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EXPLORING THE ETHNOMATHEMATICS IN PHILIPPINE FOLKLORE: THE LEGEND OF *BAKUNAWA*

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Abstract: This study explores the Legend of *Bakunawa* through the lens of ethnomathematics, examining how indigenous Filipino folklore encodes mathematical concepts. Using Bishop's six universal mathematical activities—counting, locating, measuring, designing, playing, and explaining—the research identifies culturally embedded forms of mathematical thinking within the narrative. The legend, which tells of a serpent-like dragon attempting to devour the seven moons, contains patterns, sequences, spatial reasoning, and symbolic numeration that align with core mathematical principles. Through qualitative analysis and ethnographic context, the study highlights how storytelling functions as both a cultural and educational tool, bridging oral tradition and formal mathematics education. The findings affirm that the *Bakunawa* myth, like many indigenous narratives, provides a culturally rich and pedagogically sound foundation for teaching mathematical concepts. These stories are vessels of mathematical knowledge, which help educators promote culturally responsive pedagogy, strengthen learner identity, and enrich classroom engagement.

Keywords: Bakunawa, ethnomathematics, Philippine folklore, mathematics education

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INTRODUCTION

Culture is the collective expression of a people's identity—shaped by their history, language, beliefs, practices, and shared knowledge. It is not static; rather, it evolves through storytelling, rituals, social behaviors, and ways of knowing the world. Central to culture are the myths and legends that communities pass down through generations. These stories do more than entertain; they serve as vehicles of wisdom, moral instruction, and symbolic representation of how societies make sense of the universe around them (Gaverza, 2014). Around the world, myths and legends are vital threads in the fabric of cultural identity. The Greek myths of the Titans, the Norse tales of Yggdrasil and Ragnarok, the Chinese legend of Hou Yi and the ten suns, and the Egyptian myth of

Ra's nightly journey through the underworld all reflect how different civilizations encoded cosmological and philosophical knowledge through story.

The Philippines has its own share of known myths, legends and folklores. The key findings from the study of Eslit (2023) on ten Filipino folklores reveal that these folklores embody the rich cultural heritage and identity of the Filipino people by representing deeply rooted values, beliefs, and traditions. The observed similarities and differences among the narratives underscore the cultural diversity within the Philippines, emphasizing the vital role these stories play in promoting cultural understanding and the need to preserve them in contemporary society.

Myths and legends not only reflect cultural values but also encode forms of practical and logical reasoning. As Levi-Strauss (1955) argued, myths function as tools of classification and logic within cultures. In this light, they serve as bridges between cultural knowledge and formal disciplines—like mathematics. However, the decline of folk narrative transmission, largely due to modernization and industrialization, has weakened the role of storytelling in preserving cultural heritage. Myths are increasingly dismissed as superstition, particularly by younger generations. As a result, Philippine mythology—rich with regional diversity and cultural symbolism—faces the risk of being forgotten. Scholars emphasize that schools serve as vital spaces to reclaim the value of these narratives. However, current curricula often lack the depth and time needed to meaningfully explore them (Reyes, 2022).

To ensure the survival and relevance of these value-laden cultural artifacts, education systems must integrate these stories into subjects like literature, history, and notably, mathematics, through culturally grounded frameworks such as ethnomathematics (Knijnik, 2024). Doing so not only preserves the narratives but also empowers learners to connect with their heritage in academically enriching ways. Different efforts were made in the academe to forward the preservation of these cultural heritage narratives. One such example is the development of a 2D storybook as a tool for cultural preservation and curriculum integration. As Philippine myths and folk narratives face decline due to modernization, media influence, and gaps in educational focus, especially under evolving curricular reforms, there is a growing need to revitalize interest in indigenous stories. The *Bakunawa* legend, rich in symbolic and logical elements, offers a compelling narrative framework for young learners. By transforming the story into a 2D illustrated storybook—complete with narration, visual storytelling, and interactive components—the aim is to enhance learner engagement while promoting cultural identity and value formation (Ducusin *et al*., 2025).

The preservation of these narratives of myths and legends must be included in the direction academic institutions have to do. The use of legends and myths as culturally relevant narrative can be a foundation on understanding how locals can mathematicize natural events in early days. The notion that mathematics is culturally embedded is the foundation of ethnomathematics, a field introduced by Brazilian mathematician Ubiratan D'Ambrosio in the late 1970s. Ethnomathematics recognizes that every cultural group has developed its own ways of quantifying, measuring, reasoning, and solving problems, based on their unique needs, environments, and worldviews (D'Ambrosio, 1985).

Ethnomathematics is supported by the Situated Cognition Theory, developed by Brown, Collins, & Duguid (1989). The theory asserts that knowledge is inextricably linked to the context in which it is learned and applied. In this view, cognition is not abstract and general but deeply tied to specific cultural practices, environments, and social interactions. Applied to ethnomathematics, situated cognition suggests that mathematical knowledge cannot be fully understood or appreciated when removed from the cultural context in which it emerged. Situated cognition affirms that mathematical understanding is most meaningful when learned in context—through culturally authentic practices and narratives that reflect how communities use math. Ethnomathematics aligns perfectly with this principle, offering learners contextualized problems rooted in storytelling, communal practices, traditional architecture, or indigenous rituals.

Thomas & Jacob (2021) noted in their study that the primary aim of ethnomathematics is to deepen the understanding of the interconnectedness between culture and mathematics, highlighting how mathematical ideas are shaped by cultural contexts and everyday practices. It enables educators and researchers to explore how cultural traditions, beliefs, and experiences influence mathematical thinking, and how mathematical reasoning, in turn, is reflected in cultural expressions. This culturally informed perspective promotes inclusive and responsive educational practices that honor the diverse ways communities engage with mathematics. Ethnomathematics is particularly significant in societies with predominantly oral traditions, where mathematical knowledge is preserved and transmitted through storytelling, rituals, craftsmanship, and daily problem-solving rather than formal notation.

Bishop (1991) pointed out six universal mathematics activities, the key elements when looking at the ethnomathematics from the indigenous knowledge. These activities highlighted how mathematical thinking is deeply embedded in human cultures and societies, with each activity representing a fundamental mathematical process that transcends cultures. These are:

a. Counting – determining the number of elements in a set, which is fundamental to many mathematical concepts and is present in every culture in some form;
b. Locating – identifying positions in space, whether through maps, coordinates, or other systems;
c. Measuring – quantifying physical properties, such as length, volume, time, and temperature;
d. Designing – creating and constructing objects, structures, or systems, often guided by geometric principles and mathematical reasoning;
e. Playing – involving the creation and engagement with games, which are often based on mathematical rules and concepts such as strategy, probability, and logic;
f. Explaining – referring to the ability to communicate and share mathematical ideas, either orally or through written symbols.

Recognizing the cultural richness and mathematical depth embedded in Philippine myths and legends—particularly the Legend of *Bakunawa*—this study actively investigates how these narratives can function as culturally responsive frameworks for mathematics education.

METHOD

This study employed a qualitative-ethnographic research design, appropriate for exploring cultural narratives and understanding mathematical knowledge within indigenous oral traditions. Qualitative research allows for deep contextual interpretation of human experiences, stories, and meanings (Creswell & Poth, 2018), while ethnography offers the lens to examine cultural practices as they are lived and transmitted across generations (Spradley, 2016).

The ethnographic foundation of the study builds upon the researcher's prior fieldwork with one of the largest indigenous communities in Mindanao, Philippines. In that earlier research in 2019, the community's oral traditions, rituals, and livelihood systems were documented—revealing forms of mathematical reasoning present in their weaving patterns, spatial orientation, use of measurement, and symbolic representations. These culturally embedded practices laid the groundwork for further exploration of myth-based mathematical knowledge.

This study focused specifically on textual and narrative analysis of folklore, particularly the Legend of *Bakunawa*, using content analysis methods (Krippendorff, 2019). Texts were collected from oral retellings, published anthologies, and video

transcripts. The framework in analyzing the ethnomathematics of the legend generally follows Alan Bishop's framework of six universal mathematics activities - counting, locating, measuring, designing, playing and explaining (Bishop, 1988). Through thematic coding, the researcher identified recurring mathematical concepts which can be aligned to Bishop's framework. Each identified theme was then cross-referenced with the mathematics curriculum to determine learning competencies that could inform the development of culturally responsive instructional materials.

RESULTS AND DISCUSSION

The Legend of *Bakunawa*

The ethnographic study conducted with one of the largest indigenous ethnolinguistic groups in Mindanao, Philippines showed rich cultural and indigenous practices. This community, known for its resilience and deep connection to ancestral knowledge, revealed a living culture where mathematics, belief, and tradition are tightly interwoven into daily life. The presence of a deeply rooted tradition of oral storytelling serves not only as cultural narratives but also as frameworks for understanding natural phenomena and organizing knowledge—including mathematical concepts. These oral traditions were passed down from ancestral elders to younger generations, in mostly communal and familial affairs. Among the numerous myths preserved by the community, one story stood out due to their recurring appearance and rich symbolic content: the Legend of *Bakunawa*. The story serves as indigenous explanation for celestial events, particularly eclipses and the changing appearance of the moon.

Bakunawa is one of the most enduring mythical creatures in Visayan folklore, often portrayed as a gigantic serpent or dragon that dwells in the depths of the ocean. In this context, Visayan folklore refers to the collection of traditional stories, beliefs, rituals, songs, and cultural practices originating from Visayan-speaking communities in the Philippines. These communities are predominantly found in the Visayas region and parts of Mindanao, where languages such as Cebuano, Hiligaynon, Waray-Waray, Aklanon, Kinaray-a, and Bantayanon are spoken.

The name *Bakunawa* comes from "baku" (to bend or curve) and "nawa" (causer), highlighting his serpentine form and his feared appetite for celestial bodies which causes the eclipse (Nair, n.d.). The Legend of *Bakunawa* is one of the most widely documented and enduring myths in Philippine folklore, deeply rooted within the broader cultural context of pre-colonial Filipino cosmology, demonstrating how its symbolism—centered on cosmic disruption, restoration, and communal response (Eslit, 2024). It has been

preserved across oral traditions, scholarly texts, and digital media, reflecting its cultural depth and narrative significance.

Eugenio (2007), in her comprehensive anthology *Philippine Folk Literature*, includes retellings of the *Bakunawa* myth, situating it as a central figure in the indigenous cosmological belief system. The Aswang Project has also contributed to the popular and academic resurgence of interest in the *Bakunawa* narrative. In a well-annotated video presentation, Clark (2016) offers a bilingual version of the tale, highlighting both the linguistic nuances and the cosmological symbolism embedded in the story. Even beyond local contexts, the narrative aligns with what Frye & Damrosch (2020) describes in *Anatomy of Criticism* as a mythic archetype—where celestial devourers symbolize cosmic disorder and renewal. These works collectively affirm that *Bakunawa* is not only a popular folk figure but also a rich subject for literary, cultural, and mathematical analysis.

According to the *Bakunawa* story, long ago, the sky was said to have seven radiant moons, shining in perfect harmony and lighting the world even at night. These moons were adored by mortals and gods alike for their glow and grace. But *Bakunawa*, residing in the ocean depths, was mesmerized by their beauty—and some versions say, consumed by envy or longing. Unable to resist his desire, *Bakunawa* leapt from the ocean and swallowed the moons, one at a time, plunging the world into growing darkness. With each moon he devoured, the nights became colder, lonelier, and dimmer. The people grew afraid, and their desperation peaked when only one moon remained. As *Bakunawa* soared to devour the final moon, the people banged drums, beat gongs, clanged pots, and screamed into the sky. The earth trembled with sound and fury. This overwhelming noise startled *Bakunawa*, forcing him to retreat to the ocean, sparing the last moon and restoring light to the heavens. Figure 1 shows the AI-generated image interpretation of the legend of the *Bakunawa* (Open AI, 2025).

Figure 1. AI-generated image depicting the *Bakunawa* story

Oral, Textual, and Video-Based Retellings of the Legend of *Bakunawa*

Oral narratives were drawn from the researcher's prior ethnographic engagement with an indigenous community in Mindanao (2019), where one of the community elder narrated the *Bakunawa* legend. These accounts were delivered in *Bisaya*, the natural linguistic medium of cultural transmission. Selected excerpts are presented in their original language alongside English translations to preserve cultural nuance while ensuring accessibility for a wider scholarly audience. To strengthen analytical triangulation, these oral accounts were examined alongside authoritative printed retellings (Eugenio, 2007) and widely circulated video narrations (Clark, 2016), allowing for comparison across narrative forms and media.

The coding process was guided by Bishop's (1988) six universal mathematical activities—counting, locating, measuring, designing, playing, and explaining, which conceptualize mathematics as a cultural practice rather than a formalized system. Narrative segments were analyzed for linguistic cues, symbolic actions, and culturally meaningful practices that reflect these activities. Importantly, this study does not assume historical intent to use formal mathematics; instead, it interprets mathematical ideas as emergent patterns of reasoning embedded in storytelling, ritual action, and cosmological explanation, consistent with ethnomathematical principles (D'Ambrosio, 1985; Rosa & Orey, 2016).

Table 1 presents illustrative coded excerpts from oral, textual, and video sources, explicitly linking narrative elements to mathematical activities and providing cultural interpretation of each section. This approach foregrounds indigenous voices while establishing a clear analytical bridge between folklore, mathematical reasoning, and mathematics education. It further shows that mathematical ideas in the *Bakunawa* legend are inseparable from cultural meaning. Counting expresses balance and loss, patterns signal warning and predictability, rhythm measures time and cooperation, and spatial movement reflects cosmological understanding. Mathematics, in this worldview, is not abstract—it is felt, narrated, and lived. This further demonstrates how ethnomathematics moves beyond identifying structures to understanding why those structures matter to the people who tell the stories, thereby strengthening both the cultural integrity and pedagogical relevance of the study.

Table 1. Ethnomathematical Coding of the Legend of *Bakunawa*

Data Source	Narrative Excerpt	Category	Mathematical Activity	Cultural Interpretation
Oral storytelling (elder, field notes 2019)	*"Sa una, pito ka bulan ang naa sa langit, ug hayag kaayo tanan."* "Before, there were seven moons in the sky, and all of them were very bright."	Enumeration	Counting	The number seven signifies completeness and harmony; elders describe this as a time when the world was balanced. Counting here expresses wholeness, not quantity alone.
Oral storytelling (elder, field notes 2019)	*"Dili kalit mawala tanan—usa-usa ra gyud."* "They did not disappear all at once—only one at a time."	Sequential pattern	Counting	The gradual loss reflects the belief that imbalance happens progressively, warning people before total darkness.
Oral storytelling (elder, field notes 2019)	*"Kada kaon niya og bulan, nagkadulom ang palibot."* "Each time he ate a moon, the surroundings grew darker."	Cumulative change	Counting / Explaining	Sequential counting is tied to felt consequence; numbers track increasing danger and urgency, not abstract subtraction.
Oral storytelling (elder, field notes 2019)	*"Mosaka ang Bakunawa gikan sa dagat, padulong sa langit."* "*Bakunawa* rises from the sea toward the sky."	Directional movement	Locating	The sea–sky path reflects indigenous spatial orientation and cosmology; location signals threat approaching balance.
Oral storytelling (elder, field notes 2019)	*"Maglibot ang lawas niya sa bulan."* "His body coils around the moon."	Circular form	Designing	Describes curvature and circular geometry.
Oral storytelling (elder, field notes 2019)	*"Kinahanglan dugay ug kusog ang pagbunal sa tambol."* "The drumming must be strong and last a long time."	Duration and intensity	Measuring	Rhythm measures time and intensity; sustained action reflects communal endurance and cooperation.
Oral storytelling (elder, field notes 2019)	*"Kung sabay-sabay mi, mahadlok siya."* "When we act together, he becomes afraid."	Coordination	Playing	Collective rhythm follows shared rules; play is purposeful and strategic, not random.

Data Source	Narrative Excerpt	Category	Mathematical Activity	Cultural Interpretation
Oral storytelling (elder, field notes 2019)	*"Mao ni ang hinungdan nganong usahay mawala ang bulan."* "This is why the moon sometimes disappears."	Explanation of phenomena	Explaining	The story explains eclipses through culturally coherent logic, linking patterns to cause and response.
Eugenio (2007), text	"The *Bakunawa* swallowed the moons one by one."	Sequential action	Counting	"One by one" signals ordered enumeration. Printed retellings preserve the idea of gradual loss, reinforcing the cultural meaning of sequence.
Eugenio (2007), text	"Only one moon remained in the sky."	Part–whole relation	Counting	Highlights subtraction and remainder concept symbolically.
Clark (2016), video	"Each time the *Bakunawa* rose, the moon grew darker."	Repeated cycle	Explaining	Cyclic repetition supports pattern-based reasoning. Repetition emphasizes predictability and cyclical nature of cosmic events.
Clark (2016), video	"The drums echoed until the dragon retreated."	Sound over time	Measuring	Duration marked by rhythmic repetition.
Clark (2016), video	"People believed noise could protect the moon."	Cultural logic	Explaining	Expresses culturally grounded cause–effect reasoning.

In the oral retelling, the community elder consistently described the presence of seven moons as a time when the world was "complete" and "balanced." The number seven is not treated as a neutral quantity but as a symbol of wholeness, harmony, and cosmic order. The elder explained that the world was brightest and most stable when all seven moons were present, suggesting that counting in the narrative serves as a way of tracking balance rather than measuring amount.

As each moon disappears, the counting sequence—seven, six, five, and so on—marks increasing imbalance and danger. The elder emphasized that the moons vanish "one by one," reinforcing the idea that disorder unfolds gradually, allowing the community time to observe, respond, and act collectively. Counting functions as a cultural tool for monitoring change, warning of impending crisis, and emphasizing the moral responsibility of vigilance. Thus, numerical progression in the *Bakunawa* legend

is meaningful not because it forms a sequence, but because it encodes a logic of progressive disruption and communal accountability.

Patterns in the *Bakunawa* narrative—such as repeated attempts to devour the moon and the recurring need for communal action—reflect a belief in the cyclical nature of events. The community often note that *Bakunawa* does not appear only once; rather, the threat returns, and the community must repeatedly respond. This repetition reinforces the idea that natural phenomena follow recognizable patterns that can be anticipated and explained.

From an ethnomathematical perspective, such patterning reflects a culturally grounded understanding of regularity and predictability, where repeated events signal underlying order in the universe. Recognizing patterns enables the community to prepare appropriate responses, reinforcing collective knowledge and continuity across generations.

The *Bakunawa* legend reveals that numbers, patterns, and sequences are meaning-bearing elements within indigenous storytelling. Counting signifies balance and warning, patterns encode predictability, and repetition reinforces communal knowledge. Mathematics, in this context, is not an external system imposed on the story, but an embedded way of understanding the world, expressed through narrative, symbolism, and collective memory. This interpretive step affirms the ethnographic depth of the study and positions the legend as a culturally authentic foundation for ethnomathematics research and pedagogy.

Ethnomathematics of the Legend of *Bakunawa*

The Legend of *Bakunawa*, while often celebrated for its mythic beauty and cultural symbolism, is more than just a story—it is a vessel of indigenous knowledge. Embedded within its narrative are patterns, cycles, symbols, and structures that reflect deep ethnomathematical thinking. This transformation of myth into mathematical insight underscores the profound truth that folklore can be a legitimate source of mathematical learning. When analyzed through the lens of Bishop's (1988) six universal mathematical activities - counting, locating, measuring, designing, playing, and explaining—the narrative reveals how mathematical thinking is embedded in traditional storytelling, rituals, and symbolic representations.

Conting

The presence of counting in the legend —particularly through the reference to seven moons—demonstrates that the cultural group behind the story possessed a foundational understanding of numerical concepts. The sequential consumption of the moons by *Bakunawa* illustrates more than narrative tension; it reflects the community's ability to identify, quantify, and track a set of elements in a logical order. This suggests that even in the absence of formal mathematical notation, there existed an intuitive and practiced system of counting. Such knowledge, passed down through oral tradition, affirms that indigenous groups had developed ways to structure numerical thinking through storytelling, symbolism, and ritual. The legend thus serves as a culturally embedded representation of counting, which can be extended into formal mathematical instruction by connecting it to concepts such as enumeration, ordinal numbers, and arithmetic sequences.

Furthermore, this sequence of disappearance reflects more than just rote enumeration; it initiates a shift from simple counting to structured mathematical reasoning, particularly in the form of an arithmetic sequence. As each moon is swallowed, a predictable pattern emerges—an opportunity to explore both quantitative progression and cultural meaning.

The legend also prominently features seven moons, a number that is not arbitrary but symbolically significant across many cultures—including the *Visayan* worldview. This use of a culturally meaningful numeral is an example of *cultural symbol quantification*, where numbers represent not only quantity but also mythological, spiritual, or cosmological significance.

In many indigenous and traditional societies, certain numbers recur in oral traditions, rituals, and cosmologies due to their symbolic value. The number seven is globally associated with completeness, cosmic order, and cycles—appearing in various traditions such as the seven heavens in Islam, the seven days of creation in Christianity, and the seven stars of the Pleiades in many indigenous beliefs (Rappaport, 1999).

In Philippine folklore, the number seven often symbolizes wholeness before disruption, making the disappearance of each moon in the *Bakunawa* legend not only a numerical loss but a cosmic imbalance. This symbolic representation of quantity, known as cultural quantification, helps learners explore how numbers convey meaning beyond mathematics. Ascher (1991) explains that "numbers used in myths are often not literal but metaphorical—they encode concepts of sacredness, memory, and social structure". This aligns with D'Ambrosio's (1990) ethnomathematical perspective, where

mathematics is not isolated from culture but arises from the practices, symbols, and beliefs of a people.

This transformation of counting into a formal sequence opens two key dimensions for analysis: first, the mathematical structure of the moon's disappearance as a linear pattern (Arithmetic Sequences); and second, the symbolic use of numbers within the cultural context of the story (Cultural Symbol Quantification).

Locating

Bakunawa's journey from the ocean to the sky is a representation of spatial orientation and positional awareness. The legend describes the serpent emerging from the sea and rising toward the heavens to devour the moons, which are positioned across the night sky. This ascent and trajectory imply that the people who told and preserved the story had a keen understanding of relative positions, direction, and movement through space. Additionally, the villagers' response—gathering beneath the sky, looking upward, and directing sound upward to drive *Bakunawa* away—further reflects their intuitive grasp of vertical and horizontal positioning, distance, and targeted action.

Such narrative elements suggest that traditional communities possessed practical knowledge of locating, using the sky and landscape as reference points. This aligns with what Bishop defines as one of the universal mathematical activities: the ability to identify and describe spatial relationships, such as "above," "below," "near," or "toward." In the legend, this understanding is embedded in how the people visualize *Bakunawa*'s path, predict his movement, and locate the moons in relation to the earth and each other.

Measuring

The Legend of *Bakunawa* subtly illustrates that early Filipino communities had a practical understanding of measurement—not through formal tools, but through observation, rhythm, and embodied experience. The villagers' ritual of beating drums and making noise to scare *Bakunawa* away is not random; it follows a rhythmic pattern over time, which can be measured in intervals, duration, and frequency. This implies a traditional sense of temporal measurement, where time is marked through repetitive action and sound cycles—similar to early timekeeping systems used in many ancient cultures. Rappaport (1999) explains that ritualized repetition functions as a mechanism for measuring duration and signaling completion in traditional societies, where time is experienced relationally rather than abstractly. In African, Polynesian, and Indigenous

American contexts, drumming and chanting have long served as temporal regulators, coordinating collective action and marking phases of ritual or labor (Ascher, 1991).

Moreover, the imagery of *Bakunawa* rising from the ocean to the sky to reach the moons implies an awareness of distance, height, and scale. While early communities may not have had rulers or measuring tapes, they demonstrated an intuitive understanding of relative size, proportionality, and vertical space—all of which are foundational in modern measurement concepts.

This myth demonstrates that the people of old were not only storytellers but also keen observers and practical mathematicians who measured through ritual, experience, and nature. Their actions reflect a lived form of measurement that can be harnessed in today's classrooms to teach key concepts such as time measurement (e.g., seconds, minutes, rhythm intervals), length and height estimation (e.g., from sea to sky, serpent's reach), volume and intensity (e.g., drumbeats and sound projection), and even non-standard units of measurement, helping students understand how early communities made sense of their world without modern tools.

Designing

In both traditional and contemporary Filipino art, *Bakunawa* is often illustrated as a spiraling, coiling serpent, frequently shown encircling the moon or ascending from the sea toward the sky. These visual representations transcend mere ornamentation; they reflect a profound geometric sensibility rooted in cultural symbolism. The serpent's curves, loops, and circular motion embody key mathematical concepts such as rotational symmetry, radial balance, curvature, and spatial organization.

These design elements suggest that early Filipino communities held an intuitive understanding of geometry and pattern recognition, which they manifested through mythological depictions, traditional crafts, and body art. The spiral form of *Bakunawa* serves as a symbolic reference to celestial movement and cyclical phenomena, directly aligning with natural patterns such as lunar phases and eclipses. Through these culturally embedded visuals, we see that indigenous artistic expression also functioned as a vehicle for mathematical thinking, demonstrating how myth and mathematics were seamlessly integrated in pre-colonial worldviews.

Playing

The legend presents a vivid scene of collective action: villagers banging drums, clanging pots, and making loud noises to drive the serpent away from the last moon. This

response, while ritualistic, also embodies elements of structured play—rhythm, coordination, repetition, and communal participation. In this context, play is embedded in the legend not as idle activity, but as a purposeful and interactive performance, blending cultural expression with strategic timing and shared goal setting.

This dimension of the myth provides a natural entry point for integrating mathematics through play. The drumming and noisemaking can be adapted into rhythm-based math games, where students engage in beat counting, time intervals, and pattern creation. For example, learners can replicate drumming sequences that follow a mathematical pattern—such as alternating beats in multiples or Fibonacci sequences—linking music and rhythm with arithmetic and logic.

Explaining

At its core, the Legend of *Bakunawa* functions as an indigenous explanation for natural phenomena—particularly lunar eclipses and celestial cycles. In the absence of formal astronomical models, early communities used narrative frameworks to make sense of the world around them. The myth transforms a complex, abstract event—the darkening or disappearance of the moon—into a coherent and meaningful story rooted in observation, belief, and cultural logic. This aligns directly with Bishop's definition of explaining as a fundamental mathematical activity: the ability to communicate, justify, and represent mathematical ideas within one's cultural context.

Bishop (1988) asserts that all cultures develop methods for explaining quantities, patterns, and changes in their environment—whether through verbal reasoning, gestures, drawings, or symbolic storytelling. In the case of the *Bakunawa* legend, the people used metaphor and myth to explain cyclical patterns in the sky, reason about cause and effect, and propose communal responses to observable phenomena. These actions reflect a culturally embedded form of logical reasoning and conceptual modeling—key components of mathematical explanation.

The Legend of Bakunawa demonstrates how indigenous narratives can function as rich repositories of ethnomathematical knowledge. When examined through the lens of Bishop's six fundamental mathematical activities—counting, locating, measuring, designing, playing, and explaining—the legend reveals a depth of cultural logic and mathematical reasoning intricately woven into its storytelling.

From the symbolic significance of the seven moons to the spatial journey of the serpent and the rhythmic response of the villagers, each element reflects a culturally grounded understanding of quantity, space, pattern, and cause-effect relationships. This reinforces the idea that traditional oral literature is not only a vessel for transmitting values and beliefs but also a framework for mathematical thought, offering educators meaningful and context-rich opportunities to connect learners' cultural heritage with formal mathematical concepts.

Pedagogical Potential of the Legend of *Bakunawa*

The ethnomathematical analysis of the Legend of *Bakunawa* demonstrates that indigenous folklore has strong pedagogical potential for mathematics education when interpreted through culturally responsive and contextualized frameworks. Rather than treating folklore as a supplementary cultural artifact, this study positions the *Bakunawa* narrative as a meaningful instructional context through which learners can encounter and make sense of formal mathematical ideas. The legend illustrates how mathematical thinking can emerge naturally from storytelling, observation of patterns, and cultural interpretation, affirming ethnomathematics as a bridge between indigenous knowledge systems and school mathematics.

Within the narrative, elements such as the sequential disappearance of the moons, *Bakunawa*'s movement across cosmic spaces, and the villagers' rhythmic response to impending darkness reflect culturally embedded ways of reasoning about number, space, time, and change. These elements need not be interpreted as evidence of historical formal mathematics; rather, they demonstrate how cultural narratives can be pedagogically translated into mathematical learning experiences. Through guided instruction, teachers may draw on these narrative patterns to support learners' understanding of numerical progression, spatial orientation, measurement, and logical explanation, all while remaining grounded in cultural meaning.

Example can be the narrative movement of *Bakunawa* from the ocean toward the sky, which provides rich opportunities for teaching locating and spatial reasoning. Learners can model *Bakunawa*'s path through drawings, diagrams, or digital simulations, tracing vertical ascent, curved trajectories, or coiling motion. These activities introduce geometric ideas such as position, direction, distance, arcs, angles of elevation, and rotation. More advanced tasks may include plotting *Bakunawa*'s route and the position of the moons on a coordinate plane, assigning coordinates to represent the sea, sky, and moon.

Through such story-based modeling, abstract geometric concepts become tangible and meaningful. This approach aligns with situated cognition theory, emphasizing that mathematical learning is enhanced when concepts are embedded in narrative and cultural context.

Importantly, the strength of the *Bakunawa* legend lies not in the number of specific lessons it can generate, but in its capacity to serve as a coherent narrative anchor for mathematical sense-making. By situating mathematical ideas within a familiar cultural story, learners are encouraged to observe patterns, construct representations, justify reasoning, and explain phenomena in ways that are both cognitively and culturally meaningful. This approach aligns with ethnomathematics' central aim: to humanize mathematics by recognizing it as a cultural practice shaped by experience, symbolism, and collective understanding.

The *Bakunawa* legend exemplifies how indigenous folklore can function as a flexible and powerful pedagogical resource—one that supports conceptual learning, affirms cultural identity, and invites reflective engagement with mathematics as a lived and meaningful human activity.

CONCLUSION

This study demonstrates that the Legend of *Bakunawa* is more than a mythological tale—it is a culturally embedded narrative that reflects the mathematical thinking of indigenous Filipino communities. Through the lens of ethnomathematics and Bishop's six fundamental mathematical activities, it becomes evident that traditional folklore offers meaningful opportunities to explore mathematical concepts in context. The legend encapsulates symbolic numeration, sequential reasoning, spatial understanding, and cultural explanations of natural phenomena, all of which can be aligned with formal mathematics curricula. Furthermore, the study affirms that oral traditions are vital sources of indigenous knowledge, offering both pedagogical value and cultural depth. Integrating the *Bakunawa* narrative into educational materials fosters a culturally responsive approach to mathematics, allowing learners to connect abstract ideas with familiar stories and heritage. It empowers students by validating their cultural identity and encourages a more inclusive, engaging, and meaningful mathematics education. This study opens several pathways for future research. Further ethnomathematical studies may explore other Philippine myths, legends, and indigenous narratives to examine how diverse cultural groups encode mathematical reasoning through storytelling, ritual, and artistic expression. Classroom-based investigations may also be conducted to examine how

folklore-integrated mathematics instruction influences learners' conceptual understanding, engagement, and sense of cultural identity. Additionally, interdisciplinary studies combining mathematics education, anthropology, and curriculum development may contribute to the design of sustainable, culturally grounded instructional materials for various educational levels.

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