Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5, 2639-2646
2025
Publisher: Learning Gate
DOI: 10.55214/25768484.v9i5.7527

Content knowledge in mathematics with arts integrated learning: A study on high emotional intelligence

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Abstract: This study aims to describe the content knowledge of Elementary School Teacher Education students with High Emotional Intelligence (EI) in Mathematics learning the area of flat shapes integrated with art. This study used a descriptive explorative approach with qualitative methods. Data were collected through in-depth interviews, observations, and document analysis related to lesson plans and task completion. College students with high EI demonstrate strong content knowledge of flat shape areas integrated with art, as shown by five indicators: they can explain the area concept correctly, present clear and relevant methods with examples, simplify formula derivation, relate area concepts to art (music, dance, drama, visual art), and clearly explain problem-solving procedures in an art context. High EI content knowledge in art-integrated plane figure area learning is linked to Emotional Intelligence aspects, including management skills, empathy, problem-solving, emotional regulation, self-motivation, and self-awareness. The conclusion of this study shows that elementary school teacher education college students with high EI in Mathematics learning the area of flat shapes integrated with art have strong content knowledge.

Keywords: *Area of flat shapes, Content knowledge, High emotional intelligence, Integrated arts learning, Mathematics.*

1. Introduction

In Indonesia, learning mathematics plays a vital part in shaping the overall education framework [1]. Mathematics holds great importance in Indonesia, forming the basis for many scientific disciplines and helping learners build essential abilities like critical thinking, self-discipline, and precision [2]. In addition, developing strong mathematical skills often depends on having well-developed emotional intelligence [3, 4]. Being able to regulate emotions, remain calm under pressure, and collaborate well with others plays a key role in achieving success in learning mathematics [5]. Even so, the connection between strong math skills and elevated emotional intelligence still needs deeper exploration.

Emotional Intelligence (EI) has attracted significant attention from scholars, researchers, and professionals in the field of mental health [6]. Emotional Intelligence is key to a person's success, personal growth, and overall development [7]. Emotional Intelligence acts as a shield, helping to prevent mental health challenges like anxiety, depression, and stress [8]. As a result, it is considered an important contributor to mental well-being [9]. Emotional Intelligence is a blend of emotional and cognitive abilities that enable a person to adjust both socially and psychologically [10]. College students are a key driver of social progress, and those with resilient psychological traits are better equipped to navigate changes in their surroundings [11]. Therefore, Emotional Intelligence in college students is essential and warrants in-depth examination.

Emotional Intelligence involves recognizing, responding to, and managing emotional cues, even without fully understanding them, as well as the ability to grasp and control emotions without

History: Received: 7 March 2025; Revised: 28 April 2025; Accepted: 5 May 2025; Published: 24 May 2025
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completely experiencing or comprehending the feelings involved [12]. Emotional Intelligence is made up of four essential elements [13, 14]. The first component is emotional perception, which involves the ability to accurately identify, express, and differentiate between various emotions. The second is emotional assimilation, which focuses on processing emotions by directing attention to relevant emotional signals. The third is emotional understanding, which entails recognizing and labeling emotions through both words and personal experiences. Lastly, emotional management refers to the ability to stay receptive to both positive and negative emotions, engage or detach from them thoughtfully, and regulate emotions in relation to oneself and others [12].

A high level of Emotional Intelligence is associated with better psychological well-being [15]. Individuals with a high level of Emotional Intelligence are skilled at recognizing and understanding both their own emotions and those of others. They can navigate their emotional environment, improving their adaptability and communication, which helps them achieve their objectives in interactions [10]. Emotional Intelligence is regarded as one of the most important skills in professional settings [16]. Individuals with high Emotional Intelligence are self-aware, understand their own needs, acknowledge their strengths and weaknesses, regulate their emotions well, and cultivate meaningful relationships [17]. The results of the study indicate that Emotional Intelligence enhances learning motivation, with self-efficacy and social support serving as intermediary factors between EI and motivation to learn [9]. College students with elevated Emotional Intelligence are often more engaged and tend to achieve higher success [18]. Emotional Intelligence has become a well-established indicator of a person's abilities, knowledge, and skills across various areas, including the workplace, education, personal life, and overall success [19]. One area where this is evident is in Pedagogical Content Knowledge (PCK).

Pedagogical Content Knowledge (PCK) represents a unique type of understanding that educators use to promote effective learning in the classroom. Therefore, developing PCK is crucial for teachers and can begin as early as their college education [20]. PCK helps in understanding how teachers plan learning activities and convert their subject knowledge into formats and representations (such as analogies and illustrations) that are both meaningful and accessible to students, while being developmentally suitable. In this way, PCK connects knowledge about teaching and learning, forming a solid foundation for developing high-quality teaching expertise [21, 22]. One component of PCK is Content Knowledge (CK), which is crucial as it forms the foundation of the learning process. Teachers with a deep understanding of the subject matter can deliver information more clearly and accurately to students. Moreover, a solid grasp of the material enables teachers to answer student questions correctly, link related concepts, and foster a more meaningful and effective learning experience. Without strong CK, the learning process will be less effective and challenging to meet the intended educational outcomes. Teachers who possess strong CK and high EI can present lessons with greater empathy, recognize students' needs, and foster a learning atmosphere that promotes both academic and emotional growth. This is backed by an initial study conducted at Nahdlatul Ulama University of Surabaya.

A preliminary investigation carried out at Nahdlatul Ulama University Surabaya among students in the Elementary School Teacher Education program found that their understanding of the concept of the area of flat shapes was still quite limited. The area of a flat figure is a mathematical concept used to measure the amount of surface enclosed within the edges of a two-dimensional shape, which lacks thickness or depth [23]. Every kind of two-dimensional shape has a specific formula for finding its area, usually determined by its unique dimensions and properties [24, 25]. Previous research emphasizes the value of incorporating art within mathematics instruction [26]. This perspective is reinforced by insights from faculty members at Nahdlatul Ulama University Surabaya, who highlight the benefits of blending art into mathematics instruction—especially when teaching topics like the area of two-dimensional shapes. In light of this, the present study aims to explore the connection between mathematical content knowledge and the use of arts-integrated learning among students with high Emotional Intelligence.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 2639-2646, 2025
DOI: 10.55214/25768484.v9i5.7527

2. Research Method

2.1. Types and Samples of Research

The purpose of this study is to examine the content knowledge (CK) of college students in Elementary School Teacher Education programs who demonstrate high levels of emotional intelligence (EI). Employing a descriptive-exploratory design and qualitative methods, the research explores how these students deliver lessons on the area of flat shapes by integrating artistic elements. This method was selected because it enables the investigation to occur in a natural context, emphasizing the teaching process and presenting findings through narrative descriptions. The study subjects were seventh-semester PGSD students at Nahdlatul Ulama University Surabaya, who had completed courses related to mathematics and art. Students with high EI were selected based on their performance in a Mathematics Ability Test and an EI assessment.

2.2. Research Instruments

The study utilizes a Mathematics Ability Test to evaluate students' basic mathematical skills, requiring a minimum score above 75 to confirm proficiency, along with an Emotional Intelligence assessment grounded in established psychological tools. The Mathematics Ability Test consists of ten essay questions designed to evaluate students' grasp of the concept of flat shape areas. The Emotional Intelligence assessment, adapted from Indra Darmawan's *Kiat Jitu Taklukkan Psikotes*, evaluates students' EI levels. To gather detailed insights into their Pedagogical Content Knowledge (PCK), an interview guide was created, and the learning process was documented using audio-visual recording tools. Before the instruments were implemented, they underwent validation by three experts two professors and one doctoral-level academic specializing in Mathematics Education. This process ensured that the tools were appropriate for the study, aligned with the research goals, matched the test indicators, and used clear, accessible language. The validation outcomes confirmed that the instruments were both reliable and suitable for the research.

2.3. Data Analysis

Data were gathered through comprehensive interviews, observations, and the analysis of documents such as lesson plans and completed tasks. The data analysis followed a systematic process: first, categorizing the data according to the CK code (C1, C2, C3, C4, C5) on Table 1; second, eliminating irrelevant information; third, presenting the data in narrative and chart formats for easier interpretation; and finally, interpreting the data to identify patterns and relationships between the findings. Conclusions were drawn based on the analyzed data to describe the CK of Elementary School Teacher Education program college students with high EI in art-integrated learning.

Table 1.
CK Analysis Code.

Components	Code	Indicators of art integration in mathematics learning
Content Knowledge	C1	Explaining the concept of Area of Flat Shapes
	C2	Explaining how to determine the area of flat shapes by providing examples.
	C3	Explaining how to get the formula for flat shapes
	C4	Providing examples of the relationship between the concept of area and the concept of art (music, dance, drama or visual art)
	C5	Explaining the procedure for solving mathematical problems related to the area of flat shapes in the context of art

3. Results

Based on the results of the work that has been done by High EI, namely completing content knowledge tasks and interviews, a description of High EI content knowledge is obtained based on the results of completing tasks and interviews based on indicators C1, C2, C3, C4 and C5, which is described as follows:

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3.1. C1. Explaining The Concept of the Area of a Flat Shape

From the results of the analysis on indicator C1, High EI shows knowledge about the area of a flat shape as the number of square units of area used to cover the entire surface of the flat shape. High EI understands that area is a two-dimensional measure that covers the entire area covered by a geometric shape. The number of area units emphasizes that area is measured in small units that are added together to cover the entire area.

3.2. C2. Explaining How to Determine the Area of a Flat Shape by Providing an Example

High EI explains how to determine the area of a flat shape by providing an example of calculating the floor area by calculating the number of tiles that cover the entire floor area. The method presented by High EI is very relevant and easy to understand. This explanation shows that the area of a flat shape can be calculated by identifying and adding up the small units that cover the entire area.

3.3. C3. Explaining How to Get the Formula for Plane Figures

Proving the area of rectangles and triangles if the stages carried out by High EI in proving the KLM triangle formula are summarized in the following stages: (1). starting by stating that the KLM triangle has a base a and a height t, (2). Drawing a triangle and extending it into a rectangle by combining two identical triangles, (3). Explaining that the area of each triangle is half the area of the rectangle formed. This shows that the area of a triangle is half the area of a rectangle with the same base and height, (4). Mentioning that the area of the KLM triangle is half the area of a rectangle with a base a and a height t, and (5). Calculating that the area of the triangle is ½ x a x t. The answer given by high EI shows an understanding of how the area of a triangle can be related to the area of a rectangle.

3.4. C4. Providing Examples of the Relationship Between the Concept of Area and the Concept of Art (Music, Dance, Drama or Visual Art)

Based on the results of the analysis of the results of completing tasks and interviews, high EI links music art with mathematics learning, especially the concept of the area of flat shapes, by combining song lyrics and mathematical formulas. The example given is memorizing the formula for the area of flat shapes through songs so that it is easier for children to understand. For dance, High EI links dance art with the concept of the area of flat shapes through dance movements. High EI explains how movement patterns in dance can form flat shapes such as squares, with each step having a relationship with the concept of area. In drama, High EI links drama art with fine arts and the concept of the area of flat shapes through role-playing and art projects. He gives examples of how children can create art images of the roles played in the drama, such as building buildings from various types of flat shapes. Then, they are asked to calculate the area of the flat shape used in the project. Through art, subjects use pattern designs as visual representations of the concept of area, for example designs on carpets or floors that are used to calculate area. From this analysis, it can be seen that respondents have a good understanding of the relationship between art and mathematics through the concept of the area of flat shapes. This approach shows an effort to make mathematics learning more interesting and relevant for students through integration with other arts.

3.5. C5. Explaining the Procedure in Solving Mathematical Problems Related to the Area of Flat Shapes in the Context of Art

Based on the analysis results of 2 methods of completing tasks and interviews, High EI identified the area of two triangles, namely triangle x which has a base of 10 cm and a height of 6 cm, and triangle y which has a base of 8 cm and a height of 15 cm. HEI calculated the area of triangle x correctly using the formula Area = 1/2 × base × height so that the Area of triangle x = 1/2 × 10 × 6 = 30. Likewise, the calculation of the area of triangle y is done by the method Area of triangle y = 1/2 × 8 × 15 = 60. High EI explained the process by stating that 8 multiplied by 1/2 becomes 4, then 4 multiplied by 15 to get 60. The next step is to calculate the area of the canvas using the formula Area = length × width,

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 2639-2646, 2025
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with Area of canvas = 30 × 20 = 600. This calculation was done correctly by High EI. In the next procedure, the High EI subject determines the number of triangles needed to cover a canvas with a total area of 600. For triangle x (30), High EI estimates that using 6 triangles will produce a total area of 6×30=180. While for triangle y (60), the subject estimates that using 7 triangles will produce a total area of 7×60=420. Thus, the total area calculated is 180+420=600, which is numerically correct. However, although the calculation of the total area is correct, there is a logical error in the High EI subject's approach. The subject did not consider how the triangles would be arranged geometrically to cover the canvas without leaving gaps or overlapping inappropriately. In the Planning Stage, High EI used a numerical strategy to calculate the number of triangles needed based on the total area. However, at this stage, the subject does not consider the geometric appropriateness of the triangle layout. This shows that although numerical planning has been carried out, the geometric visualization aspect has not been integrated. In the Implementing the Plan stage, High EI successfully calculates the area accurately and determines the number of triangles based on the total area of the canvas. However, the execution of this plan is not entirely correct because there is no attempt to validate whether the triangle can actually cover the canvas physically. And the final stage of Re-checking high EI has re-checked the results obtained. Based on this analysis, it can be concluded that the subject has a good understanding in the mathematical calculation aspect, but requires further development in the geometric visualization and solution evaluation aspects.

High EI content knowledge on the area of flat shapes is evident from task completion analysis and interviews, based on indicators C1 to C5. C1 defines the area of a flat shape as the total number of square units needed to cover its surface. C2 demonstrates examples, such as calculating the number of tiles to cover a floor, illustrating the relationship between length, width, and area, and proving area formulas through geometric transformations. C4 integrates art, including music (mathematical formulas in lyrics), dance (creating flat shapes with movements), drama (linking art projects to drama roles), and visual art (projects like wall hangings and tile collages). C5 involves understanding the problem (e.g., designating dimensions, area, and canvas coverage), planning a numerical approach, and verifying the solution. High EI subjects not only grasp the theoretical concept of area but also connect it with art and practical problem-solving, highlighting the link between content knowledge and high EI.

The relationship between high EI Content Knowledge and high EI for relationship management skills, igh EI links abstract concepts, like the area of a plane figure, with the arts (music, dance, drama, visual arts), demonstrating empathy for how others learn. This interdisciplinary approach helps individuals grasp concepts creatively. Empathy and Social Awareness, through examples like drama simulations or dance floor patterns, high EI shows understanding of diverse learning styles, using art to teach abstract concepts, such as flat shapes, while empathizing with students' needs. Problem Solving and Emotional Regulation, high EI presents systematic solutions to problems (e.g., fabric calculations) and maintains emotional self-control while solving complex tasks. Self motivation, high EI makes abstract concepts more accessible by applying them in practical and artistic contexts. Self-awareness, high EI used visual and symbolic approaches to explain concepts, demonstrating an awareness of teaching strengths and weaknesses, and adapting strategies to meet diverse learning needs.

4. Discussion

Based on the results of the study, college students with high EI have strong content knowledge about the area of flat shapes integrated with art. This is evidenced by 5 indicators of CK, namely high EI can explain the concept of area of a plane figure correctly, the method conveyed by high EI to explain how to determine the area of a plane figure by providing examples is very relevant and easy to understand, high EI can explain how to get the formula for a plane figure more easily, high EI can provide examples of the relationship between the concept of area and the concept of art (music, dance, drama or visual art) clearly, high EI can explain the procedure in solving mathematical problems related to the area of a plane figure with an art context clearly. In addition, the content knowledge in high EI in learning the area of flat shapes integrated with art is related to aspects of EI which include management

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 2639-2646, 2025
DOI: 10.55214/25768484.v9i5.7527

skills, empathy and social awareness, problem solving and emotional regulation, self motivation, and self-awareness. The results of this study are in line with previous research that management skills among Kindergarten Teachers as related to EI and Self-Efficacy [27] empathy and social awareness [28] problem solving [29] and emotional regulation [30] self motivation [31] self-awareness [32]. This shows that EI is an important psychological aspect that a teacher must have. Teachers need high Emotional Intelligence (EI) to fully grasp their content knowledge (CK). EI is crucial for educators as it enables them to identify, comprehend, and regulate both their own emotions and those of others [33]. Emotional Intelligence allows educators to foster a supportive learning atmosphere, establish empathetic connections with students, and enhance their motivation to learn [9, 19]. Furthermore, Emotional Intelligence aids teachers in managing stress, resolving conflicts, and adjusting to diverse student personalities. Educators with high EI are also able to inspire, motivate, and guide students effectively, fostering an environment that nurtures both their academic and emotional growth [34].

The findings of this study suggest that integrating art into the learning process enhances content knowledge. By incorporating artistic elements like visual arts, music, or drama into their teaching approaches, educators can deepen students' comprehension of the subject matter [21]. The arts provide teachers with the chance to introduce learning concepts in more innovative and diverse ways, enhancing the student experience while also deepening teachers' understanding of the material they deliver [35]. Incorporating the arts in education enables teachers to explore engaging, multisensory teaching methods, which can enhance their mastery of the subject matter. Additionally, blending the arts into instruction broadens teachers' perspectives on presenting content, helping them explain complex ideas more effectively and in a more captivating way [36]. Moreover, integrating the arts into teaching offers teachers opportunities for professional development, encouraging them to innovate and adjust their teaching strategies to better address the diverse needs of their students [21, 37]. Therefore, this study demonstrates that the arts not only benefit students but also play a crucial role in enhancing teachers' content knowledge and supporting a more effective and well-rounded teaching process. The limitations of this study are that it only involved students (prospective teachers) with HEI and also only 1 material, namely the area of flat shapes. In addition, it is also limited to only one aspect of PCK. The findings of this study suggest that elementary school teacher education students with high EI are better equipped to effectively explain the CK related to the area of flat shapes.

5. Conclusions

College students with high EI have strong content knowledge about flat shapes integrated with art, demonstrated through five indicators: they can explain the area concept correctly, provide relevant and easy-to-understand methods for determining area, simplify the formula derivation, clearly relate the area concept to art (music, dance, drama, visual art), and clearly explain problem-solving procedures for area in an art context. High EI content knowledge in art-integrated plane figure area learning is associated with aspects of EI which include management skills, empathy and social awareness, problem solving and emotional regulation, self-motivation, and self-awareness. The recommendation based on the results of this study is that further research is needed on EI levels (high, medium, and low) and also on other materials.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
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References

[1] M. Hayati and M. Jannah, "The importance of mathematical literacy skills in mathematics learning," *Griya Journal of Mathematics Education and Application*, vol. 4, no. 1, pp. 40-54, 2024.

[2] F. K. Ulfa, "Students' mathematical connection and critical thinking abilities in mathematics learning through the brain-based learning model," *Jurnal Pendidikan Matematika*, vol. 6, no. 2, pp. 106-116, 2020. https://doi.org/10.33474/jpm.v6i2.5537

[3] F. F. Rohmah and J. Soebagyo, "Investigation of students' reasoning ability in solving junior high school mathematics problems reviewed from emotional intelligence," *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, vol. 5, no. 2, pp. 149-158, 2022. https://doi.org/10.30605/proximal.v5i2.1854

[4] A. Muhtadi, S. Kaliky, J. Hukom, and D. Samal, "A meta-analysis: Emotional intelligence and its effect on mathematics achievement," *International Journal of Instruction*, vol. 15, no. 4, pp. 745-762, 2022. https://doi.org/10.29333/iji.2022.15440a

[5] I. N. Amelia, H. Patmawati, and S. V. Dewi, "The relationship between emotional intelligence and students' mathematical literacy abilities," *Indiktika: Jurnal Inovasi Pendidikan Matematika*, vol. 7, no. 1, pp. 274-282, 2024. https://doi.org/10.31851/indiktika.v7i1.15577

[6] H. Antonopoulou, "The value of emotional intelligence: Self-awareness, self-regulation, motivation, and empathy as key components," *Technium Education and Humanities*, vol. 8, pp. 78-92, 2024.

[7] M. Fteiha and N. Awwad, "Emotional intelligence and its relationship with stress coping style," *Health Psychology Open*, vol. 7, no. 2, p. 2055102920970416, 2020. https://doi.org/10.1177/2055102920970416

[8] R. W. Moeller, M. Seehuus, and V. Peisch, "Emotional intelligence, belongingness, and mental health in college students," *Frontiers in Psychology*, vol. 11, p. 499794, 2020. https://doi.org/10.3389/fpsyg.2020.00093

[9] Y. Tang and W. He, "Relationship between emotional intelligence and learning motivation among college students during the COVID-19 pandemic: A serial mediation model," *Frontiers in Psychology*, vol. 14, p. 1109569, 2023. https://doi.org/10.3389/fpsyg.2023.1109569

[10] T. B. Norboevich, "Analysis of psychological theory of emotional intelligence," *European Journal of Research and Reflection in Educational Sciences*, vol. 8, no. 3, pp. 99-104, 2020.

[11] K. Wang, Y. Yang, T. Zhang, Y. Ouyang, B. Liu, and J. Luo, "The relationship between physical activity and emotional intelligence in college students: The mediating role of self-efficacy," *Frontiers in psychology*, vol. 11, p. 967, 2020. https://doi.org/10.3389/fpsyg.2020.00967

[12] C. Prentice, S. Dominique Lopes, and X. Wang, "Emotional intelligence or artificial intelligence–an employee perspective," *Journal of Hospitality Marketing & Management*, vol. 29, no. 4, pp. 377-403, 2020. https://doi.org/10.1080/19368623.2019.1647124

[13] J. D. Mayer, D. R. Caruso, G. Sitarenios, and M. R. Escobar, "How many emotional intelligence abilities are there? An examination of four measures of emotional intelligence," *Personality and Individual Differences*, vol. 219, p. 112468, 2024. https://doi.org/10.1016/j.paid.2023.112468

[14] L. M. Bru-Luna, M. Martí-Vilar, C. Merino-Soto, and J. L. Cervera-Santiago, "Emotional intelligence measures: A systematic review," *Healthcare (Switzerland)*, vol. 9, no. 12, 2021. https://doi.org/10.3390/healthcare9121696

[15] R. Trigueros, A. M. Padilla, J. M. Aguilar-Parra, P. Rocamora, M. J. Morales-Gázquez, and R. López-Liria, "The influence of emotional intelligence on resilience, test anxiety, academic stress and the Mediterranean diet. A study with university students," *International Journal of Environmental Research and Public Health*, vol. 17, no. 6, p. 2071, 2020. https://doi.org/10.3390/ijerph17062071

[16] L. Karimi, S. G. Leggat, T. Bartram, L. Afshari, S. Sarkeshik, and T. Verulava, "Emotional intelligence: Predictor of employees' wellbeing, quality of patient care, and psychological empowerment," *BMC Psychology*, vol. 9, no. 1, p. 93, 2021. https://doi.org/10.1186/s40359-021-00593-8

[17] A. Ö. Topaloğlu, "The study of college students' emotional intelligence qualities," *Procedia-Social and Behavioral Sciences*, vol. 152, pp. 1274-1281, 2014. https://doi.org/10.1016/j.sbspro.2014.09.361

[18] K. C. Zhoc, R. B. King, T. S. Chung, and J. Chen, "Emotionally intelligent students are more engaged and successful: examining the role of emotional intelligence in higher education," *European Journal of Psychology of Education*, vol. 35, no. 4, pp. 839-863, 2020. https://doi.org/10.1007/s10212-019-00458-0

[19] R. Kant, "Emotional intelligence: A study on university students," *Journal of Education and Learning (EduLearn)*, vol. 13, no. 4, pp. 441-446, 2019. https://doi.org/10.11591/edulearn.v13i4.13592

[20] S. Sutamrin, R. Rosidah, and A. Zaki, "The pedagogical content knowledge (PCK) of prospective teachers," *EduLine: Journal of Education and Learning Innovation*, vol. 2, no. 4, pp. 399-405, 2022. https://doi.org/10.35877/454ri.eduline1291

[21] S. K. Leung, J. Wu, and T. H. Ho, "Early childhood visual arts education: Teachers' content knowledge, pedagogical content knowledge, and challenges," *The Asia-Pacific Education Researcher*, vol. 34, no. 1, pp. 351-363, 2025. https://doi.org/10.1007/s40299-024-00859-w

[22] N. Supriatna, M. Mutiani, E. W. Abbas, T. P. W. Rini, and B. Subiyakto, "Technological, pedagogical, content knowledge (TPACK): A discursions in learning innovation on social studies," *The Innovation of Social Studies Journal*, vol. 2, no. 2, pp. 135-142, 2021.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 2639-2646, 2025
DOI: 10.55214/25768484.v9i5.7527

[23] N. L. P. J. Dewi and I. W. Sujana, "Learning multimedia based on rpg maker mv material for circumference and area of flat shapes for elementary school students," *Journal of Education Technology*, vol. 5, no. 3, pp. 365-374, 2021. https://doi.org/10.23887/jet.v5

[24] D. D. B. Istika and R. Rusnilawati, "Problem based learning model assisted by wordwall can improve mathematics learning outcomes of grade iv elementary schools on the material of perimeter and area of flat shapes," *Jurnal Review Pendidikan dan Pengajaran*, vol. 7, no. 4, pp. 12658-12663, 2024. https://doi.org/10.31004/jrpp.v7i4.34183

[25] Y. Arni, A. O. Andira, G. Nabilla, and M. Mursiani, "Improving student learning outcomes in determining the area and perimeter of flat shapes through the use of drill method," *Continuous Education: Journal of Science and Research*, vol. 5, no. 1, pp. 62-71, 2024. https://doi.org/10.51178/ce.v5i1.1788

[26] I. Nurhikmayati, "Implementation of STEAM in mathematics learning," *Jurnal Didactical Mathematics*, vol. 1, no. 2, pp. 41-50, 2019. https://doi.org/10.31949/dmj.v1i2.1508

[27] Q. Agbaria, "Classroom management skills among kindergarten teachers as related to emotional intelligence and self-efficacy," *International Journal of Instruction*, vol. 14, no. 1, pp. 1019-1034, 2021. https://doi.org/10.29333/IJI.2021.14160A

[28] F. Ioannidou and V. Konstantikaki, "Empathy and emotional intelligence: What is it really about?," *International Journal of Caring Sciences*, vol. 1, no. 3, p. 118, 2008.

[29] S. Deniz, "The relationship between emotional intelligence and problem solving skills in prospective teachers," *Educational Research and Reviews*, vol. 8, no. 24, p. 2339, 2013. https://doi.org/10.5897/ERR2013.1584

[30] A. Peña-Sarrionandia, M. Mikolajczak, and J. J. Gross, "Integrating emotion regulation and emotional intelligence traditions: A meta-analysis," *Frontiers in Psychology*, vol. 6, p. 160, 2015. https://doi.org/10.3389/fpsyg.2015.00160

[31] N. Amador-Licona, J. M. G. Mendoza, I. B. Martínez, B. A. R. Bogarín, and L. M. V. Elizarrarás, "Emotional intelligence and academic motivation in high school students with an adequate academic average," *Nova Scientia*, vol. 12, no. 24, 2020. https://doi.org/10.21640/ns.v12i24.2251

[32] V. K. Bratton, N. G. Dodd, and F. W. Brown, "The impact of emotional intelligence on accuracy of self-awareness and leadership performance," *Leadership & Organization Development Journal*, vol. 32, no. 2, pp. 127-149, 2011. https://doi.org/10.1108/01437731111112971

[33] M. Hen and A. Sharabi-Nov, "Teaching the teachers: Emotional intelligence training for teachers," *Teaching Education*, vol. 25, no. 4, pp. 375-390, 2014. https://doi.org/10.1080/10476210.2014.908838

[34] H. Krishnan and S. R. Awang, "Role of emotional intelligence in teaching," *Jurnal Kemanusiaan*, vol. 18, no. 1, pp. 87–92, 2020. https://doi.org/10.22452/jk.vol18no1.8

[35] J. Russell and M. Zembylas, "Arts integration in the curriculum: A review of research and implications for teaching and learning," *International Handbook of Research in Arts Education*, pp. 287-312, 2007.

[36] J. Lilliedahl, "Building knowledge through arts integration," *Pedagogies: An International Journal*, vol. 13, no. 2, pp. 133-145, 2018. https://doi.org/10.1080/1554480X.2018.1454320

[37] Y. Nompula, "An investigation of strategies for integrated learning experiences and instruction in the teaching of creative art subjects," *South African Journal of Education*, vol. 32, no. 3, pp. 293-306, 2012.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 2639-2646, 2025
DOI: 10.55214/25768484.v9i5.7527