in pythagoras material, is reviewed from the emotional intelligence of students.

This study uses three techniques for collecting data on students' mathematical literacy tests, where the test contains questions related to pythagoras. This test is used to assess students' ability in numeracy. Next, an emotional intelligence questionnaire. A questionnaire was given to measure the level of emotional intelligence of students. The results are categorized into three levels: high, medium, and low. This study uses a questionnaire instrument to be given to grade VIII students at SMP Negeri 2 Suranenggala. This questionnaire is used to determine the scale of students' intelligence according to the Emotional Quotient indicators according to Daniel Golmen[5], namely Self-awareness, Self-regulation, Self-motivation, Empathy, and social skills. Furthermore, subjects will be taken, namely 3 students who have high, medium and low emotional intelligence. The main instrument in this study is the researcher himself assisted by supporting instruments which include the Emotional Quotient questionnaire, the test instrument of theorem pythagoras questions and the interview guideline instrument.

The first data collection was carried out by providing an Emotional Quotient scale questionnaire to obtain subjects who had self-awareness, self-regulation, self-motivation, empathy, and social skills[17]. Second, give test questions to 3 subjects to measure their mathematical literacy and the last by conducting direct interviews to get more in-depth information. The data analysis techniques in this study are data reduction, data presentation and conclusion drawn. Meanwhile, checking the validity of the data of this study uses the diligence of observers and triangulation which tests the credibility of the data by checking the same data from the results of the test and interviews. An additional analysis technique in this study uses the Microsoft Excel application to search for statistical values in questionnaire data and written tests which aims to calculate the correlation value between the results of the questionnaire and the test given to students.

III. RESULTS AND DISCUSSION

Based on the results of research conducted at SMP Negeri 2 Suranenggala, Cirebon Regency, it was found that students' mathematical literacy in working on theorem pythagoras problems is still moderate. This is evidenced by the results of filling out questions carried out by 3 students in class directly. There is one student who still does not understand the symbols and formulas of theorem pythagoras directly, but this is different from when students practice or use rulers and measuring instruments. In this problem, students can solve the problem easily. Furthermore, the results of the study on the emotional intelligence scale using a questionnaire showed that students with strong self-awareness, directed self-control, strong self-motivation, a sense of empathy, and social skills

tended to be better. A good level of cooperation between friends in working on problems is enough motivation for students to understand and solve theorem pythagoras problems well.

Students' emotional intelligence in working on theorem pythagoras problems is still low. This can be proven by students who still rely on empathy from friends to always be assisted in doing assignments, lack enthusiasm in working on problems and rush to solve problems related to theorem pythagoras. Factors that can affect students' emotional intelligence include the ability to stay focused and calm in dealing with problem solving, the ability to communicate well[18].

The results of this study have important implications for mathematics education at the junior high school level, utilizing this understanding to design learning strategies that not only hone students' cognitive abilities but also their emotional intelligence. Teaching students how to manage stress, work in groups, and build confidence[19], Therefore, the introduction of self-emotions is very important for students so that what is taught in school can be implemented properly. The following are the results of research that researchers have found in the field:

1. The Effect of Emotional Intelligence on Mathematical Literacy

High emotional intelligence is related to students' ability to manage their emotions well, focus on learning, and have good empathy and social skills. At a time when students are faced with challenging tasks, such as understanding and applying the Pythagorean Theorem, the ability to stay calm, manage frustration, and communicate well will greatly help them solve math problems. Students with good emotional intelligence tend to be able to manage the stress and anxiety that arise when facing difficult exams or problems, such as Pythagorean problems are better able to think clearly and solve mathematical problems effectively [8].

2. Emotional intelligence involves self-motivation

Emotional intelligence involves high self-motivation, which means students with better emotional intelligence tend to be more motivated to learn and put in more effort to understand mathematical concepts, including the Pythagorean Theorem[20]. In the above statement, it can be concluded that emotional intelligence still needs to be done because of self-motivation that can support the learning process. In the context of mathematics learning, especially the material of the Pythagorean Theorem, emotional intelligence plays an important role in building students' confidence[21]. Students who are able to manage their emotions well can focus more on understanding formulas and concepts, and are better prepared to face challenges in solving problems related to the theorem[22]. In addition, students who have high emotional intelligence are also more open to positive or negative feedback, which helps to further develop in mathematical abilities.

3. The Relationship between Emotional Intelligence and Mathematical Literacy

The results showed that there was a moderate positive correlation between emotional intelligence and mathematical literacy in Pythagorean's theorem as seen from the results of pythagoras tests, interviews, and direct observations. This means that the higher the emotional intelligence of the students, the better their understanding of the Pythagorean theorem. These results support an alternative hypothesis that there is a significant relationship between the two variables [22]. Emotional intelligence includes the ability to manage emotions, adapt to change, and cope with stress. In the context of mathematics, the ability to remain calm and organized in the face of mathematical challenges, as well as having confidence, can improve students' ability to understand and apply mathematical concepts such as the Pythagorean theorem.

4. The Role of Emotional Intelligence in Mathematics Learning

Emotional intelligence plays a very important role in the learning process. In mathematics, many students feel pressured when faced with difficult problems[23]. High emotional intelligence can help students manage feelings of anxiety and frustration, which are often a major barrier to learning math. For example, students with good emotional intelligence tend to be more resilient and less likely to give up when faced with challenging math problems[24]. The Pythagorean theorem, although it is a basic concept in mathematics, is often considered difficult by some students. Skills in managing emotions, such as staying focused and not feeling burdened by mistakes, help students to overcome these challenges. With the ability to stay calm and think clearly, students can more easily apply Pythagorean theorem in problem solving[25].

The correlation coefficient found was 0.56 by summing the average values of all data collection techniques, indicating a moderate positive relationship. This means that emotional intelligence contributes to improved mathematical literacy, but there are still other factors that also affect students' mathematical comprehension [8]. Factors such as learning motivation, teaching quality, or previous math learning experience may also play an important role in a student's level of mathematical literacy. However, although this correlation is moderate, the results remain statistically significant ($p = 0.004$). This suggests that emotional intelligence has a considerable influence on mathematical literacy, and is not just a coincidence[1].

Emotional intelligence is the ability to recognize one's own feelings or the feelings of others and be able to consciously motivate oneself and adjust spontaneously to achieve better results. However, this emotional intelligence needs to consider spiritual intelligence as an effort to build character and self-evaluation.

IV. CONCLUSIONS

Based on the results of research that has been carried out at SMPN 2 Suraneggala, it can be concluded that emotional intelligence must be instilled in students from an early age by managing emotions in a healthy way, therefore mathematics learning is said to be successful if students have positive emotional intelligence. To manage emotional intelligence in mathematics learning can be done by teaching cultural values

to students, recognizing in advance the most prominent student emotions, when they understand take action by teaching the control of these emotions to students, introducing students to make rules to be more disciplined and consistent.

Students with high emotional intelligence tend to be more able to cope with stress and anxiety arising in completing mathematical tasks, and are able to solve mathematical problems related to Pythagorean's theorem more specifically and effectively. Therefore, learning strategies that integrate emotional management and social skills can help students improve their math skills. For future researchers, hopefully they can explore more components and indicators regarding emotional intelligence with students' thinking abilities so that they can be more developed.

REFERENCES

- [1] C. Novianti, B. Sadipun, and J. M. Balan, "Pengaruh Motivasi Belajar Terhadap Hasil Belajar Matematika Peserta Didik," *Sci. Phys.* ..., 2020, [Online]. Available: <https://journal.ipm2kpe.or.id/index.php/SPEJ/article/view/992>
- [2] S. L. Defi, I. N. Parta, and H. Permadi, "Penguasaan Konsep Matematika Siswa Smp Ditinjau Dari Keyakinan Epistemologis Tentang Matematika Dan Kecerdasan Emosional," *AKSIOMA J. Progr. Stud. Pendidik. Mat.*, vol. 10, no. 3, p. 1963, 2021, doi: 10.24127/ajpm.v10i3.3690.
- [3] A. Awaluddin, M. Musari, and L. Lubna, "Hubungan Kecerdasan Emosional dan Kinerja Guru dengan Prestasi Belajar Siswa di SMA Negeri 1 Batukliang Utara, Lombok Tengah," *Manazhim*, vol. 5, no. 2, pp. 1061–1081, 2023, doi: 10.36088/manazhim.v5i2.3710.
- [4] A. F. Rangkuti and F. D. Anggraeni, "Hubungan persepsi tentang kompetensi profesional guru matematika dengan motivasi belajar matematika pada siswa SMA," *J. Psikologia*, 2005, [Online]. Available: https://www.researchgate.net/profile/Filia-Anggraeni/publication/42362649_Hubungan_Persepsi_Tentang_Kompetensi_Profesional_Guru_Matematika_Dengan_Motivasi_Belajar_Matematika_Pada_Siswa_SMA/links/0c96051f375ea9dd6200000/Hubungan-Persepsi-Tentang-Kompeten
- [5] S. Suprihatiningsih, U. Katolik, S. Agustinus, T. Harmini, U. D. Gontor, and K. Kunci, "Volume : 9 Bulan : Februari Tahun : 2023 Mengelola Kecerdasan Emosional dalam Pembelajaran Matematika Volume : 9 Nomor : 1 Bulan : Februari Tahun : 2023," no. 2012, pp. 109–114, 2023, doi: 10.32884/ideas.v9i1.1152.
- [6] E. R. Ananda, R. R. Wandini, P. Guru, M. Ibtidaiyah, U. Islam, and N. Sumatera, "Analisis Kemampuan Literasi Matematika Siswa Ditinjau dari Self Efficacy Siswa," vol. 6, no. 5, pp. 5113–5126, 2022, doi: 10.31004/obsesi.v6i5.2659.
- [7] A. T. Prasasty, "Pengaruh disiplin dan motivasi belajar terhadap prestasi belajar matematika siswa kelas X SMK Bina Karya Insan Tangerang Selatan," *Util. J. Ilm. Pendidik. Dan Ekon.*, 2017, [Online]. Available: <http://journal.unuha.ac.id/index.php/utility/article/view/64>
- [8] T. P. Anggraini, N. Abbas, F. A. Oroh, and ..., "Pengaruh kecerdasan emosional dan motivasi belajar terhadap hasil belajar matematika siswa," *Jambura J.* ..., 2022, [Online]. Available: <https://ejurnal.ung.ac.id/index.php/jmathedu/article/view/11807>
- [9] F. Anggraini and I. Rafianti, "PENGARUH EMOTIONAL SPIRITUAL QUOTIENT (ESQ) TERHADAP KEMAMPUAN PEMECAHAN MASALAH MATEMATIS DAN MOTIVASI BELAJAR SISWA," vol. 1, no. 1, pp. 84–96, 2020.
- [10] A. Budiyan, R. Marlina, and K. E. Lestari, "Analisis Motivasi Belajar Siswa Terhadap Hasil Belajar Matematika," *Maju*, 2021, [Online]. Available: <https://www.neliti.com/publications/502080/analisis-motivasi-belajar-siswa-terhadap-hasil-belajar-matematika>
- [11] S. N. Hikmah and V. H. Saputra, "Korelasi Motivasi Belajar dan Pemahaman Matematis terhadap Hasil Belajar Matematika," ... J.

- Pendidik. Mat., 2023, [Online]. Available: <https://ejurnal.teknokrat.ac.id/index.php/jurnalmathema/article/view/2552>
- [12] S. Silfitriah and W. H. Mailili, "Pengaruh minat belajar dan motivasi belajar terhadap hasil belajar matematika siswa kelas VII SMP Negeri 4 Sigi," *Guru Tua J. Pendidik. dan Pembelajaran*, 2020.
- [13] M. Takdir, "Kepomath go 'penerapan konsep gamifikasi dalam pembelajaran matematika dalam meningkatkan motivasi belajar matematika siswa,'" *Penelit. Pendidik. Insa.*, 2017.
- [14] N. Irfan, "Hubungan motivasi belajar dan lingkungan belajar terhadap prestasi belajar matematika," *EKUIVALEN-Pendidikan Mat.*, 2018.
- [15] W. Maghfiroh, P. Mahanani, and N. Nihayati, "Pengaruh Kecerdasan Emosional terhadap Prestasi Belajar Siswa Kelas IV SD Selama Pembelajaran Daring," *J. Pembelajaran, Bimbingan, dan Pengelolaan Pendidik.*, vol. 1, no. 7, pp. 552–562, 2021, doi: 10.17977/um065v1i72021p552-562.
- [16] F. Hasan, S. W. D. Pomalato, and H. B. Uno, "Pengaruh pendekatan realistic mathematic education (RME) terhadap hasil belajar matematika ditinjau dari motivasi belajar," *Jambura J. ...*, 2020, [Online]. Available: <https://ejurnal.ung.ac.id/index.php/jmathedu/article/view/4547>
- [17] A. Fane and S. Sugito, "Pengaruh keterlibatan orang tua, perilaku guru, dan motivasi belajar terhadap prestasi belajar matematika siswa," *J. Ris. Pendidik. Mat.*, 2019, [Online]. Available: <https://journal.uny.ac.id/index.php/jrpm/article/view/15246>
- [18] S. Setyaningsih, "Hubungan Variasi Mengajar Guru dan Motivasi Belajar Siswa dengan Hasil Belajar Matematika," *Joyf. Learn. J.*, 2020, [Online]. Available: <https://journal.unnes.ac.id/sju/jlj/article/view/39313>
- [19] E. Novita and L. Hamimi, "Kognitif," vol. 4, no. July, pp. 695–711, 2024.
- [20] T. Taufik and N. Komar, "Hubungan self efficacy terhadap peningkatan motivasi belajar dan hasil belajar matematika siswa di sekolah," *Andragogi J. Pendidik. Islam dan ...*, 2021, [Online]. Available: <https://jurnalptiq.com/index.php/andragogi/article/view/220>
- [21] D. G. Kognitif, "Analisis kemampuan literasi matematika pada materi teorema pythagoras yang ditinjau dari gaya kognitif," vol. 1, no. April, pp. 1–11, 2024.
- [22] R. C. Hastari, "Penerapan Strategi Tutor Sebaya Dalam Meningkatkan Motivasi Belajar Matematika," *Abdimas J. Pengabd. Masy. ...*, 2019, [Online]. Available: <http://jurnal.unmer.ac.id/index.php/jpkm/article/view/2811>
- [23] M. A. Nur, "Pengaruh perhatian orang tua, konsep diri, persepsi tentang matematika terhadap hasil belajar matematika melalui motivasi belajar siswa kelas VIII SMP negeri di ...," *Mat. Dan Pembelajaran*, 2016, [Online]. Available: <http://jurnal.iainambon.ac.id/index.php/INT/article/view/288>
- [24] U. S. Supardi, "Pengaruh pembelajaran matematika realistik terhadap hasil belajar matematika ditinjau dari motivasi belajar," *J. Cakrawala Pendidik.*, 2012, [Online]. Available: <https://journal.uny.ac.id/index.php/cp/article/view/1560>
- [25] F. Prasetyo and D. Dasari, "Studi Literatur: Identifikasi Kecemasan Matematika dan Motivasi Belajar Terhadap Hasil Belajar Matematika Siswa," *RANGE J. Pendidik. Mat.*, 2023, [Online]. Available: <https://core.ac.uk/download/pdf/553287302.pdf>.