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Enumeration rules and numeracy problems in tourism activities

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Abstract

School mathematics is designed to equip students with foundational mathematical knowledge while simultaneously fostering mathematical literacy, including numeracy, essential for effective problem-solving. Achieving these objectives requires students to engage with mathematics through contexts that are relevant to their prior knowledge and lived experiences, thereby facilitating a more meaningful mastery of mathematical concepts and literacies. The tourism sector offers a rich context for such engagement, presenting opportunities to connect enumeration rules and numeracy with real-world scenarios. This study investigates the integration of enumeration rules and numeracy through tourism-based learning activities situated in Kerinci, Jambi. The aim is to inform the development of learning resources that are locally relevant and reflect the authentic experiences of students. Employing an exploratory qualitative methodology, this research involved field observations and semi-structured interviews with local tourism practitioners and mathematics educators. Thematic analysis was conducted to identify genuine tourism-related activities in Kerinci that illustrate the application of enumeration principles and numeracy skills. Findings indicate that a range of tourism activities including selecting transportation modes, accommodations, destinations, travel routes, and tourist attractions are inherently linked to enumeration (determining the number of possible choices) and numeracy (applying quantitative reasoning to make optimal decisions). By situating enumeration and numeracy within everyday tourism practices, this study demonstrates how local contexts can enhance mathematics instruction. The results provide a foundation for future design research focused on developing and evaluating instructional trajectories that incorporate local tourism scenarios into mathematics teaching, particularly regarding enumeration and numeracy concepts.

Keywords: Enumeration Rules, Exploration Study, Kerinci Tourism, Numeracy Problems, Tourism Context

Introduction

Integrating abstract mathematical concepts with students' everyday experiences has been widely demonstrated to boost engagement and deepen conceptual understanding in mathematics education (Freudenthal, 1991; Arthur et al., 2018). Context-based pedagogies empower learners to view mathematics not simply as a collection of procedures, but as a meaningful discipline intertwined with daily life (Boaler, 2016; Gravemeijer & Doorman, 1999). When mathematical ideas are situated in familiar settings, students' numeracy develops in more authentic and lasting ways (Niss, 2003; OECD, 2018). Therefore, selecting relevant and relatable contexts is crucial for designing effective mathematics instruction aimed at fostering both engagement and higher-order thinking skills (Stillman et al., 2016; Verschaffel et al., 2000).

Tourism offers a context with substantial potential for mathematics learning, particularly for Indonesian high school students. In regions like Kerinci, tourism is an integral component of the local social and cultural fabric. Topics such as destinations, travel routes, and budgeting routinely appear across disciplines, including geography and economics, making them accessible and compelling for students. Observations and interviews confirm students' keen interest and prior experiences with tourism-related tasks like itinerary planning, destination comparison, and cost estimation activities that inherently require mathematical reasoning (de Lange, 2003; Stohlmann et al., 2012). These practices exemplify applications of route optimization, scheduling, and decision-making under constraints, directly connecting to fundamental mathematical concepts in combinatorics and counting principles (van den Heuvel-Panhuizen, 2003; Kaiser & Willander, 2005). Tourism, thus, emerges as both an engaging and culturally meaningful context as well as a rich pedagogical foundation for nurturing numeracy and combinatorial thinking.

Despite the recognized value of authentic contexts, there remains limited research on employing tourism-based scenarios to teach advanced mathematical concepts such as combinatorics. Existing studies primarily emphasize real-world problems' contributions to motivation and comprehension (Stohlmann et al., 2012; van den Heuvel-Panhuizen, 2003), but few address higher-order topics like permutations and combinations. Furthermore, the instructional effectiveness of such contexts for conveying specific mathematical principles is seldom systematically evaluated (Stillman et al., 2016; Silver et al., 2009). This research gap highlights the need for further exploration of tourism as a context for teaching enumeration rules.

Planning and executing travel itineraries frequently necessitate the use of counting principles, such as permutations and combinations. Whether learners select sequences of destinations or consider multiple routes, they naturally engage with these underlying mathematical ideas, often intuitively but without formal recognition (Chan, 2013). Embedding such scenarios in classroom practice creates opportunities to bridge students' real-life experiences with formal mathematics, making abstract concepts more tangible and relevant (Silver et al., 2009; English, 2009). In this regard, leveraging tourism contexts in teaching counting principles may offer both pedagogical coherence and increased learner motivation.

Research supports that authentic contexts facilitate critical thinking, problem-solving, and transfer of learning in mathematics education (Lesh & Doerr, 2003; Boaler, 1998). However, to maximize their educational value, contexts must be carefully aligned with targeted mathematical concepts (Stillman et al., 2016; Blum & Leiss, 2007). Misalignment risks turning context into a distraction instead of a bridge to deeper understanding (Ainley et al., 2006; Gal & Tout, 2014). Thus, assessing the pedagogical relevance of tourism for counting rules requires intentional instructional design anchored in educational theory and substantiated by empirical research. This study addresses the question of how tourism activities can be identified, analyzed, and transformed into mathematics tasks that authentically embody enumeration rules and numeracy challenges.

Research by Artigue (2009) affirms that real-life settings, such as event planning and travel, can facilitate learning of advanced mathematical concepts when these are integrated into structured instructional progressions. Artigue's local instructional theory suggests that contextual learning is most effective when grounded in learners' cultural and social realities while retaining conceptual rigor (Artigue, 2009; Gravemeijer, 1994). Still, achieving productive transfer from context to concept necessitates instructional scaffolding and careful examination of the mathematical potential within chosen scenarios (Schoenfeld, 2002; Bakker, 2018). Accordingly, this study explores tourism activities in Kerinci, identifying their mathematical affordances to inform future design research on learning trajectories for counting principles.

Given the current literature, a notable research gap persists regarding the use of tourism as a context for combinatorial mathematics, particularly in teaching permutations and combinations. Tourism inherently involves choices, sequencing, and constraint-based decision-making, which map directly onto key ideas in combinatorics (English, 2009; Silver et al., 2009). Yet without focused research evaluating their instructional potential, these connections remain theoretical. Therefore, this study seeks to identify tourism-based activities that generate enumeration and numeracy problems, with the aim of developing contextually relevant numeracy resources that can inform future instructional design research for teaching counting principles.

Methods

This study utilized an exploratory qualitative design to investigate how tourism activities in Kerinci, Jambi can embody enumeration rules and numeracy challenges for mathematics education. Data collection involved field observations and semi-structured interviews with local tourism practitioners and mathematics educators. Tourism activities at sites familiar to students were documented and analyzed to identify authentic scenarios reflecting permutation and combination principles, which were subsequently reformulated as potential learning resources.

The focus on the Kerinci region, known for its rich natural and cultural tourism, offers contextually grounded findings with potential transferability to similar tourism settings elsewhere in Indonesia and beyond. Qualitative exploratory research is well-suited for examining how real-world contexts can inform instructional design by revealing nuanced relationships between students' experiences and mathematical concepts (Creswell & Poth, 2018; Merriam & Tisdell, 2016).

The researcher acted as the primary instrument in data collection, employing their interpretive skills to capture the social and educational significance of the tourism context (Patton, 2015). Triangulation between observations and interviews enhanced data credibility (Denzin, 2012; Yin, 2018). Thematic analysis proceeded through open coding to identify key tourism activities, axial coding to link these activities with relevant mathematical principles, and selective coding to refine themes highlighting authenticity and pedagogical relevance.

To ensure trustworthiness, strategies such as triangulation and member checking were implemented. The latter involved sharing interpretations with participating students for validation, supporting credibility and confirmability (Lincoln & Guba, 1985; Shenton, 2004; Anney, 2014). The findings contribute to designing culturally responsive, contextually meaningful mathematics learning resources that foster students' numeracy development through engagement with real-life tourism activities.

Results and Discussion

Choosing a Route to Kerinci

Kerinci's geographical isolation within the Bukit Barisan mountain range results in diverse access routes from various regions of Sumatra and beyond. For example, travelers from Jambi may fly via Muara Bungo or travel by land through Bangko, while those from West Sumatra often choose scenic land routes such as Tapan or Muara Labuh (see Table 1). Visitors from Jakarta or international locations like Singapore typically reach Kerinci by flying through Jambi or Padang airports (see Figure 1). This diversity of travel options offers a meaningful context for teaching permutation principles by engaging students in constructing mathematical tasks that require identifying and enumerating all possible travel combinations based on origin city, route choices, and mode of transportation.

Table 1. Some alternative routes to Kerinci

Departure City	Common Route	Description
Jambi and other cities in Jambi	• Muara Bungo > Kerinci (by air) • Bangko > Kerinci	Only one air travel option from Jambi (DJB) to Kerinci (KRC) with a transit at Muara Bungo (BUU)
Pekanbaru and other cities in Riau	• Jambi > Muara Bungo > Kerinci (by air) • Jambi > Bangko > Kerinci • Bukittinggi > Solok > Bangko > Kerinci • Bukittinggi > Solok > Muara Labuh > Kerinci	Three route options from Riau to Kerinci are mostly land-based, except if flying via DJB to KRC
Padang and other cities in West Sumatra	• Tapan > Kerinci • Muara Labuh > Kerinci • Muara Bungo > Kerinci (by air) • Bangko > Kerinci	All options from West Sumatra to Kerinci are by land
Bengkulu and other cities in Bengkulu	• Tapan > Kerinci • Lubuk Linggau > Bangko > Kerinci	All options from Bengkulu to Kerinci are by land

Departure City	Common Route	Description
Palembang and other cities in South Sumatra	• Jambi > Muara Bungo > Kerinci (by air) • Jambi > Bangko > Kerinci • Lubuk Linggau > Bangko > Kerinci • Sekayu > Bangko > Kerinci	Only one air route from Jambi (DJB) to Kerinci (KRC) transits at Muara Bungo (BUU)
Cities in other provinces in Sumatra	• Jambi > Kerinci • Padang > Kerinci	Visitors may first fly to Padang (PDG) or Jambi (DJB), or travel by land before continuing to Kerinci
Cities outside Sumatra	• Jambi > Kerinci • Padang > Kerinci • Jakarta > Jambi > Kerinci • Jakarta > Padang > Kerinci	Visitors may fly to Padang (PDG) or Jambi (DJB) first, or transit through Jakarta (CKG) before continuing
Cities outside Indonesia	• Padang > Kerinci • Jakarta > Jambi > Kerinci • Jakarta > Padang > Kerinci	International tourists can fly into Jakarta (CKG) or Padang (PDG) before heading to Kerinci

Through these tasks, students practice combinatorial reasoning, beginning with listing all feasible travel sequences and progressing to generalizing patterns to calculate the total number of combinations by applying multiplication rules and permutations.

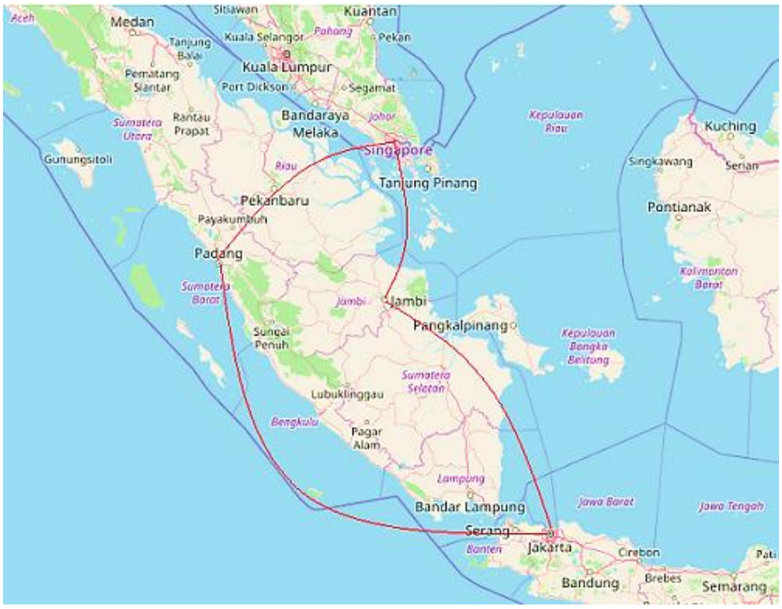

Figure 1. Flight to Kerinci

For example, in the figure 1, **t**here are no direct flights to Kerinci (Sungai Penuh), so tourists from various regions or countries must first fly to Jambi or Padang, for example, flying from Jakarta or Singapore. In this context, there are pedagogically, the variability in travel routes exemplifies authentic situations amenable to mathematical modeling through permutation and combination concepts. Although classroom implementation data were not collected, this approach aligns with the Realistic Mathematics Education (RME) framework, which posits that meaningful understanding arises through learners' interaction with genuine problem contexts (Gravemeijer & Terwel, 2000).

By listing all possible routes from multiple departure points to Kerinci, students can visualize combinations using tree diagrams or directly calculate totals using permutation formulas. Such real-world applications link abstract counting principles with contexts students find relevant, thereby enhancing their mathematical reasoning and modeling abilities (Sevinc & Lesh, 2022).

> ***Problem 1.*** *A tourist wants to travel from Jambi to Kerinci. There are two available travel options: by land or by air. If the tourist chooses the land route, there are possible paths like Jambi → Muara Bulian → Tebo → Bangko → Kerinci and Jambi → Muara Bulian → Sarolangun → Bangko → Kerinci. While, if the tourist chooses the air route, the tourist must go through Jambi → Bungo → Kerinci. How many different ways can the tourist choose to reach Kerinci from Jambi?*

For instance, Problem 1 illustrates the addition rule in counting within the context of choosing routes to Kerinci. Here, a tourist selects one route from two alternatives, each with a certain number of path options. The total number of ways to reach Kerinci is calculated by summing the options: 2 (land routes) + 1 (air route) = 3 possible ways.

Choosing Modes of Transportation

Transportation to Kerinci consists of combinations of air and land travel, influenced by factors such as airline availability, route schedules, and fare structures. For instance, tourists can fly into Jambi or Padang and continue their journey to Kerinci using minibus services like Gunung Kerinci or Sinar Gunung (see Table 2). Four main access points to Kerinci exist: via Bangko, Tapan, Muara Labuh, and by air through Depati Parbo airport (see Figure 2). These sequential travel options provide a concrete example of the rule of product in the presence of constraints.

Table 2. Various of transportation mode to Kerinci

Travel Route	Transportation Options	Description
Jakarta (CKG) > Jambi (DJB)	Garuda Indonesia, Citilink, Batik Air, Lion Air, Super Air Jet	Flights available daily, economy fares range from IDR 800,000 to 1.4 million
Jakarta (CKG) > Padang (PDG)	Garuda Indonesia, Citilink, Batik Air, Lion Air, Super Air Jet, Pelita Air	Flights available daily, economy fares range from IDR 1 million to 2.1 million
Jambi > Bangko > Kerinci	Gunung Kerinci, Safa Marwa, Kerinci Wisata, Anak Gunung	Mostly uses Toyota Hiace minibuses, fare IDR 200,000
Padang > Tapan > Kerinci	Sinar Gunung	Mostly uses Toyota Hiace minibuses, fare IDR 150,000
Padang > Muara Labuh > Kerinci	Gunung Kerinci, Safa Marwa, Kerinci Wisata, Sinar Gunung, Anak Gunung	Mostly uses Toyota Hiace minibuses, fare IDR 150,000
Jambi (DJB) > Muara Bungo (BBU) > Kerinci (KRC)	Susi Air	Flights only on Mondays and Fridays, fare IDR 400,000–500,000

From an instructional perspective, integrating authentic transportation data into numeracy tasks invites students to apply mathematical reasoning in practical, real-life travel planning scenarios. This approach advances mathematical literacy by prompting students to interpret transportation timetables, compare costs, and optimize their travel routes, consistent with the principles of contextualized mathematics education (Boaler, 1993; OECD, 2021).

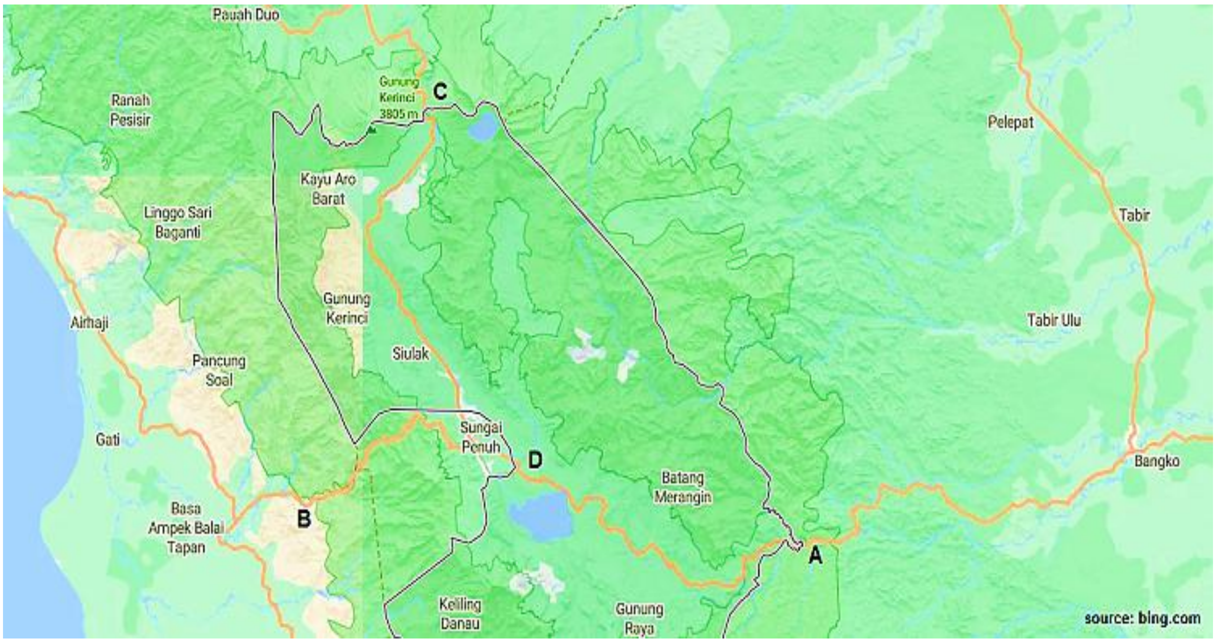

Figure 2. Kerinci only has three entry points by land, namely via Bangko (A), via Tapan (B), and via Muara Labuh (C) and one entry point by air via Depati Parbo airport (D)

Problem 2A exemplifies the enumeration rule in the context of available transportation to Kerinci:

> ***Problem 2A***. *A tourist from Jakarta travels to Kerinci via Padang. There are 5 different flight options from Jakarta to Padang, and 7 travel van services from Padang to Kerinci. How many different ways can the tourist travel from Jakarta to Kerinci?*

This question demonstrates the multiplication rule: the tourist must make a sequence of independent choices (flight and travel van). Therefore, the total number of combinations is calculated as $5 \times 7 = 35$ possible travel routes.

In contrast, Problem 2B provides a numeracy task contextualized by transportation data:

> ***Problem 2B***. *A traveler is comparing routes from Jakarta to Kerinci. The available options, along with durations and costs, are as follows (use midpoints for cost estimation):*

Route	*Duration*	*Cost*
Jakarta–Jambi	*1 hour 20 mins*	*IDR 800,000 – 1,400,000*
Jakarta–Padang	*1 hour 45 mins*	*IDR 1,000,000 – 2,100,000*
Jambi–Kerinci	*9 hours 30 mins*	*IDR 250,000*
Padang–Kerinci	*7 hours*	*IDR 150,000*

Which route offers the lowest total cost, and which offers the shortest total travel time? (Assume the time spent during transit is the same for all options).

This problem requires students to interpret data, estimate midpoints of cost ranges, apply basic arithmetic, and compare alternatives to make an informed decision. Teacher observations reveal that students often estimate using interval endpoints rather than midpoints, encouraging midpoint estimation in this context nurtures more realistic and robust mathematical literacy through authentic decision-making.

Choosing Accommodation

Accommodation in Kerinci is concentrated in three main regions: Sungai Penuh, Kayu Aro, and Semurup (see Figure 3). Each area offers unique amenities and proximity to attractions Sungai Penuh provides convenient central access and a wide range of hotels and guest houses, Kayu Aro is known for its highland scenery and proximity to tea plantations, and Semurup features more limited but strategically located lodging choices (see Table 3). This diversity creates opportunities for students to engage in enumeration and selection tasks, such as planning multi-day stays considering location and activity preferences.

Table 3. Lodging option in three key regions

Area	Lodging Options	Advantages
Sungai Penuh	Kerinci Grand Hotel, Hotel Kerinci, Hotel D'Vania, Hotel Mahkota, Hotel Aroma, Hotel Arafah, Hotel Jaya Wisata, Hotel Masgo, and various guest houses	Strategically located in the center of Kerinci, easier access to all destinations. Located in shopping centers for easier access to food and transport
Kayu Aro	Bintang Kerinci Hotel, Swarga Lodge, The Hills Kerinci, Family Resort, and various homestays	Strategically located in the highlands with many popular destinations. Cooler and more scenic with tea plantations and gardens
Semurup	Hotel Rindau and Hotel Berkah Atrama	Centrally located in Kerinci, closer to some attractions and administrative centers

Integrating these accommodation scenarios into classroom activities enables students to analyze both quantitative variables (distance, pricing) and qualitative factors (amenities, convenience), supporting modeling competencies and interdisciplinary connections between mathematics, tourism, and geography (Gainsburg, 2008).

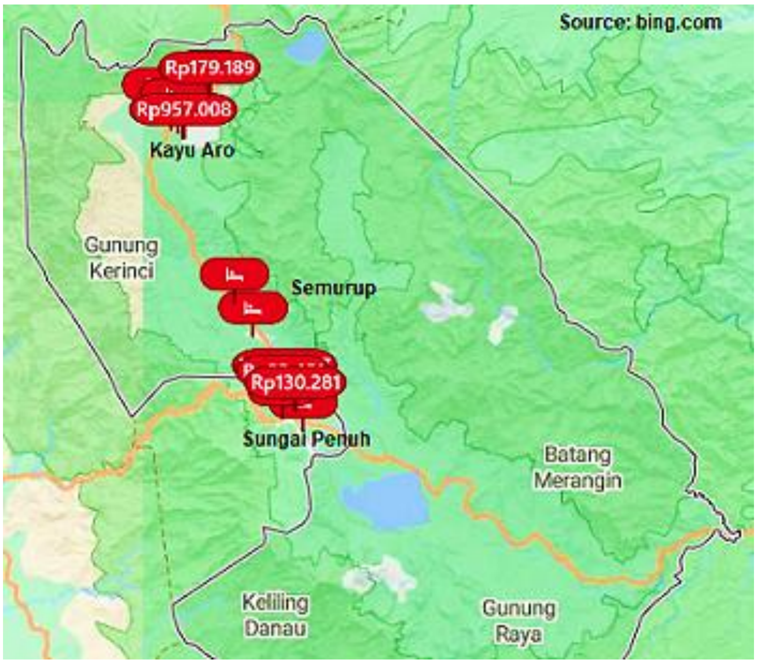

Figure 3. Hotel in Kerinci is mostly spread across two main regions: Sungai Penuh and Kayu Aro

Problem 3 is an example problem in enumeration rule that use context of accommodation options in Kerinci.

> ***Problem 3.*** *A tourist plans to explore various tourist destinations spread across Kerinci. The tourist decides to stay for two days and can choose to stay in one of the following places: Sungai Penuh, Kayu Aro, or Semurup. How many different options are there for choosing a place to stay for two days? (The tourist must stay in two different places each night).*

This problem involves choosing a place to stay each night, where the choice for the second night depends on the first. Thus, it's a classic case of the multiplication rule, either with or without repetition or a case of permutation if repetition not allowed. Total options: $3 \times 2 = 6$ ways because the tourist must stay in two different places.

Choosing Destinations

Kerinci features a diverse array of natural attractions, including Mount Kerinci, Lake Gunung Tujuh, and Telun Berasap Waterfall (see Table 4), each offering spectacular views (see Figure 4). These destinations vary in type ranging from mountains and lakes to waterfalls and provide different experiences such as hiking, boating, and sightseeing. This diversity presents rich opportunities for educators to design counting principal tasks that integrate both combinations and permutations, facilitating meaningful connections between mathematical concepts and real-world contexts.

Table 4. Tourist attractions that we can choose

Tourist Attraction	Type	Description
Mount Kerinci	Mountain	The highest active volcano in Indonesia (3805 masl)
Lake Gunung Tujuh	Lake/Swamp	Located in a dormant volcanic caldera in 1950 masl
Rawa Bento	Lake/Swamp	The highest swamp in Sumatra (1333 masl), 10 sq km
Telun Berasap Waterfall	Waterfalls	50 meters tall, sourced from Lake Gunung Tujuh and Rawa Bento
Kayu Aro Tea Plantation	Highland	The second largest tea plantation in the world (25 sq km)
Aroma Pecco	Lake/Swamp	A small lake surrounded by forest in Kayu Aro Tea Plantation
Tirai Embun Hill	Highland	A camping ground with views of Mount Kerinci (1643 masl)
Semurup Hot Spring	Hot Spring	A 76 sq meter pool used for bathing and boiling eggs
Sungai Medang Hot Spring	Hot Spring	Used by locals for bathing
Depati Coffee	Highland	Tourism concept around coffee plantation (1453 masl)
Lake Kerinci	Lake/Swamp	The largest lake in Kerinci (46 sq km)
Pancaro Rayo Waterfall	Waterfalls	150 meters tall, flows into Lake Kerinci
Lake Lingkat	Lake/Swamp	Small (0.12 sq km) with clear greenish water
Lake Kaco	Lake/Swamp	Only 90 sq meters with blue crystal-clear water

Integrating authentic contexts into mathematics instruction not only increases student engagement but also fosters critical decision-making abilities in mathematical planning. By evaluating destination types and related activities, students gain experience in classifying, filtering, and arranging options strengthening logical reasoning and numeracy skills (Posamentier & Krulik, 2008; Maass, 2006).

Problem 4 is an example problem in enumeration rule that use context of choosing destinations in Kerinci.

Problem 4. *A tourist has one day to explore popular attractions in Kerinci and plans to visit 3 different places from 10 available options. How many distinct combinations of 3 places can the tourist choose to visit?*

This problem exemplifies the use of combinations in enumeration. The tourist is forming a group of three attractions, and the order of selection does not affect the outcome only the set of destinations chosen matters. Applying the combination formula with $n = 10$ (total places) and $r = 3$ (places to visit), we get 120 different combinations.

Figure 4. Great view of some tourist attractions in Kerinci

Thus, there are 120 unique combinations for selecting 3 destinations out of 10. This scenario effectively demonstrates the concept of combinations and connects abstract mathematical principles to real-world tourism contexts.

Planning Routes and Itineraries

Natural attractions in Kerinci including Mount Kerinci, Lake Gunung Tujuh, and Telun Berasap Waterfall are widely distributed in the region (see Figure 5). The matrix of distances and travel times between popular destinations (e.g., Telun Berasap, Rawa Bento, Kayu Aro; see Table 5) provides a robust context for examining permutation and optimization problems. Students can develop efficient itineraries by applying concepts such as the traveling salesman problem or by calculating totals for different route sequences (Suliman et al., 2024).

Table 5. Distance and time spend to reach from and to each popular destination

Distance/Time	TB	RB	KT	AP	AS	SM	DC	DK	DL
TB	0	6 km (15')	17 km (35')	18 km (37')	48 km (95')	54 km (104')	58 km (113')	73 km (137')	93 km (173')
RB	6 km (15')	0	13 km (29')	14 km (32')	44 km (89')	50 km (98')	54 km (107')	69 km (130')	88 km (166')
KT	17 km (35')	13 km (29')	0	2 km (5')	32 km (60')	38 km (73')	42 km (87')	57 km (104')	76 km (137')
AP	18 km (37')	14 km (32')	2 km (5')	0	31 km (62')	36 km (69')	41 km (86')	56 km (102')	75 km (135')
AS	48 km (95')	44 km (89')	32 km (60')	31 km (62')	0	8.5 km (18')	13 km (28')	29 km (59')	47 km (87')
SM	54 km (104')	50 km (98')	38 km (73')	36 km (69')	8.5 km (18')	0	15 km (33')	20 km (38')	43 km (83')
DC	58 km (113')	54 km (107')	42 km (87')	41 km (86')	13 km (28')	15 km (33')	0	36 km (67')	52 km (94')

Distance/Time	TB	RB	KT	AP	AS	SM	DC	DK	DL
DK	73 km (137')	69 km (130')	57 km (104')	56 km (102')	29 km (59')	20 km (38')	36 km (67')	0	25 km (48')
DL	93 km (173')	88 km (166')	76 km (137')	75 km (135')	47 km (87')	43 km (83')	52 km (94')	25 km (48')	0

Note: TB: Telun Berasap waterfall, RB: Rawa Bento (swamp), KT: Kebun Teh (tea plantation), AP: Aroma Peco (swamp), AS: Semurup hot spring, SM: Sungai Medang hot spring, DC: Depati Coffe (highland), DK: Kerinci lake, and DL: Lingkat lake

This context promotes higher-order thinking by requiring problem-solving and reasoning as students compare route combinations and seek optimal solutions within given constraints. It also introduces graph theory and algorithmic reasoning into school mathematics in an accessible, real-world framework (Schoenfeld, 1985; Blum & Ferri, 2009).

Figure 5. Location of some tourist attractions in Kerinci

Problem 5A is an example problem in enumeration rule that use context of different routes in visiting destinations.

Problem 5A. *Suppose a tourist selects 4 easily accessible tourist destinations to visit in one day. How many different routes (orders of visit) can the tourist choose for visiting these 4 places?*

This scenario is a permutation problem, as the tourist arranges 4 distinct places in an ordered sequence, with each unique order representing a different route. Using the permutation formula for n = 4 (distinct items), we get 24 different routes. There are 24 possible routes for visiting the four destinations in a single day.

While Problem 5B is an example an example numeracy problem that use context of duration in visiting destinations.

Problem 5B. *A tourist plans to visit three attractions in Kerinci: TB (Telun Berasap Waterfall), RB (Rawa Bento Swamp), and DC (Depati Coffee Highland). They are staying at a hotel near Semurup Hot Spring (AS). The travel table below indicates distances and times (in minutes) between these points.*

Distance/ Time	***TB***	***RB***	***AS***	***DC***
TB	*0*	*6 km (15')*	*48 km (95')*	*58 km (113')*
RB	*6 km (15')*	*0*	*44 km (89')*	*54 km (107')*
AS	*48 km (95')*	*44 km (89')*	*0*	*13 km (28')*
DC	*58 km (113')*	*54 km (107')*	*13 km (28')*	*0*

If the tourist begins at 8:00 AM and must return to the hotel (AS) by 5:00 PM, how much average time can be spent at each attraction (assuming no repeated visits)?

Students must interpret the table, calculate total travel times based on chosen itinerary, subtract travel durations from total available time, and divide by the number of attractions. This problem exemplifies real-world numeracy literacy, requiring the integration of data interpretation, time calculation, and logical planning skills.

Choosing Attractions and Activities

Selecting from a range of activities hiking, boating, bathing in hot springs, bird watching across Kerinci's destinations introduces students to the concept of overlapping sets, which can be explored and visualized through Venn diagrams and the inclusion-exclusion principle (see Table 6). Certain sites offer multiple activities simultaneously, while others feature only specific options, making this a rich context for addressing compound counting problems.

Table 6. Some activities in each tourist sites

Activity	Tourist Sites	Description
Hiking	Mount Kerinci, Lake Gunung Tujuh, Telun Berasap Waterfall, Pancaro Rayo Waterfall, Lake Kaco	Hiking is needed for sites inaccessible by motor vehicles
Boating	Lake Kerinci, Lake Gunung Tujuh, Rawa Bento, Aroma Pecco	All lakes offer boating experiences
Hot Spring Bathing	Semurup Hot Spring, Sungai Medang Hot Spring	Hot springs offer bathing and egg-boiling experiences
Bird Watching	Mount Kerinci, Gunung Tujuh, Rawa Bento, Lake Kaco	Bird watching is done while hiking or relaxing near nature

Integrating real tourist activities into combinatorial tasks allows students to personalize their mathematical exploration by arranging, selecting, and analyzing activities using set theory.

Additionally, these contexts foster civic and environmental awareness by embedding mathematics within the framework of sustainable tourism (Ferri, 2018).

Problem 6 is an example problem in enumeration rule that use context of doing tourism attractions.

> ***Problem 6.*** *Suppose a tourist plans to engage in the following during the visit: hiking twice, boating once, and bird watching once. In how many different sequences can these activities be arranged?*

This is a permutations problem involving repeated elements. The total number of activities is four (hiking, hiking, boating, bird watching). The calculation is given by $4! : 2! = 24 : 2 = 12$ different sequences. There are 12 distinct ways for the tourist to sequence these four activities, considering that hiking is repeated twice. This problem connects real tourism choices to fundamental principles of permutations with repetitions, providing an engaging context for developing students' combinatorial reasoning and applied mathematical skills.

Overall, the findings of this study are consistent with the principles of Realistic Mathematics Education (RME), which advocates for the use of meaningful and experientially rich contexts as foundations for mathematical reasoning (Gravemeijer & Doorman, 1999; Van den Heuvel-Panhuizen, 2003). In this research, tourism in Kerinci served as a realistic context one familiar to students and well-suited for supporting the process of horizontal mathematization, whereby authentic scenarios are explored, organized, and modeled mathematically. Through engagement with these contexts, students were not performing rote combinatorial procedures but, rather, actively constructing understanding by connecting travel situations to formal enumeration principles. This approach reflects Boaler's (1993) view that authentic contexts render mathematical concepts more tangible and relevant for learners, thereby strengthening both conceptual grasp and motivation.

Consequently, the integration of Kerinci's tourism context illustrates how local realities can effectively bridge students' intuitive reasoning with formal mathematical abstraction. Building on these insights, educators are encouraged to design similar context-based tasks using locally relevant experiences that resonate within students' daily lives. In other regions, this might involve leveraging transportation networks, market interactions, or community events as vehicles for introducing enumeration principles. By situating mathematical tasks in familiar environments, teachers enable students to engage in horizontal mathematization exploring, representing, and generalizing patterns from everyday situations prior to formal symbolic expression. Such pedagogical strategies not only facilitate deeper conceptual understanding but also reinforce numeracy skills and foster an appreciation of mathematics as a practical tool for understanding the surrounding world.

Conclusion

The integration of tourism contexts from Kerinci in mathematics instruction has demonstrated that principles of counting and combinatorics can be effectively and meaningfully taught through authentic, real-life experiences. The study identified several pertinent scenarios such as selecting modes of transportation, choosing accommodations, planning travel routes, and sequencing tourist destinations that inherently embody enumeration rules. Such contextualized tasks enable students to engage not only in mathematical calculations but also in reasoning, planning, and decision-making connected to genuine situations.

Pedagogically, this approach aligns with the philosophy of Realistic Mathematics Education, emphasizing the use of meaningful contexts to foster student engagement and deep conceptual understanding. The familiarity and relevance of tourism-related activities enhance student motivation and facilitate the connection between mathematical learning and everyday life. Moreover, this integration supports the process of horizontal mathematization, where learners develop symbolic mathematical representations based on concrete, experiential decision-making.

In practice, mathematics teachers and pre-service educators should be adept at identifying and designing locally relevant contexts as a cornerstone of numeracy instruction. Such strategies can increase students' engagement and support the alignment of curriculum objectives with the realities of their lived experiences. Looking ahead, embedding local tourism scenarios such as those in Kerinci offers a promising pathway for developing contextual mathematics learning that is both grounded in local culture and consistent with broader curricular reforms.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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