UNIVERSITAS
KRISTEN
MARANATHA

JL. Prof. drg. Surya Sumantri, M.P.H. No.65
Bandung - 40164, Jawa Barat, Indonesia
Phone: +62 22 201 2186 / 200 3450 | Ext. 1642
Fax: +62 22 200 5916
Email: interior.creahum@maranatha.edu
Website: www.maranatha.edu

Fakultas Humaniora dan Industri Kreatif
Program Sarjana Desain Interior

S U R A T T U G A S

Nomor : 05/Srt.Tgs/DI/FHIK/VI/2024

Yang bertanda tangan di bawah ini, Ketua Program Sarjana Desain Interior Fakultas Humaniora dan Industri Kreatif, Universitas Kristen Maranatha, menugasi :

- Nama : Dr. Erwin Ardianto Halim, S.Sn., MFA.
- Jabatan : Dosen Biasa Progdi. Desain Interior
- NIK : 630039
- Alamat : Jl Suria Sumantri No. 65 Bandung

Sebagai Penulis Pertama artikel terindex scopus Q2 (SRJ 0,133) - berjudul "Investigation of Mathematical Ideas on Drawing Ramakien and Ramayana by Thai and Indonesian Students" - Jurnal The International Journal of Design Education Vol.18, no.2, 2024.

Bandung, 1 Juni 2024

Dekan Fakultas Humaniora dan Industri Kreatif
Universitas Kristen Maranatha

Dr. Krismanto Kusbiantoro, S.T., M.T.

Kepala Program Sarjana Desain Interior
Fakultas Humaniora dan Industri Kreatif
Universitas Kristen Maranatha

Elliati Djakaria S., Dipl.Ing., M.Min.

Visi

"Menjadi Program Sudi Desain Interior berwawasan global yang modern, universal, dan dinamis pada tahun 2034 dengan berlandaskan pada budaya bangsa serta nilai-nilai hidup Kristiani".

Misi

1) **Menyelenggarakan pendidikan di dalam bidang Interior Desain, budaya, dan *creativepreneurship* dengan integritas baik secara karakter dan keilmuan**
2) **Mengembangkan keprimaan di dalam keilmuan desain khususnya Desain Interior dan penerapannya melalui kegiatan penelitian**
3) **Memperhatikan kebutuhan masyarakat akan nilai tambah di bidang desain, khususnya desain interior melalui berbagai program pengabdian yang menerapkan penelitian**

The International Journal of Design Education, Volume 18, Issue 2

Title: The International Journal of Design Education, Volume 18, Issue 2
Publisher: Common Ground Research Networks
Collection: Common Ground Research Networks
Series: Design Principles & Practices
Journal Title: The International Journal of Design Education
Volume: 18
Issue: 2
Date: December 30, 2024
ISSN: 2325-128X (Print)
ISSN: 2325-1298 (Online)
DOI: https://doi.org/10.18848/2325-128X/CGP/v18i02

Common Ground Journals and Books

Subscribe

Search Works ...

SERIES (28)

- Common Ground Books
- Common Ground Open
- The Arts in Society
- Information, Medium & Society
- Climate Change: Impacts an...
- Diversity in Organizations, C...
- Global Studies
- Spaces & Flows
- Design Principles & Practices
- New Directions in the Huma...
- Interdisciplinary Social Scie...
- Aging & Social Change
- Tourism and Leisure Studies
- The Learner
- Organization Studies
- Religion in Society
- Food Studies
- Communication and Media ...
- e-Learning and Innovative P...
- Sport & Society
- On Sustainability
- Technology, Knowledge & S...
- World Universities Forum
- The Constructed Environment
- Health, Wellness & Society
- The Image
- Science in Society
- The Inclusive Museum

View All

A Transdisciplinary Approach to Sustainable Architecture

Isra'a Fardous

Facing a VUCA World

Ernesto Pacheco Velazquez

Interpreting the Benefits and the Challenges of Utilizing Computer Animation Techniques in Higher Education

Nahla M. Moussa, Shlagha Agarwal

Spatial Identity Creation Using Inquiry-Based Learning for Design Students

Preechaya Krukaset, Natthaphon Anusornthorangkul, Yanin Rugwongwan

Mapping Design Education

Priyanka Sewhag Joshi, Vijai Singh Katiyar

Effects of Odia Handwriting Education on Children's Letterform Comprehension

Arnav Kumar Tripathy, Subir Dey

Investigation of Mathematical Ideas on Drawing Ramakien and Ramayana by Thai and Indonesian Students

Erwin Ardianto Halim, Monica Hartanti, Elizabeth Wianto, Christine Claudia Lukman, Eakachat Joneurairatana

The International Journal of Design Education
ISSN: 2325-129X (Print), ISSN: 2325-1298 (Online)
Volume 18, Issue 2, 2024
https://doi.org/10.18848/2325-128X/CGP/v18i02/149-166

Original Research

Investigation of Mathematical Ideas on Drawing Ramakien and Ramayana by Thai and Indonesian Students

Erwin Ardianto Halim, Universitas Kristen Maranatha, Indonesia
Monica Hartanti, Universitas Kristen Maranatha, Indonesia
Elizabeth Wianto, Universitas Kristen Maranatha, Indonesia
Christine Claudia Lukman, Universitas Kristen Maranatha, Indonesia
Eakachat Joneurairatana, Silpakorn University, Thailand

Received: 01/13/2024; ***Accepted:*** 04/05/2024; ***Published:*** 06/28/2024

Abstract: The concept of mathematics and geometric patterns typically evolves organically from a society's culture. When mathematical geometry is combined with culture, it can contribute significantly to both formal and non-formal education. The purpose of this research is to highlight the relationship between mathematics and culture, namely through pictures based around the Ramakien and Ramayana legends created by design students in Thailand and Indonesia. The investigators use a qualitative approach with ethnomathematics as the methodology in this study. Individuals directly participating in the research process, gathering data through literature reviews, observations, and documentation, served as the instruments in this study. The technique entails evaluating Ramakien and Ramayana images generated by Thai and Indonesian students. The results of this research show the mathematical activities and geometric patterns found in the illustrations created by students from both countries. According to the results, there is a link between mathematics and culture that is rooted in the creative process, the artists' practices, educational backgrounds, and cultural influences, all of which deliberately contribute to the emergence of new characters inside these images.

Keywords: *Ethnomathematics, Creative Process, Drawing, Thailand, Indonesia, Sacred Geometry*

Introduction

Culture and mathematics are inseparable (Ditasona 2018). According to D'Ambrosio (1985), ethnomathematics is an approach that evaluates the function of mathematics in culture with the goal to contribute to the understanding of each and their relationship. Ethnomathematics is a method of incorporating mathematical ideas and concepts into certain cultural groups' cultures (Budiarto, Artiono, and Setianingsih 2019). The objects of study in ethnomathematics include communal activities, historical artifacts, and cultural products of a civilization that contains mathematical notions (Nisa and Rofiki 2022).

Ethnomathematics attempts to explore the relationship between mathematics and culture, helping artists and designers to better understand mathematics. This understanding

is necessary for producing works that are more meaningful in their cultural context (Arisetyawan et al. 2014). According to Milton and Orey (2013), ethnomathematics is a learning paradigm that aims to raise knowledge of how students might learn more effectively. The investigation in this study focuses on the knowledge of students from different cultures in effectively combining ethnomathematics into their artistic creations through drawing.

Previous research on ethnomathematics as an approach for teaching mathematics has been extensively addressed, as seen in the publication "Students' Metacognition on Mathematical Problem Solving through Ethnomathematics in Rjang Lebong, Indonesia" by Herawaty et al. (2018). According to the study, the students are aware of ethnomathematics found in traditional Indonesian homes, which resulted in the discovery of geometric notions that provide mathematical insights into surface area, pyramid volume, rectangular prism, and cube.

Another journal investigated the geometric transformation concepts in Besurek Bengkulu fabric, indicating that geometric transformation elements such as reflection, translation, rotation, and dilation exist in the fabric. As a result, teachers may utilize Besurek Bengkulu cloth as a teaching aid in math classes. An article titled "Ethnomathematics in Perspective of Sundanese Culture" (Abdullah 2017), which used ethnomathematics as a research foundation, discovered that the Sundanese community commonly uses symbolic mathematical calculations in daily life to measure dimensions such as base, length, width, area, height, weight, classification, and time. They also utilize these calculations to forecast certain natural occurrences.

According to the summary of previous studies shown above, culture and mathematics have a strong connection that is automatically integrated into social life and the process of creating cultural products in the form of habits and artifacts. Despite numerous studies investigating ethnomathematics as a research method, no specific research has been conducted that specifically investigates ethnomathematics in the drawings of students undergoing formal education from two different national backgrounds, teaching methods, and cultures, namely Thailand and Indonesia.

Methodology

Gerring (2017) defines this type of study as a descriptive qualitative study with a research object. The four drawings from the informants are analyzed using ethnomathematics. The study focuses on four informants who are formal design education students with diverse socioeconomic and cultural origins. This diversity of backgrounds helps to create new and unique artworks. With the research object in place, the researcher conducts an ethnomathematics study using the four informants' drawings, showing mathematical notions that determine the characters in the created works. The following stages are taken throughout the data collection process:

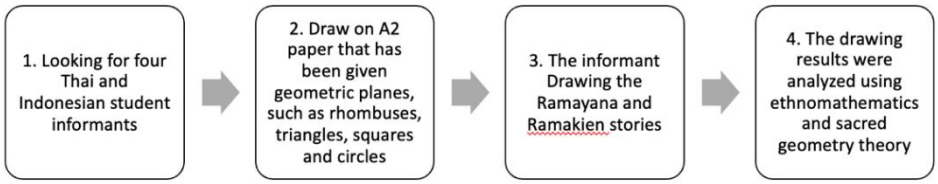


Figure 1: Data Collection Flowchart
Source: Halim et al.

The following shows how the data retrieval process was carried out in this study, as explained in the data collection flowchart. The data was collected live in Thailand and Indonesia, providing authentic evidence for this study.

Figure 2: The Process of Collecting Data—Indonesian Students
Source: Halim et al.

Figure 3: The Process of Collecting Data—Thai Students
Source: Halim et al.

Result and Discussion

Ethno-mathematics

D'Ambrosio, a Brazilian mathematician, pioneered ethnomathematics in 1985. According to D'Ambrosio (2001), ethnomathematics is defined as follows:

> Today, the prefix "ethno" is widely accepted as a broad term that incorporates the social-cultural background, encompassing language, jargon, behavioral standards,

> myths, and symbols. The origin of the word "mathema" is obscure, although it often refers to explaining, knowing, understanding, and engaging in activities such as ciphering, measuring, classifying, inferring, and modeling. The suffix "tics" is derived from the word "techné" and has the same root as the word "technique."

Ethnomathematics attempts to discover that different ways of engaging with mathematics are tied to culture, and that mathematical practices are negotiated within a group and cultural framework (Zayyadi 2018). Ethnomathematics is the consequence of evolving societal activities, and it includes mathematical notions related to traditional themes, communal settlements, temples, and inscriptions. In essence, it is the result of activities involving mathematical concepts carried out by a tribe or community, often without the community's knowledge (Supiyati and Hanum 2019).

D'Ambrosio (1985) defines ethnomathematics as the recognition of the relationship between mathematics and culture, highlighting the fact that mathematics may be used in a variety of ways. Ethnomathematics is defined as the cultural anthropology of mathematics and mathematics education, rather than just ethnicity (Arwanto 2017). Ethnomathematics is inextricably linked to local culture and can be seen in cultural goods such as student drawings (Supiyati and Hanum 2019).

Thus, ethnomathematics attempts to analyze mathematical values in this study. Upon deeper inspection, it is discovered that various mathematical notions, including concepts related to spatial structures and transformation geometry (reflection, rotation, and mirroring), are embedded in the drawings of Thai and Indonesian students. These mathematical notions are not only visible in the ornaments and characters shown, but they are also evident in the drawing process. Students from Thailand and Indonesia have unconsciously incorporated mathematical values into their artwork.

Geometric shapes that are two-dimensional in nature appear in various ways, two of which are in the application of origami, which is known as an art from Japan and is a bridge in understanding elementary-level mathematics education (Hibi 2022). Understanding mathematical calculations with algorithms that are difficult to understand can be facilitated through the depiction of two-dimensional fields (Hibi 2021), so it is not strange if mathematics has a cultural foundation that is implemented through two-dimensional drawings.

Mathematical Concepts

Skemp (2012) describes a concept as an abstract idea used to classify and group a set of items. In this study, mathematical concepts are developed from a variety of experiences commonly shared by design students. The illustrations in this study are used to illustrate mathematical concepts, particularly those concerning geometry. This makes abstract mathematical concepts like straight lines, parallel lines, symmetry, points, rectangles, triangles, circles, and rhombuses easier to understand. The data analysis that follows expands on these concepts:

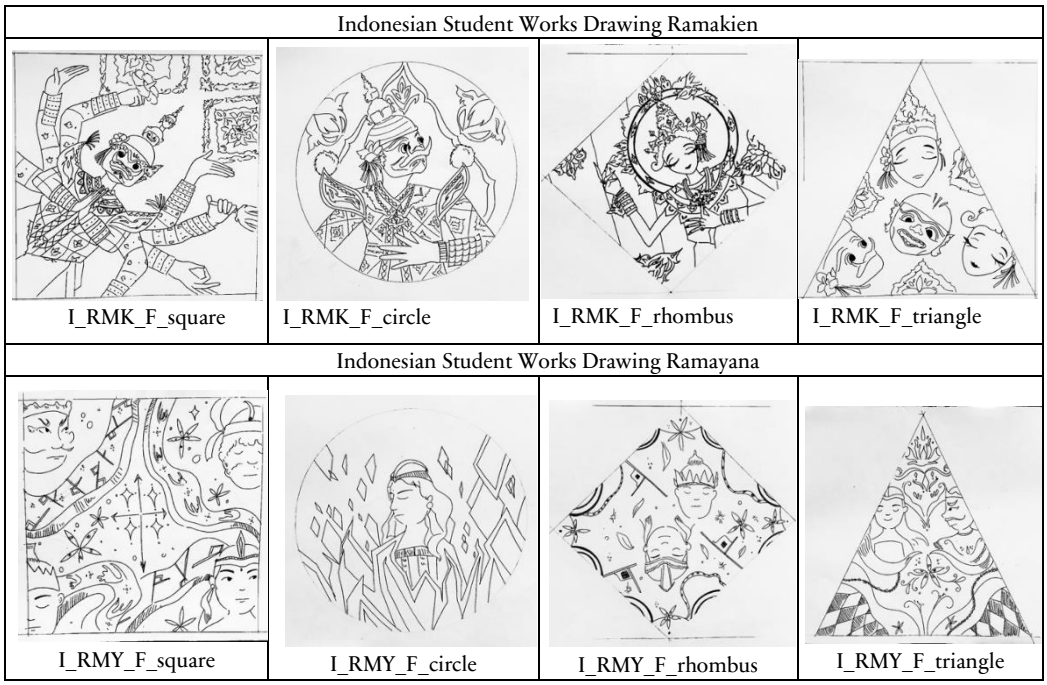


Figure 4: Final Work of Indonesian Students Drawing Ramakien and Ramayana
Source: Halim et al.

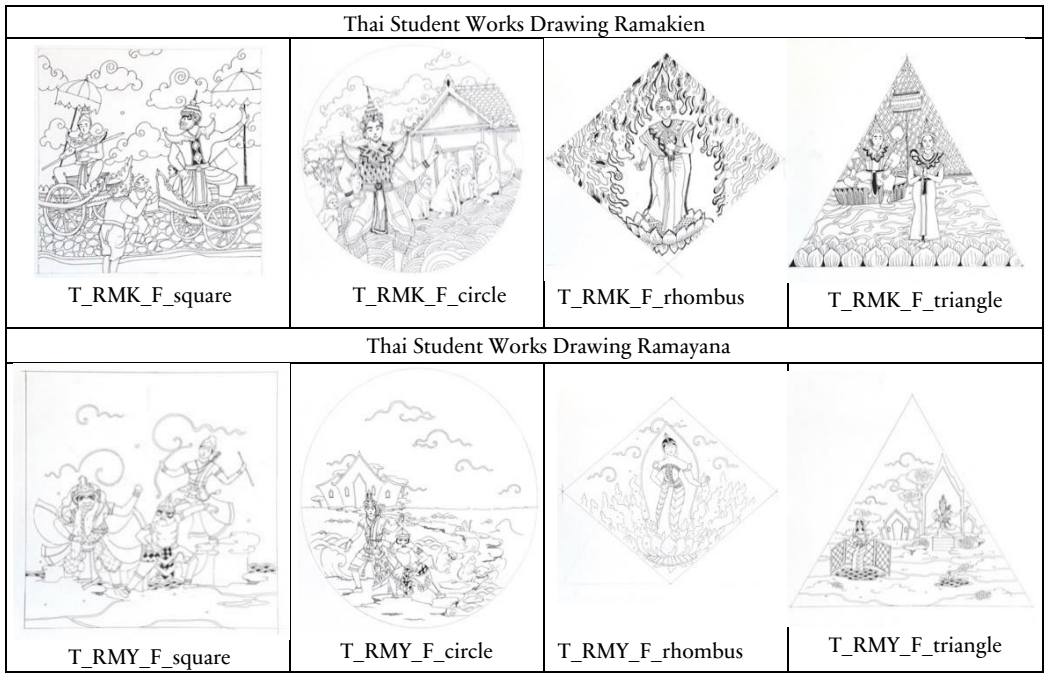


Figure 5: Thai Student Final Work Drawing Ramakien and Ramayana
Source: Halim et al.

The data shown above are the final projects of four students for this study, all of whom have formal education backgrounds but come from diverse nations and cultures. Individual features and drawing styles of pupils from both countries can be seen in their final pieces. This information will be evaluated using Ethnomathematics, with a focus on recognizing basic geometric shapes, as detailed below. The study of basic geometric shapes will be used as a reference for examining the students' work. The fundamental shapes are as follows:

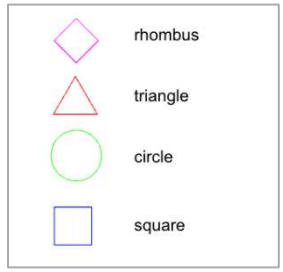
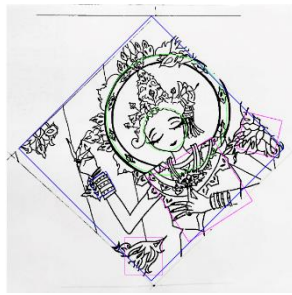
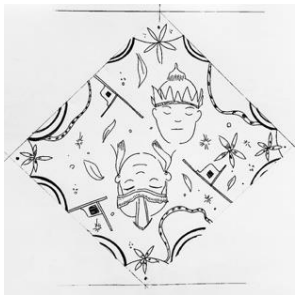
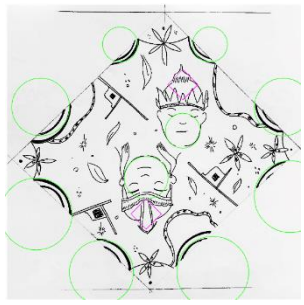


Figure 6: Basic Geometric Shapes
Source: Halim et al.

In this research, the final works of the students will be analyzed based on the categories of drawing styles provided earlier. These categories include:

Table 1: Rhombus-shaped Media

Final Work–Rhombus	*Analysis*	*Findings*
		Basic geometric shapes such as triangles, circles, and rotated squares resembling rhombuses were identified in the artwork. These shapes dominate the drawings, which have a flat quality. The basic geometric shapes are fragmented, following the composition chosen by the students who created them.
		In this image, basic geometric shapes include circles and rhombuses, with circles being the most frequently encountered and repeated shape. The drawing has a flat and overlapping nature, featuring numerous ornaments and figures that are cut based on the composition.

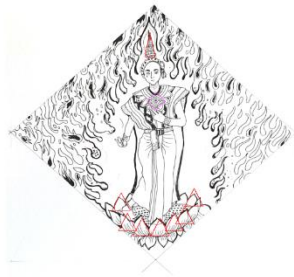
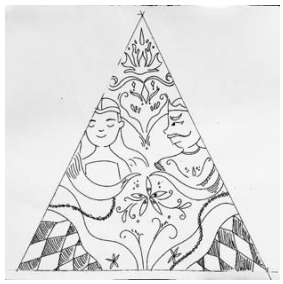
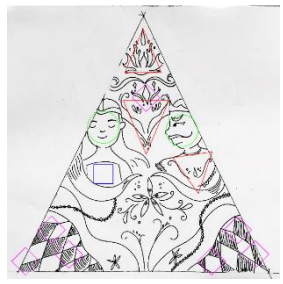
Final Work–Rhombus	*Analysis*	*Findings*
		The basic geometric shape in this student's drawing is the isosceles triangle, showcasing a full-body character shaped like a triangle and depicting repeated instances of the triangle shape.
		There are three basic geometric shapes present: triangles, large rhombi in the depicted character, and circular shapes in the basic ornament of clouds.

Table 2: Triangular-shaped Media

Final Work–Triangular	*Analysis*	*Findings*
		The basic geometric shapes found in this drawing are rhombi, large triangles, and squares, with repeated instances of the square shape. The image demonstrates the use of a repetition system.
		In the analysis of this image, basic geometric shapes include isosceles triangles depicted both upside down and right side up, as well as rhombi resembling trays that form new patterns and ornaments. The drawing is symmetrical.

Final Work–Triangular	*Analysis*	*Findings*
		The isosceles triangle serves as the basic geometric shape in this student's drawing. It portrays a full-body character shaped like a triangle and repeats the triangular form throughout the image.
		There are four basic geometric shapes in the form of equilateral triangles, isosceles triangles, rectangles, and intersected circles used to create ornaments in the drawing. The use of this two-layer system adds a story telling effects to the image.

Table 3: Circle-shaped Media

Final Work–Circle	*Analysis*	*Findings*
		The basic geometric shapes found in this drawing are rhombi, large triangles, and squares, with repeated instances of the square shape.
		In the analysis of this image, basic geometric shapes include isosceles triangles depicted both upside down and right side up, as well as rhombi resembling trays that form new patterns and ornaments.

Final Work–Circle	*Analysis*	*Findings*
		The isosceles triangle serves as the basic geometric shape in this student's drawing. It features a full-body character shaped like a triangle, depicting the repeated use of the triangle form to create the setting in the image.
		There are four basic geometric shapes in the form of equilateral triangles, isosceles triangles, rectangles, and intersected circles used to create ornaments in the drawing. For example, crescent shapes are used to form cloud ornaments and wave ornaments.

Table 4: Square-shaped Media

Final Work–Square	*Analysis*	*Findings*
		The drawing is created with symmetric representation and features two basic geometric shapes: squares and isosceles triangles. The uniqueness of this image is observed in the way the student draws diagonally, transforming the squares into rhombus.
		In the analysis of this image, basic geometric shapes include triangles, rhombi, and circles. The circular shapes are found in the figures depicting the faces of the characters. The symmetric representation divides the space evenly both vertically and horizontally.

Final Work–Square	*Analysis*	*Findings*
		The basic geometric shapes in this student's drawing are circles and squares, featuring full-body characters. The use of an overlay system is centered within the square shape.
		The dominant shape in this image is the circle, almost covering the entire composition, with a small section featuring rhombi. The drawing is identified by a symmetrical system on both the right and left sides, and the main character is drawn larger. Repetition is also evident in the circular areas, repeating multiple times.

In this study, ethnomathematics may be seen in various portions of each artwork generated by Indonesian and Thai students. This is consistent with Ascher's definition of ethnomathematics as mathematics that emerges and develops inside a specific culture (Puspadewi and Putra 2014).

Discussion

According to the analysis of the photos above, cultural disparities, educational system differences, and diverse cultural origins have no effect on the achievement of a piece of art (Ukar et al. 2021). Similarly, the unconscious application of ethnomathematics becomes a part of every artist and designer who develops a work since individuals produce something distinct from what already exists, which is known as creativity (Rachmawati and Euis 2010; Yeni and Euis 2010). This examination reveals in each image:

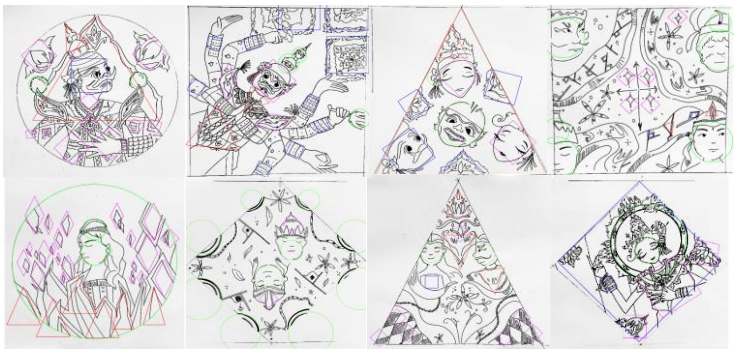


Figure 7: Final Work of Indonesian Students Drawing Ramakien and Ramayana
Source: Halim et al.

The eight images in Figure 7, drawn by two Indonesian students of different genders using different media, show a similarity in drawing style, particularly in the cropping and close-up presentation of popular characters. The students' drawings show the usage of ideal proportions or balance, such as symmetrical proportions, providing an idealized look in which the top and lower regions of the human body are balanced (Subagiyo and Sulistyo 2013). This is confirmed by Renaissance architectural theory, which incorporates the concept of balance, which is represented by both symmetrical and asymmetrical features. Aesthetic principles dictate symmetry, which stresses harmony in the image (Surasetja 2000). All of these aspects contribute to the cultural product of ethnomathematics.

Unconsciously, Indonesian students use basic shapes that repeat in ethnomathematics, such as rhombi, circles, and triangles. This helps to create new and optimal proportions in the layouts, making them more visually appealing. An intriguing finding from the ethnomathematics inquiry in the drawings is the employment of geometric shapes, such as triangles, in depictions of female figures and ornaments worn by the main character. This drawing method adheres to visual arts principles by stressing the enlargement of the primary character in order to produce a more noticeable presence (Tabrani 2018).

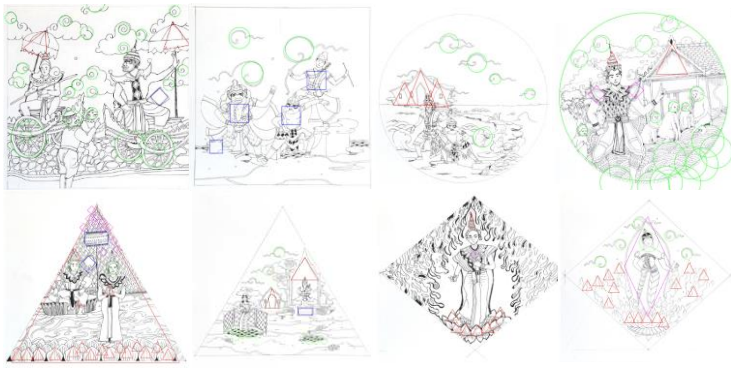


Figure 8: Thai Students' Final Drawings of Ramakien and Ramayana
Source: Halim et al.

An additional unexpected discovery in Thai students' artwork is uncovered through ethnomathematical research. Geometric shapes identified in the above image include isosceles triangles, circles, and rhombi. The Thai students appear to draw in a symmetrical system, employing geometric shapes that, unknowingly, establish a setting within the image and create a three-dimensional environment, enhancing the narrative quality of the drawing. Thai students, on the other hand, use basic geometric shapes to depict female characters and ornaments in the main character's portrayal, increasing the image's overall storytelling element. Another important finding in this study is the use of mathematical concepts (ethnomathematics) in the drawings of Indonesian and Thai students.

1. Identified basic ethnomathematical shapes such as circles, squares, rhombi, circles, and isosceles triangles indicate the students' thought process and understanding in constructing narrative drawings.
2. Based on the analysis, there is the use of the isosceles triangle in the portrayal of the female figure.
3. Two-dimensional shapes or ethnomathematics can be extracted from the drawings of Indonesian and Thai students in this image, enabling students to draw more proportionally and narratively.

Further examination reveals the utilization of different transformations, such as rotation, repetition, and mirroring. Using ethnomathematics in the drawings of Thai and Indonesian students, it is possible to inspire other students and educators to create artwork that is strengthened by the use of ethnomathematics. The discovery of geometric shapes in the Thai and Indonesian student's drawings demonstrates that holy geometry is still employed unknowingly today. Before we go any farther, let us first look at sacred geometry:

Sacred Geometry

Geometry (Hejazi 2005) is a discipline of mathematics that deals with the interactions between points, lines, angles, and figures in space. Sacred geometry ascribes meanings to specific mathematical shapes and proportions, and studies spatial order using measures and relationships of forms (Brewer 2019).

The concept of Sacred Geometry has been a significant philosophical influence for renowned painters of the Middle Ages and Renaissance, including Leonardo da Vinci and Michelangelo, impacting the execution of their artistic endeavors (Hendricks 2009). The famous Vitruvian Man, for example, depicts the proportions of the human figure through the combination of geometric squares and circles, creating harmony between both the higher and lower worlds, where the geometric circle symbolizes the spiritual realm, and the squares represent the human realm (Hendricks 2009). The first geometric sign constructed by mankind, known as Sun Geometry, is a combination of circles with a central point or rays spreading from

the center globally. This geometric sun symbol is acknowledged as the earliest and most common symbol found in prehistoric art (Hendricks 2009). In a study titled "A Mathematical Study of a Symbol: The Vesica Piscis of Sacred Geometry," it was discovered that mathematics and sacred geometry go beyond human-made interpretations. They serve as symbolic representations of the relationship between God and human life, which are integrated into scientific and philosophical studies (Sparavigna and Baldi 2016). Geometry is commonly associated with Classical Greece and prominent figures like Pythagoras, Plato, and Euclid. Euclid wrote the first actual textbook on the subject, which is known as Elements. Additionally, the ancient order of Freemasons has held Geometry in high esteem and reverence. This association dates back to the great Cathedral Building era of the twelfth through the fourteenth centuries, from whom modern Masons derive their family line (Carlson 2012).

The oldest human-made geometric symbol known as Sun Geometry is a composition of a circle with a central point or with rays emanating from its center universally. This geometric sun symbol is thought to be the earliest and most common symbol in prehistory (Hendricks 2009). The idea of sacred geometry is visible in this study through the drawings of pupils from Thailand and Indonesia with diverse educational and cultural backgrounds.

The following is an overview of the findings of the use of holy geometry in Ramakien and Ramayana artwork by Thai and Indonesian students:

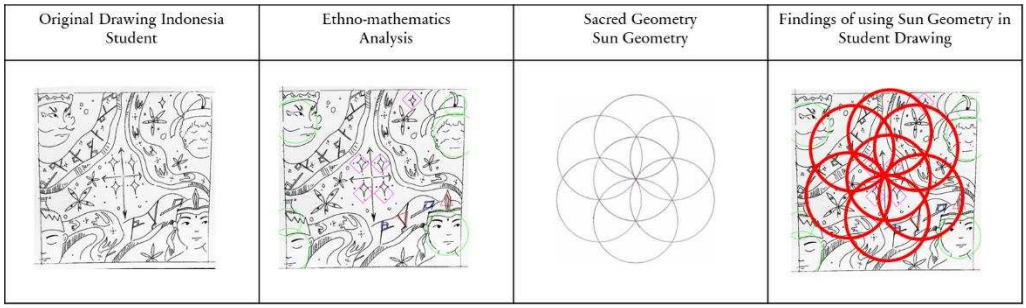


Figure 9: The Process of Geometric Analysis of Sacred Images of Indonesian Students
Source: Halim et al.

Figure 9 shows that students' drawings often include geometric forms. These forms can be seen in the characters drawn, as well as in the layouts. Students use a geometric sun system with a central point and systematic arrangement for the main character and other decorations.

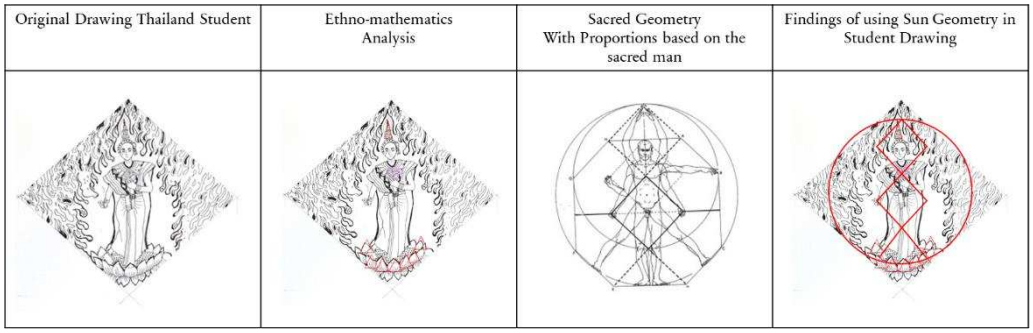


Figure 10: Analysis of Sacred Geometry in the drawing of Thai students depicting Ramayana
Source: Halim et al.

Figure 10 displays sacred geometry with human proportions in the figure of the woman, portraying Sinta, the main character, created by a Thai student on a rhombus-shaped field. Sinta's upper body fits within the diamond shape in this image, with her feet not touching the ground. This geometric shape offers a meaning similar to being in a sanctuary and on Earth at the same time. The proportions and geometric shapes in this artwork are not deliberate; they are completely spontaneous but have significant connotations related to sacred geometry.

Conclusion

There is a correlation between ethnomathematics and the drawings of Thai and Indonesian students in the process of developing fresh creativity. Because the concept of ethnomathematics is clearly apparent in their drawings, Thai and Indonesian students' artworks are helpful for contextual and logical learning. It extends beyond studying geometric shapes to investigate ethnomathematics in culture and other works of art. Based on the findings of the study, mathematical principles in the drawings of students can be used in the learning process, particularly in revealing the various cultures of both countries. This promotes a knowledge of the strong relationship between mathematics and culture (ethnomathematics) and how it might contribute to culturally based learning.

Aside from that, we can see those geometries, on the surface, provide guidance to rulers or individuals when writing a narrative, as demonstrated by the results of assessments in Indonesia and Thailand. Geometrical proportions serve as an aesthetically pleasing measuring tool. Geometric properties also influence composition and decision-making based on mathematical radii. In this context, sacred geometry, as opposed to other forms of geometry, has important implications not just for enhancing teaching with good aesthetics, but also for teaching good philosophy.

This research underscores the benefits of Ambrosio's traditional ethnomathematical theory, which demonstrates that diverse cultures rely on unique aspects of geometry to

interpret the significance of epic narratives. Additionally, variations in customs, inclinations, and aptitudes also impact the way the nuances of a piece of art are perceived.

This research contribution to enhance the curriculum of formal and non-formal education by integrating the creative process of mathematics in the creation of art, which will help students understand that mathematics can play an important role in the creative process. This will create awareness among students from the beginning that mathematics can improve their creative skills.

Limitations

The research is limited in its discussion of geometric shapes, specifically circles, squares, triangles, and rhombuses. Nevertheless, these fundamental shapes are integral to forming more complex figures.

Acknowledgment

We would like to thank Maranatha Christian University for providing the Overseas Research Grant and the Doctoral Program in Design Arts (International Program) at Silpakorn University, Bangkok.

AI Acknowledgment

Generative AI or AI-assisted technologies were not used in any way to prepare, write, or complete essential authoring tasks in this manuscript.

Informed Consent

The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

REFERENCES

Abdullah, Atje Setiawan. 2017. "Ethnomathematics in Perspective of Sundanese Culture." *Journal on Mathematics Education* 8 (1): 1–16. https://doi.org/10.22342/jme.8.1.3877.1-15.

Arisetyawan, Andika, Didi Suryadi, Tatang Herman, and Cece Rahmat. 2014. "Study of Ethnomathematics: A Lesson from the Baduy Culture." *International Journal of Education and Research* 2(10): 681–688. https://www.ijern.com/journal/2014/October-2014/54.pdf.

Arwanto, Arwanto. 2017. "Eksplorasi Etnomatematika Batik Trusmi Cirebon Untuk Mengungkap Nilai Filosofi Dan Konsep Matematis" [Ethnomathematics Exploration of Cirebon Trusmi Batik to Reveal Philosophical Values and Mathematical Concepts]. *Phenomenon: Jurnal Pendidikan MIPA* 7 (1): 40–49. https://doi.org/10.21580/phen.2017.7.1.1493.

Budiarto, Mega Teguh, Rudianto Artiono, and Rini Setianingsih. 2019. "Ethnomathematics: Formal Mathematics Milestones for Primary Education." *Journal of Physics: Conference Series* 1387 (1): 012139. https://doi.org/10.1088/1742-6596/1387/1/012139.

Brewer, D. 2019. *Sacred Geometry Book of History, Meanings and How to Create Them*. Lulu.com. https://www.lulu.com/it/shop/debbie-brewer/sacred-geometry-book-of-history-meanings-and-how-to-create-them/paperback/product-23982365.html?page=1&pageSize=4.

Carlson, Randall. 2012. "The Meaning of Sacred Geometry." *Sacredgeometryinternational.com.* https://sacredgeometryinternational.com/the-meaning-of-sacred-geometry/.

D'Ambrosio, Ubiratan. 1985. "Ethnomathematics and Its Place in the History and Pedagogy of Mathematics." *For the Learning of Mathematics* 5 (1): 44-48. http://www.jstor.org/stable/40247876.

D'Ambrosio, Ubiratan. 2001. "What is Ethomathematics and How can It Help Children in Schools?" *Teaching Children Mathematics* 7 (6): 308–310. https://doi.org/10.5951/TCM.7.6.0308.

Ditasona, C. 2018. "Ethnomathematics Exploration of the Toba Community: Elements of Geometry Transformation Contained in Gorga (Ornament on Batak House)." *IOP Conference Series: Materials Science and Engineering* 335 (1). https://doi.org/10.1088/1757-899X/335/1/012042.

Gerring, John. 2017. "Qualitative Methods." *Annual Review of Political Science* 20:15–36. https://doi.org/10.1146/annurev-polisci-092415-024158.

Hendricks, Steven. 2009. "Sacred Geometry." *New Philosophy* 112 (3–4): 911–932.

Herawaty, D., W. Widada, T. Novita, L. Waroka, and A. N. M. T. Lubis. 2018. "Students' Metacognition on Mathematical Problem Solving Through Ethnomathematics in Rejang Lebong, Indonesia." *Journal of Physics: Conference Series* 1088 (1): 012089. https://doi.org/10.1088/1742-6596/1088/1/012089.

Hibi, Wafiq. 2021. "Non-Isomorphism Between Graph and Its Complement." *Journal of Multicultural Education* 7 (6): 256, 258.

Hibi, Wafiq. 2022. "The Educational and Geometric Psychological Impact of Origami on Sixth Graders." *Journal of Positive Psychology and Wellbeing* 6 (1): 2031–2039. https://journalppw.com/index.php/jppw/article/view/2893/1870.

Hejazi, Mehrdad. 2005. "Geometry in Nature and Persian Architecture." *Building and Environment* 40 (1): 1413–1427. https://doi.org/10.1016/j.buildenv.2004.11.007.

Milton, Rosa, and Daniel Clark Orey. 2013. “Ethnomodeling as a Research Theoretical Framework on Ethnomathematics and mathematical modeling.” *Journal of Urban Mathematics Education* 6 (2): 62–80. https://doi.org/10.21423/jume-v6i2a195.

Nisa, Asfira Zakiatun, and Imam Rofiki. 2022. “Exploration of the Ethnomathematics of the Bung Karno Tomb Complex in Cultural Based Mathematics Learning.” *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang* 6 (1): 107–120. https://doi.org/10.31331/medivesveteran.v6i1.1926.

Puspadewi, K. R., and Putra, I. 2014. "Etnomatematika di balik kerajinan anyaman Bali" [Ethnomathematics behind Balinese Woven Crafts]. *Jurnal matematika* 4 (2): 80–89. https://doi.org/10.24843/JMAT.2014.v04.i02.p47

Rachmawati, Yeni, and Kurniati Euis. 2010. *Strategi Pengembangan Kreativitas Pada Anak Usia Taman Kanak-Kanak* [Strategies for Developing Creativity in Children. Jakarta: Kencana Prenada Media]. Jakarta: Kencana.

Skemp, Richard R. 2012. *The Psychology of Learning Mathematics,* Expanded American Edition. New York: Routledge.

Supiyati, Sri, and Farida Hanum. 2019. “Ethnomathematics in Sasaknese Architecture.” *Journal on Mathematics Education* 10 (1): 47–58. https://doi.org/10.22342/jme.10.1.5383.47-58.

Surasetja, R. Irawan. 2000. *Teori-Teori Arsitektur Dunia Barat* [Architectural Theories of the Western World]. Teori Perencanaan dan Perancangan II. FPTK UPI

Sparavigna, A. C., and M. M. Baldi. 2016. “A Mathematical Study of a Symbol: The Vesica Piscis of Sacred Geometry.” *PHILICA*. https://core.ac.uk/download/pdf/76529745.pdf.

Subagiyo, Heru, and Nugroho Heri Sulistyo. 2013. “ Dasar Artistik” *Jakarta: Kementerian Pendidikan dan Kebudayaan. Direktorat Pembinaan Sekolah Menengah Kejuruan.* https://repositori.kemdikbud.go.id/8844/1/Dasar-Artistik-1.pdf.

Tabrani, Primadi. 2018. “Prinsip-Prinsip Bahasa Rupa” [Principles of Visual Language]. *Jurnal Budaya Nusantara* 1 (2): 173–195. https://doi.org/10.36456/b.nusantara.vol1.no2.a1579.

Ukar, Dewi Sartika, Bahran Taib, and Bujuna Alhadad. 2021. “Analisis Kreativitas Menggambar Anak Melalui Kegiatan Menggambar” [Analysis of Children's Drawing Creativity Through Drawing Activities]. *Jurnal Ilmiah Cahaya Paud* 3 (1): 117–124. https://doi.org/10.33387/cahayapd.v3i1.2262.

Zayyadi, Moh. 2018. “Eksplorasi Etnomatematika Pada Batik Madura” [Ethnomathematical Exploration of Madura Batik]. *Sigma* 2 (2): 36–40. https://doi.org/10.53712/sigma.

ABOUT THE AUTHORS

Erwin Ardianto Halim: Assistant professor, Faculty of Humanities and Creative Industries, Universitas Kristen Maranatha, Bandung, West Java, Indonesia
Email: erwin.ardianto@art.maranatha.edu

Monica Hartanti: Associate Professor, Faculty of Humanities and Creative Industries, Universitas Kristen Maranatha, Bandung, Indonesia
Corresponding Author's Email: monica.hartanti@art.maranatha.edu

Elizabeth Wianto: Assistant professor, Faculty of Humanities and Creative Industries, Universitas Kristen Maranatha, Bandung, West Java, Indonesia
Email: elizabeth.wianto@art.maranatha.edu

Christine Claudia Lukman: Associate Professor, Faculty of Humanities and Creative Industries, Universitas Kristen Maranatha, Bandung, Indonesia
Email: christineclaudialukman@gmail.com

Eakachat Joneurairatana: Professor, Faculty of Decorative Arts, Silpakorn University, Bangkok, Indonesia
Email: ejeak9@gmail.com