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Cultural Power and Silence: A Postcolonial Analysis of the Circle and Pi in Chinese and Malaysian Mathematics Textbooks

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Abstract

Mathematics is often perceived as a neutral and universal discipline. Foundational concepts such as the circle and π are typically presented devoid of cultural, historical, or ideological context. This study uses postcolonial discourse analysis to compare how the circle and π are represented in three official middle school mathematics textbooks from China (Renjiao and Shanghai editions) and Malaysia (Form 2). It investigates how cultural narratives are constructed or suppressed through visual framing, language, and historical narration. Employing qualitative textual analysis and a four-dimensional analytical framework—*cultural embeddedness*, *π narration*, *visual-linguistic style*, and *cultural silence*—the study reveals striking contrasts. Chinese textbooks engage in *epistemic reterritorialization* (D'Ambrosio, 1985), embedding π within a national lineage featuring Zu Chongzhi and Liu Hui, and employing symbolic imagery such as ancient bridges, round fans, and porcelain. The Malaysian textbook adopts a strategy of *cultural neutrality*, producing what Spivak (1988) terms *epistemic silence* by omitting Indian and Islamic contributions and presenting π as a context-free constant. The study argues that mathematics textbooks are not apolitical tools but sites of *knowledge politics*. As Said (1978) notes, the question of who narrates history is a matter of cultural sovereignty. This research calls for reflexive, pluralist approaches to mathematics education—ones that restore erased epistemologies and allow students to encounter mathematics as a culturally alive and historically situated discipline.

Keywords: Cultural Power, Postcolonial Analysis, Pi in Chinese, Malaysian Mathematics Textbooks

Introduction: The Myth of Neutrality and the Cultural Governance of Pi

Pi is widely presented as one of the most universal, neutral, and culturally detached constants in mathematics. It is frequently introduced as a timeless, context-free ratio—a pure number that transcends geography and ideology. Yet, as Spivak (1988) famously argued, *no knowledge*

is ever outside power. Even a number as seemingly innocent as π is caught in the web of cultural authority, selective narration, and educational politics.

Across civilizations, the circle—and by extension π—has carried deep symbolic meaning. In ancient Greece, the circle signified perfection and eternity. In Chinese cosmology, it represented harmony, unity, and the principle of "round heaven and square earth." In Islamic architecture and mathematics, the circle manifests divine order and balance. Thus, the history of π is not only one of numerical approximation but also a palimpsest of cultural significance and civilizational participation (D'Ambrosio, 1985).

Despite this rich cultural history, modern school textbooks often decontextualize π, presenting it as a culturally blank constant. This study begins with a critical observation: *how different nations represent—or erase—the cultural origins of π in their textbooks reflects broader contests over epistemic power and identity*. In postcolonial societies especially, mathematics education becomes a site where narratives of legitimacy are either asserted or suppressed.

This paper compares how three official middle school mathematics textbooks—China's *Renjiao* and *Shanghai* editions, and Malaysia's Form 2 curriculum—narrate (or silence) the cultural and historical meanings of the circle and π. While the Chinese textbooks embed π within a narrative of national heritage—through images of paper-cutting, lotus leaves, Zhaozhou Bridge, and figures like Zu Chongzhi—the Malaysian textbook treats π as a dehistoricized, neutral value (3.14), omitting regional mathematical traditions. These contrasting representations raise critical questions about *epistemic sovereignty*, *cultural reterritorialization*, and *de-indigenization* in textbook design (Skovsmose, 2005; Spivak, 1988). Drawing on postcolonial theory, this study adopts the frameworks of cultural hegemony (Gramsci, 1971) and epistemic violence (Said, 1978) to interrogate how mathematics textbooks function as instruments of ideological power. Following Apple (1992), we approach the textbook not as a passive instructional tool but as a site of discourse—where some voices are amplified and others are structurally silenced.
This inquiry is guided by three core questions:

- Who is allowed to narrate the history of mathematical knowledge in the classroom?
- How do language, imagery, and problem contexts legitimize certain epistemologies while marginalizing others?
- How do postcolonial states navigate between cultural self-assertion and political neutrality in mathematics education?

By comparing these three textbooks, we aim to uncover the mechanisms through which mathematics—often regarded as culture-free—is deeply entangled with national identity, civilizational pride, and postcolonial negotiation.

This study is motivated by a central tension in mathematics education: the contradiction between mathematics' global image as a culture-free domain and its localized, ideologically charged representations in school curricula (Apple, 1992; Ernest, 1991). While previous research has problematized Eurocentric narratives (D'Ambrosio, 1985; Powell & Frankenstein, 1997), few studies have explored how mathematical constants like π become discursive sites of cultural identity, silence, and resistance in postcolonial settings. By foregrounding π—a symbol both technically precise and historically saturated—we argue that

mathematics textbooks play a critical role in shaping epistemic visibility and curricular sovereignty (Said, 1978; Spivak, 1988). The contribution of this study lies in offering a transferable analytical framework that integrates postcolonial theory, textbook discourse analysis, and cultural semiotics to examine how mathematics participates in the politics of knowledge.

Literature Review: Cultural Power, Epistemic Silence, and Postcolonial Narratives in Mathematics Education

Mathematics is often portrayed as the most neutral and objective of all disciplines. It is presented in schools as a universal language, transcending culture, history, and ideology. Yet, critical mathematics education has long challenged this myth of neutrality, showing that mathematical knowledge—as presented in textbooks—is embedded in power, ideology, and cultural politics (Apple, 1992; Ernest, 1991).The theory of ethnomathematics offers a valuable corrective to the universalist discourse. D'Ambrosio (D'Ambrosio, 1985) argues that all cultures develop their own mathematical systems, yet school curricula routinely exclude these in favor of standardized, Western-centric narratives. Building on D'Ambrosio's foundational work, Powell and Frankenstein (1997) argue for a pedagogy that explicitly contests Eurocentric mathematical narratives. This process—especially in postcolonial states—amounts to a subtle form of *knowledge purification* under the guise of technical rigor (Abdullah & Tan, 2021)

Valverde et al. (2002) emphasize that textbooks function as mirrors of national curricular ideologies, rather than mere instructional sequences. Textbooks are increasingly recognized as ideological texts that encode cultural values, political norms, and epistemological priorities. Gramsci's (Abdullah & Tan, 2021) concept of *cultural hegemony* is especially relevant here. He argued that ruling classes maintain dominance not through coercion, but through the institutionalization of their ideology as "common sense." Applied to mathematics education, this means that textbook authorities decide what counts as legitimate knowledge—and whose history is worth telling. Textbook content is often shaped not merely by pedagogical concerns but by broader negotiations of cultural legitimacy (Altbach, 1991).

Spivak's (1988) theory of *subaltern silence* adds a sharper lens. When textbooks omit the contributions of Indian or Islamic mathematicians to the history of π, this is not merely absence—it is structural exclusion. It silences alternative epistemologies and denies students the opportunity to see themselves reflected in the global history of knowledge (Ismail, 2022). Said's (1978) work on *Orientalism* further exposes the dynamics of cultural representation. By constructing non-Western knowledge as inferior or peripheral, Western narratives elevate their own rationality as universal. In school mathematics, this manifests in the glorification of figures like Euclid and Archimedes, while Indian pioneers such as Madhava or Islamic polymaths like Al-Kashi remain omitted (Zhang, 2020).

Lefebvre's (1991) *spatial theory* contributes to our understanding of how knowledge is spatially encoded. In textbooks, geometric forms are not value-neutral—they function as political symbols. The frequent appearance of circular city parks or colonial-era architecture in the Malaysian textbook suggests a spatial ideology embedded in the very layout of problems.

Bhabha (1994) complicates the binary of domination and resistance by introducing *cultural hybridity*. He argues that postcolonial narratives often operate in ambivalent spaces, where appropriation and negotiation coexist. The use of both traditional and modern imagery in Chinese textbooks—e.g., paper-cutting alongside Ferris wheels—can be seen as a hybrid discourse negotiating between cultural pride and global modernity.

Skovsmose (2005) provides a functional tool for analyzing these processes through the concept of *recontextualization*—the idea that mathematical knowledge gains meaning only within specific sociocultural contexts. He argues that textbooks do not just transmit knowledge; they construct the conditions under which knowledge becomes legitimate.

Together, these frameworks suggest that mathematics education is never culturally empty. What remains under-theorized, however, is the intersection between *epistemic silence*, spatial design, and hybrid cultural negotiation within textbook discourse. This study aims to contribute to that gap by examining how three textbooks construct—or erase—cultural meaning in the teaching of π.

Methodology: Comparative Postcolonial Textbook Discourse Analysis

This study employs **qualitative textual analysis**, combining **postcolonial discourse analysis** and **comparative textbook research** to examine how three middle school mathematics textbooks represent the circle and the constant π. The goal is to identify how cultural narratives are embedded, authorized, or silenced within mathematics instruction, and to interrogate whose mathematical histories are granted legitimacy.

As Apple and Ernest (1992; 1991) argue, textbooks are not neutral tools of instruction but ideological instruments. In postcolonial contexts, textbook design becomes an arena for negotiating national identity, cultural sovereignty, and historical memory (Pingel, 2010). Therefore, our analysis addresses both the explicit content and the silent absences across language, imagery, and historical narration.

Textbook Selection

The study analyzes three widely used government-approved textbooks:

- **Renjiao (China)**: Grade 9, national standard edition by People's Education Press
- **Shanghai Edition (China)**: Grade 6, locally authored edition
- **Malaysia Form 2 Mathematics**: KSSM national curriculum textbook approved by the Ministry of Education Malaysia

All three textbooks contain dedicated sections on the circle and π, including definitions, problem sets, historical inserts, and illustrative diagrams. The Renjiao edition represents a centralized state narrative; the Shanghai edition reflects localized cultural articulation; the Malaysian textbook emerges from a multiethnic, postcolonial curriculum balancing national unity and cultural sensitivity.

Analytical Framework

The analysis integrates Pingel's (2010) UNESCO framework for textbook research with Skovsmose's (Skovsmose, 2005) concept of *recontextualization* and Spivak's (1988) theory of *epistemic silence*. Four core dimensions are used to guide data collection and interpretation:

Cultural Embeddedness
– Are local cultural symbols, traditional motifs, or national landmarks included?

1. **Historical Narration of π**
   – Which civilizations or figures are referenced in the history of π? Does the narration imply epistemic ownership?
2. **Visual and Linguistic Style**
   – Are images symbolic or purely technical? Is the language descriptive, metaphorical, or ideologically charged?
3. **Cultural Silence**
   – Which historical traditions are omitted? Are certain civilizations structurally erased or backgrounded?

Coding and Analysis Procedures
Each textbook's circle unit was segmented into:

- Unit introductions and epigraphs
- Example problems and illustrations
- Historical content and readings
- Practice questions and visual layout

Thematic coding was informed by established principles of qualitative content analysis (Krippendorff, 2004). Text blocks were manually coded according to the four analytic dimensions. Images were separately catalogued and analyzed for background, cultural reference, and spatial symbolism. Patterns of inclusion and exclusion were recorded and triangulated.
Contextual documents such as government textbook policy reports (e.g., MOE China 2021) were consulted to support discursive interpretation.

Methodological Positioning
This research takes a reflexive, interventionist approach to textual analysis. It does not aim to describe textbooks passively but to expose the ideological work performed through silences, symbols, and selectivity. In line with Gramsci's (1971)concept of education as cultural hegemony and Spivak's (1988) call to listen for subaltern voices, this study is positioned not only as a critique of curricular neutrality but as an attempt to theorize knowledge politics in mathematics education.

Analysis and Findings: Cultural Embedding and Epistemic Silence
This chapter presents the comparative analysis of three mathematics textbooks across four analytical dimensions: cultural embeddedness, historical narration of π, visual and linguistic style, and cultural silence. The findings reveal deep contrasts in how mathematical knowledge is contextualized—or decontextualized—in China and Malaysia.

Cultural Embedding: China's National Narrative Strategy
In both the Renjiao and Shanghai editions of Chinese mathematics textbooks, the concept of the circle is deeply embedded in cultural, aesthetic, and national contexts. This cultural embedding goes beyond surface-level illustrations; it is a deliberate discursive practice that links mathematical knowledge with Chinese heritage and identity construction.

In the Renjiao textbook (Grade 9), the unit on the circle opens with a reflection on its aesthetic and philosophical significance. A quote from Pythagoras describes the circle as "the most beautiful shape," and this idea is localized through contextual examples such as the **Zhaozhou Bridge**, a Tang dynasty stone arch bridge presented as an application of circular geometry (Renjiao, P82). The exercise that follows asks students to analyze the "semi-circular" structure and compute the arch's span using circumference formulas, reinforcing a link between national heritage and mathematical reasoning.

The Renjiao textbook embeds the concept of the circle within a rich tapestry of national imagery and cultural symbolism. Rather than presenting circularity in purely abstract or technical terms, it introduces the shape through scenes and objects grounded in **Chinese social, athletic, and architectural life**. The **Mongolian yurt**, for example, represents ethnic heritage and spatial geometry in daily living. The **Olympic rings** signify international harmony and movement, while also referencing China's involvement in global sports culture. The **traditional Chinese pavilion** connects circular structures to classical aesthetics and engineering. **The athletics starting track**, a setting familiar to students, transforms the geometry of lanes and arcs into an accessible context.

These images are not random—they form a cohesive semiotic field around the circle as a **symbol of unity, endurance, and civilization**. The aesthetic selection contributes to what Skovsmose (2005) calls the "recontextualization" of mathematical knowledge: relocating abstract content into lived cultural narratives.

Figure 1 visually summarizes these culturally embedded illustrations from the Renjiao (China) mathematics textbook.

Figure 1 Cultural and symbolic illustrations of circular forms in the Renjiao (China) mathematics textbook.

The images include a Mongolian yurt, Olympic rings, Chinese pavilion, athletic tracks, and the Zhaozhou Bridge. Each symbolizes a different facet of circular geometry embedded in cultural identity, national pride, or aesthetic representation.

The Shanghai edition (Grade 6) further intensifies cultural embedding by integrating **images of paper-cutting window design**, **porcelain plates**, and **traditional fans** (P35–46), all used as contextual prompts for measuring area and circumference. Particularly notable is the problem comparing **tuanshan (round fans)** and **folding fans** in Example 7 (P45). Students are asked to determine which design holds more surface area and which is "more suitable for cooling in summer," subtly encouraging reflection on the symbolic and functional roles of circularity in Chinese material culture.

The cover page of the unit features the **FAST (Five-hundred-meter Aperture Spherical Telescope)**—the largest single-dish radio telescope in the world, located in China. Although not mathematically elaborated upon, its image functions symbolically, positioning circular geometry within a narrative of national scientific modernity.

See Figure 2 for a visual summary of these elements in the Shanghai edition.

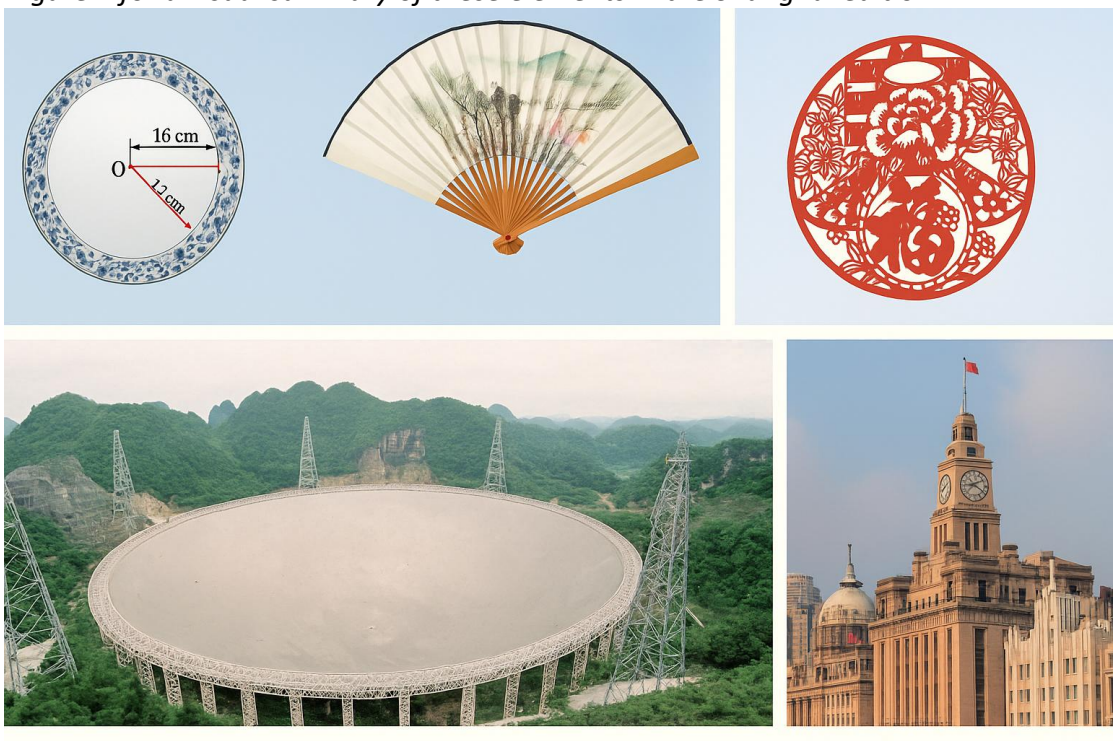

Figure 2 Cultural representations of circularity in the Shanghai edition mathematics textbook.

This collage includes visual elements such as the FAST radio telescope, a porcelain plate, a traditional folding fan, a paper-cut window decoration, and the Customs House on the Bund. These images embed mathematical concepts—particularly the circle—in cultural artifacts, national symbols, and everyday aesthetics, reflecting a pedagogical strategy of linking geometry with Chinese heritage and modernization.

These strategies exemplify what Skovsmose (2005) terms the *recontextualization* of mathematics, where abstract concepts are embedded in cultural practices. Apple (1992)

reminds us that textbooks are not neutral tools but are central to cultural reproduction. Gramsci's (1971) concept of *cultural hegemony* also applies: these embedded narratives normalize Chinese epistemic authority within mathematics, presenting it not as local knowledge but as part of a universal truth—authored by the nation.

π and Epistemic Ownership in Chinese Textbooks

In the treatment of π's historical origins, the Chinese and Malaysian textbooks adopt sharply divergent strategies. The Chinese editions engage in a deliberate act of *epistemic ownership*, integrating π into a national mathematical lineage. The Malaysian textbook, by contrast, offers a dehistoricized account, framing π as an abstract, context-free constant.

In the Renjiao textbook (Grade 9, P109), a section titled "The Quest for Pi" presents ancient Chinese mathematician **Zu Chongzhi** as the first in the world to approximate π between 3.1415926 and 3.1415927. The narrative emphasizes this as "a global breakthrough ahead of its time," situating it within a proud civilizational frame. The text references canonical Chinese works such as *The Nine Chapters on the Mathematical Art* and *Mo Jing*, attributing the origin of the area formula of a circle to the pre-Qin period.

The Renjiao textbook narrates the history of π through Liu Hui's geometric algorithm and Zu Chongzhi's accurate approximation. This narrative culminates in symbolic imagery, as seen in the inclusion of a national stamp honoring Zu

Similarly, the Shanghai edition (Grade 6, P48) includes a full-page reading on **Liu Hui's method of circular dissection** and Zu Chongzhi's accuracy. The narrative states explicitly: "Zu Chongzhi's results were more than a thousand years ahead of the West." The layout features traditional instruments like the compass and the abacus, visually reinforcing a techno-cultural identity narrative.

Both Chinese textbooks narrate the history of π through national figures, presenting Zu Chongzhi as having calculated π to seven decimal places more than a millennium before the West, and Liu Hui as the originator of the polygonal approximation method.

Figure 3 illustrates these historical renderings in both the Renjiao and Shanghai editions, combining visual and textual methods to situate π within China's intellectual tradition.

Figure 3 Historical depictions of π in the Renjiao and Shanghai mathematics textbooks.

The left panel shows a commemorative stamp of Zu Chongzhi issued by the Chinese government and featured in the Renjiao textbook. The center and right panels, from the Shanghai edition, present portraits of Liu Hui and Zu Chongzhi, accompanied by textual descriptions of Liu's "cutting a circle" algorithm and Zu's approximation of π between 3.1415926 and 3.1415927. These illustrations blend cultural symbolism with historical mathematics to position π as part of China's intellectual legacy.

In stark contrast, the **Malaysian Form 2 textbook** (P88) defines π as "an irrational number usually taken as 22/7 or 3.14 ," and offers no historical background. There is no mention of **Archimedes**, **Madhava**, **Al-Kashi**, or any other figure. This creates a pedagogical illusion of mathematical universality, where knowledge seems to exist outside of time, place, and culture.

D'Ambrosio (1985) argues that the history of mathematics is a tapestry of intercultural contributions—not the product of a single civilization. When textbooks either narrate only one tradition or omit the history altogether, they reinforce knowledge hierarchies. Said's (1978) critique of *Orientalism* helps us see how non-Western knowledge has often been rendered invisible in favor of Western rationality. Here, however, the Chinese textbooks reverse this logic, asserting their own narrative of mathematical civilization.

This localized narration of π serves what Apple (1992) calls the *textbook discourse field*, where knowledge becomes a site for producing identity, not just information. The Chinese approach situates π within a legacy of national scientific pride. The Malaysian silence, arguably intended to maintain cultural neutrality in a multiethnic society, results in epistemic marginalization—where indigenous or regional mathematical contributions are silently erased.

Decontextualization and Cultural Silence in Malaysian Textbooks
In contrast to the narrative richness of Chinese textbooks, the **Malaysian Form 2 mathematics textbook** presents a striking example of *cultural silence*. The treatment of the circle and π is highly technical, stripped of historical reference, visual symbolism, or regional identity. This silence is not accidental—it reflects a broader ideological pattern of *decontextualization* and *epistemic erasure* (Spivak, 1988).

Chapter 5 ("Circles") begins with a definition: "A circle is a set of points equidistant from a center." The value of π is introduced as "an irrational number, approximated as 3.14 or 22/7," and no historical information follows. There is no mention of Archimedes, Madhava, Zu Chongzhi, or Al-Kashi. Unlike the Chinese textbooks, which devote full pages to historical figures and textual traditions, the Malaysian edition renders π as a context-free constant.

While the Malaysian Form 2 textbook generally avoids cultural embedding, two notable exceptions offer insight into its limited engagement with socio-cultural context. One is a task involving a **round wedding table**, where students are asked to calculate the length of skirting needed to wrap around it. Although not marked by ethnic or historical specificity, the scenario is socially meaningful and grounded in everyday life. Another example is **Example 17 (P92)**, which references **Melaka**, a historical Malaysian city, in the context of designing a public recreational park. Despite this regional naming, the accompanying diagram is highly

abstract—consisting of geometric curves with no visual reference to local architecture or cultural aesthetics. These two cases illustrate the textbook's cautious strategy: offering sparse cultural framing in the text, while the visual representation remains decontextualized and technically neutral. Across these examples, π appears as an engineering tool, and the circle as a design element—never as a cultural signifier. D'Ambrosio(1985) warns that such "neutrality" is often a disguise for Western epistemic dominance, in which local traditions are omitted to preserve a standardized canon.

Figure 4 illustrates these two relatively culture-anchored problems in the Malaysian Form 2 textbook.

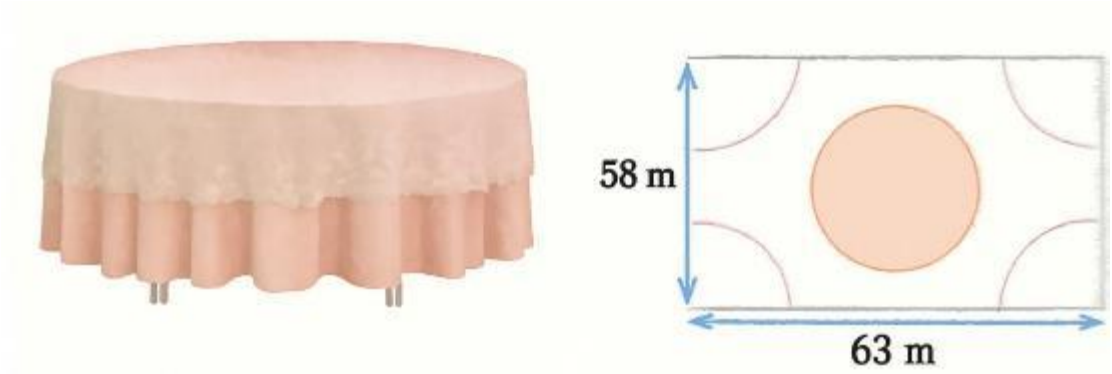

Figure 4 Selected culturally contextualized illustrations from the Malaysian Form 2 mathematics textbook.

While most illustrations in the textbook are technically abstract and culturally neutral, two problems introduce subtle cultural framing. One involves a wedding table, reflecting social ceremonial life; the other references Melaka in the context of a recreational park, although the accompanying diagram remains stylized and devoid of local visual elements.

Spivak (1988) argues that silence is not the absence of voice, but the *result of structural exclusion*. In postcolonial education, especially in nations navigating ethnic pluralism and colonial curricular inheritance, such erasures are a way to avoid political tension at the cost of cultural erasure (Ismail, 2022).

As Pingel (2010) notes, "what textbooks omit is often as meaningful as what they include." When π is presented without origin, students are denied access to the idea that mathematics is a product of human cultural diversity. This erasure reduces mathematical identity to a technical function, bypassing the historical labor and cultural imagination embedded in the development of concepts like π.

In the Malaysian case, this silence is especially striking given the region's long engagement with Indian and Islamic mathematics. Contributions such as **15th-century Melakan celestial navigation** or **Islamic geometric symmetry** are nowhere to be found. The textbook design thus reflects what Apple (1992) calls an ideological framework of curricular containment: knowledge is legitimated not by complexity, but by conformity to imported norms.

Visual and Linguistic Encoding of Ideology

Images and language in mathematics textbooks are not neutral—they are sites of ideological inscription. As Lefebvre (1991) argued, *space is not a given; it is produced through power*

relations. In educational materials, the visual and linguistic framing of concepts such as the circle plays a crucial role in constructing epistemological authority.

The Chinese textbooks consistently use **high-resolution, full-color photographs** of culturally resonant objects: the Zhaozhou Bridge, lotus leaves, porcelain plates, traditional fans, and the Shanghai Ferris wheel. These are not merely illustrative; they are symbolic anchors. For example, in the Shanghai edition (P40), the image of a **giant lotus leaf** is paired with the prompt: "Observe the elegance of circular patterns in nature," blending geometry with aesthetic appreciation and ecological identity.

By contrast, the **Malaysian Form 2 textbook** relies almost entirely on **monochrome schematic diagrams**—fans, wheels, flower beds—rendered without environmental context. Even when local architecture is shown (e.g., a historical Malaysian city Melaka in Example 17, P92), it appears as a purely geometric object. The visual "sanitization" here is not incidental; it aligns with the textbook's overall decontextualization strategy.

In terms of language, the difference is equally stark. The Chinese textbooks employ **emotionally resonant phrases** such as "the most beautiful shape," "ancient wisdom," and "national contribution," embedding cultural pride within mathematical narration. The Malaysian textbook, by contrast, uses **procedural, command-based phrasing**: "Find the circumference," "Calculate the area." The absence of narrative tone reflects a design choice favoring abstraction over cultural connection.

As Apple (1992) observed, textbook language functions ideologically—it communicates what counts as legitimate knowledge and how it should be perceived. Bhabha (Bhabha, 1994) adds that postcolonial discourse often operates in *hybrid spaces* where neutrality is rhetorical, masking deep structural bias.

One illustrative example is Example 7 in the Shanghai edition (P45), which compares **tuanshan (round fans)** and **folding fans**, prompting students not only to calculate surface area but to reflect: "Which design cools better in summer? Which one carries more cultural meaning?" This demonstrates an intentional fusion of geometry and material culture.

In sum, the way images and language are encoded in textbooks affects not just how students learn mathematics, but how they understand the cultural life of mathematical ideas.
To visually summarize the cultural differences identified in the preceding analysis, the following table compares the three textbooks across four key dimensions: cultural embeddedness, historical narration of π, visual style, and linguistic style. This comparative overview synthesizes the core findings of Chapter 4 and provides a structured basis for the discussion in the following chapter.

Table 1
Comparative Cultural Presentation in Mathematics Textbooks (China and Malaysia)

Dimension	Renjiao (China)	Shanghai (China)	Malaysia (Form 2)
Cultural Embeddedness	Mongolian yurt, Olympic rings, Chinese pavilion, athletic tracks, the Zhaozhou Bridge	FAST radio telescope, a porcelain plate, a traditional folding fan, a paper-cut window decoration, Customs House	Neutral contexts like wedding tables, clocks
Historical Narration of π	Liu Hui, Zu Chongzhi, Nine Chapters, π = 355/113	Liu Hui & Zu Chongzhi, emphasize being 1000 years ahead of the West	π defined as 22/7, no historical context
Visual Style	Color photographs, historical-cultural settings	Color photos with descriptive text	Simple diagrams, lacking cultural context
Linguistic Style	Emotive phrases: 'most beautiful shape', 'ancient wisdom'	Aesthetic language and applied reasoning combined	Instructional, functional phrasing
Epistemic Orientation	Cultural confidence, nationalized knowledge narrative	Regional culture integrated into national discourse	Decontextualized technical representation

Note. This table summarizes the cultural, historical, visual, and linguistic strategies observed in the presentation of the circle and π in three official middle school mathematics textbooks. The four analytical dimensions are drawn from the recontextualization and epistemic silence framework (Pingel, 2010; Skovsmose, 2005; Spivak, 1988).

Discussion: Textbook Discourse, Knowledge Politics, and Postcolonial Negotiation
The findings of this study reveal that the representation of the circle and π in Chinese and Malaysian mathematics textbooks is not merely a matter of instructional design but a manifestation of deep-seated cultural politics. This discussion section reflects on three dimensions: *epistemic reterritorialization*, *structural silence*, and *postcolonial hybridity*.

Reterritorializing Mathematics: Cultural Confidence and National Narratives
Chinese textbooks construct π as a civilizational achievement. Through narratives about **Zu Chongzhi** and **Liu Hui**, and symbolic imagery such as **paper-cutting**, **porcelain**, and the **FAST telescope**, the textbooks reinsert mathematical knowledge into a national epistemic lineage. This process aligns with D'Ambrosio's (D'Ambrosio, 1985) concept of *cultural reterritorialization*—reclaiming global mathematical symbols by embedding them in local histories.

Gramsci (1971) reminds us that hegemony is achieved when power becomes embedded in what is perceived as "common sense." The repeated use of culturally coded phrases like "the most beautiful shape" and the strategic inclusion of traditional imagery in Chinese textbooks reflect a project of national epistemic assertion.

Cultural Neutrality and the Legitimization of Silence
The Malaysian textbook takes an opposing approach, embracing what appears to be *cultural neutrality*. π is introduced without historical attribution; problems are framed around neutral

scenarios like fountains and flowerbeds; regional mathematical traditions are omitted entirely.

Spivak (1988) warns that *epistemic silence* is never accidental—it results from institutional choices. Pingel (2010) argues that textbook silence often reflects *state strategies for managing identity politics*. In Malaysia, the attempt to avoid privileging any one ethnic narrative produces a curriculum that avoids culture altogether, thereby inadvertently erasing cultural connection and mathematical identity.

Visual and Linguistic Encoding as Ideological Practice

Textbook images and language function as ideological instruments. Following Lefebvre (1991), we understand that spatial and visual representations in education are *produced spaces*, designed to signify inclusion or exclusion. The Chinese textbooks use symbolic images—**lotus leaves**, **round fans**, **ancient bridges**—to embed mathematics in lived culture. Malaysian textbooks, on the other hand, strip away cultural resonance, turning mosque domes into blank forms.

Yet, as Bhabha (1994) argues, discourse is never fully dominated or pure. Hybridity creates spaces for *negotiation*. The Shanghai edition's juxtaposition of **traditional fans** and **modern design** hints at a hybrid pedagogy—one that reconciles tradition with technical modernity. These "in-between" spaces are where postcolonial agency resides.

Toward a Postcolonial Mathematics Pedagogy

Chinese textbooks present a *resistant epistemology*, but also reproduce their own silences—excluding Indian and Islamic mathematical contributions. Malaysian textbooks reflect a *compromised technical epistemology*, avoiding cultural tension but sacrificing historical richness and identity resonance.

Said (1978) reminds us that "who gets to narrate history is not merely an academic question, but one of cultural sovereignty." The ways in which π is taught—who is named, whose contributions are emphasized—shape not only what students learn but what they forget, and whether they can see themselves as participants in the global history of mathematics.

Conclusion and Implications for Postcolonial Mathematics Education

This study examined how the circle and π are represented in three middle school mathematics textbooks from China and Malaysia, using a framework that combines postcolonial discourse analysis, textbook research, and cultural theory. It demonstrated that mathematics education is never culturally neutral. Rather, textbooks function as discursive tools for shaping cultural identity, epistemic legitimacy, and political memory.

Summary of Core Findings

Chinese textbooks engaged in what D'Ambrosio (1985) terms *epistemic reterritorialization*—embedding mathematical knowledge in national narratives of civilizational pride. Through stories of Liu Hui and Zu Chongzhi, and images of traditional fans, bridges, and scientific symbols like the FAST telescope, mathematics becomes an expression of heritage.

Malaysian textbooks, by contrast, employ a strategy of *cultural neutrality*, omitting historical context and cultural references. This creates what Spivak (1988) identifies as *epistemic silence*—a structure that excludes alternative knowledges under the guise of universality. As Pingel (2010) explains, silence in textbooks reflects political decisions, especially in multiethnic states where curricular sensitivity often leads to decontextualization.

Visually and linguistically, Chinese textbooks encode national identity through emotionally charged phrases and symbolic imagery. Malaysian textbooks, in contrast, present mathematics in abstract, depersonalized formats—where π becomes a number without origin, and circles are shapes without story.

According to Pingel (2009), textbook development in multicultural societies must go beyond neutrality toward inclusive representation.

Pedagogical Implications and Practice

Cultural embedding in mathematics is not ideological manipulation—it is an opportunity to reconnect knowledge with belonging and to pluralize epistemologies in education.

Chinese textbooks offer a valuable model for how mathematics can be localized and narrated through cultural references. However, their omission of non-Chinese contributions (e.g., Indian or Islamic traditions) signals the risk of turning cultural confidence into cultural exclusion.

The Malaysian case highlights the cost of neutrality: when culture is erased to avoid ethnic tension, students lose access to narratives that reflect their own heritage. Re-inserting culturally symbolic examples—such as Melakan navigation, Islamic geometry, or Malay architecture—would restore mathematics as a lived cultural practice.

Toward a Plural and Reflexive Mathematics Curriculum

As Said (1978) warned, *"Who gets to tell the history of knowledge is a question of sovereignty."* This study has shown that even a concept as seemingly neutral as π becomes a battleground for cultural voice, historical presence, and epistemic recognition.

Future research should explore:

- Comparative studies across more nations and curriculum systems;
- Student responses to culturally rich versus silent textbooks;
- Teachers' roles in supplementing silence and introducing cultural hybridity in class.

In rethinking mathematics education through a postcolonial lens, we begin not by abandoning rigor, but by reclaiming the voices erased in the name of neutrality.

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