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RUMAH GADANG: CONTEXTUAL MATHEMATICS IN A SOCIO-CULTURAL CONTEXT FOR NUMERACY ASSESSMENT

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Abstract: Numeracy is an important competency that is measured by *Asesmen Kompetensi Minimum* (AKM/Minimum Competency Assessment). To improve student numeracy, innovation is needed in learning mathematics, one of which is by using Ethnomathematics. The cultural object that becomes the benchmark is *Rumah Gadang*. Before producing effective and efficient models, devices, and learning methods based on the ethnomathematics of *Rumah Gadang* oriented to student numeracy, it is necessary to conduct a study first, so this research aims to conduct a literature review related to numeracy in the *Rumah Gadang*. The data collection method is a literature study, where the data is analyzed through three stages, namely Data Reduction, Data Presentation and Verification. Based on this research, it was found that the results of the researchers' contextual exploration of *Rumah Gadang* can be associated with 4 domains of mathematics material, namely numbers, geometry and measurement, algebra and data and uncertainty. Therefore, *Rumah Gadang* can be used as a learning material that is quite varied in terms of contextual in ethnomathematics-based mathematics learning, especially in terms of writing socio-cultural context questions in a numeracy assessment.

Keywords: Ethnomathematics, Rumah Gadang, numeracy

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INTRODUCTION

Just like most Asian countries, Indonesia also administers a national examination for students in grades 6, 9, and 12. In 2020, the national examination was transferred to a new assessment system, namely the *Asesmen Nasional* (AN). The AN program is one of the innovations made by the Ministry of Education, Culture, Research, and Technology (known as Kemendikbudristek) to improve students' education quality in Indonesia (Wijaya & Dewayani, 2021). The AN battery consists of several instruments: the *Asesmen*

Kompetensi Minimum (AKM) instrument, the Character Survey instrument, and the Learning Environment Survey instrument (MoEC, 2020).

The AKM assesses the fundamental competencies required by all students to develop their capacity and participate positively in society. There are two essential competencies that AKM measures, namely reading literacy and math/numeracy literacy (Purwanto, 2021). The measurement of reading literacy and numeracy is contextual, using real-life contexts that require participants to process information appropriately. The forms of AKM questions vary from multiple choice, multiple complex choice, matching, fill-in or short answer, and description (Wijaya & Dewayani, 2021).

Numeracy is a crucial ability that students must possess. This is because numeracy is the ability to think using mathematical concepts, procedures, facts, and tools to solve everyday problems in various types of contexts that are relevant to individuals, so that students with high numeracy will be able to solve math problems well (Sari, Lukman, & Muharram, 2021). The importance of numeracy skills for students in academic situations and everyday life does not have implications for the quality of mathematical literacy of students in Indonesia (Nasoha *et al*., 2022). This can be seen from the study conducted by Anggraini & Setianingsih (2022), where the results of the AKM test questions out of 15 students found 11 students with low numeracy skills, three with medium numeracy skills, and one with high numeracy abilities. This opinion is also reinforced by Purwanto's study (Purwanto, 2021), where the understanding of class XI students is still low; this is indicated by the results of a test completion that have not reached 50% of the total students, so it is necessary to introduce to students more models of AKM questions, especially numeration.

One of the efforts to develop numeracy is to use Ethnomathematics, a combination of mathematics and culture. According to D'Ambrosio (1999), Ethnomathematics, as modes, styles, and techniques (*tics*) explains, understands, and deals with the natural and cultural environment (*mathema*) in different cultural systems (*ethnos*). Thus, the definition of ethnomathematics is the way human groups produce ways, styles, arts and techniques of doing and knowing, learning and explaining, dealing with situations and solving problems in their natural and socio-cultural environment (D'Ambrosio, 2018). Ethnomathematics uses broad mathematical concepts related to various mathematical activities, including grouping activities, counting, measuring, designing buildings or tools, playing, and determining locations, and so on (Putri, 2017).

Ethnomathematics is suitable for learning in Indonesia, considering that Indonesia is one of the largest multicultural countries in the world. This can be seen from Indonesia's sociocultural and geographical conditions which are highly complex, diverse, and extensive (Lestari, 2016). Each region of the country has a diversity of tribes, customs and cultures. Cultural diversity can be seen in the art of buildings (traditional houses), a variety of dances, a variety of traditional clothing, and customs (Yuningsih, Nursuprianah, & Manfaat, 2021). Each region has a traditional house that has distinctive characteristics (Ilham & SB, 2012). One of the famous traditional houses in Indonesia is the *Rumah Gadang* from West Sumatra. *Rumah Gadang* is a traditional Minangkabau house that has a roof that becomes a characteristic of Minangkabau traditional houses (Marthala, 2013).

Rumah Gadang has a characteristic that distinguishes it from other traditional houses, found on the roof that curves upwards (Irianti, Dewi, & Surya, 2022). The design of the *Rumah Gadang* originates from Minangkabau history and culture, a combination of forms based on natural conditions with human needs for shelter in the form of residential arrangements, both parts with others, as well as the whole building with its features and with the natural environment so that it is and shows the characteristics of Minangkabau (Marthala, 2013). The construction of the *Rumah Gadang* is unique and attractive; it is even equipped with various forms of ornaments (Fitriza, 2018). The components in *Rumah Gadang* are in line with mathematical components that students can learn, such as the construction process, room provisions, roof shapes, ornaments, carvings, and much more (Fitriza *et al*., 2018).

Based on the presentation of the information above, it appears that *Rumah Gadang* is very suitable as a numeracy context; so the present study proposes a question: What components of the *Rumah Gadang* are suitable for use in numeracy. Through this research question, it is hoped that the study will be able to produce effective and efficient learning models, tools, and methods based on ethnomathematics bringing about the *Rumah Gadang* as the research topic, oriented towards learner numeracy. Thus this study is aimed at explicitly examining ethnomathematics based on the *Rumah Gadang* topic which is oriented towards learner numeracy.

METHOD

In this study, various kinds of literature relevant to ethnomathematics studies were collected from exploration and findings of mathematical material obtained from contextual matters in the *Rumah Gadang* traditional house. The articles analyzed came

from the *Google Scholar* computer application (https://scholar.google.com/). Data were retrieved from the *Google Scholar* platform during 2023, with the keywords ethnomathematics *Rumah Gadang*.

In analyzing the qualitative data there were three activities, namely: data reduction, presentation, and verification. (a) In the data reduction stage, the researchers reduced the data by taking the data starting from 2017 to avoid data accumulation (Hamzah, 2018). A total of 139 data were obtained. Next, the researcher selected the data manually with the criteria that the selected articles satisfied the criteria that the *Rumah Gadang* could be used as a context for mathematics learning. From this step, ten data were obtained that met the criteria. (b) In the data presentation stage, the researchers presented the data in the form of narrative texts. This is because the narrative text is the most common way of presenting data in qualitative research (Sugiyono, 2011). The ten articles obtained were analyzed to produce what components of the *Rumah Gadang* were suitable for numeracy contents, where the results of the analysis were then, again, presented in the form of narrative texts. With the presentation of these data, it made it possible to understand what the situation was like and plan further work based on what was understood. (c) Finally, in the data verification stage (conclusion drawing), conclusions (in qualitative research) were made regarding the suitability of the *Rumah Gadang* components in the numeracy contents.

RESULTS AND DISCUSSION

Ethnomathematics of the *Rumah Gadang*

The *rumah gadangs* are widely found, spread in the West Sumatra area, especially the famous one in the Batusangkar area, namely the *Istano Basa Pagaruyung Rumah Gadang* and in the South Solok area, which is called the *Land of 1000 Rumah Gadang* (Z. & Muchlian, 2019). The shape of the *rumah gadang* can be seen in Figure 1.

Figure 1. *Rumah Gadang*

The study of Ethnomathematics in the *Rumah Gadang* can be seen from the construction process. The *Rumah Gadang* of the Minangkabau community uses elements of geometry in its construction as a form of implementation of mathematics, namely mathematical properties, including the concepts of geometric transformation, such as translation (shift), rotation, and reflection (Z. & Muchlian, 2019). Even in the development process, there are activity rules where the *Rumah Gadang* has a width of five poles (Fitriza *et al*., 2018).

Apart from the construction process, the carvings in the *Rumah Gadang* can also be studied ethnomathematically. There are many types of carvings found in the *Rumah Gadang*, namely *Pucuk Rabuang* carving, *Siriah Gadang* carving, *Panco Matohari Flower* carving, *Pulang Patang Duck* carving, *Bungo Duo Tangkai jo Buah Pinang* carving, *Jarek Takambang* carving, and many more. Studies on *Rumah Gadang* carvings based on Ethnomathematics are usually in the forms of geometry both in geometric transformations and flat shapes (Fauzan, Tazman, & Fitriza., 2020; Fitriza, 2018; Fitriza *et al*., 2018; Irianti *et al*., 2022; Setiawan, Fauzan, & Arnawa, 2021; Z. & Muchlian, 2019). Furthermore, the decoration and ornaments on the door of the *Rumah Gadang* can be studied ethnomathematically. In the same case of carving, the results of analyzing the door are in the form of geometry, both in geometric transformations and flat shapes (Irianti *et al*., 2022). Stairs can also be interpreted ethnomathematically. The analysis results can be seen in the number of steps where the steps must be in odd numbers. In addition, the slope of the stairs is also the subject of analysis in Ethnomathematics. Even the Pythagorean theorem is also used in the study of stairs in the *Rumah Gadang* construction (Fauzan *et al*., 2020; Z., 2020; Z. & Muchlian, 2019).

Ethnomathematical analyses can be done on the size of the *Rumah Gadang* comparing, predicting, and calculating the quality where the lengths of the *Rumah Gadang* rooms are not always the same. Determination of the location of the rooms can also be studied ethnomathematically in geometry. In the *Rumah Gadang* construction, there is a room called *anjuang*. The *anjuang* is square in shape and has various sizes for each *Rumah Gadang* (Fauzan *et al*., 2020; Fauziah, Niniwati, & Wahyuni, 2020).

For the shape of the *Rumah Gadang*, things that can be studied ethnomathematically are the size and model of the building. The model can be seen from flat and spatial shapes (Z., 2020; Z. & Muchlian, 2019). Furthermore, the part that can be studied from the *Rumah Gadang* is the ornament used. Ornaments on the *Rumah Gadang* that can be analyzed are those on the poles, where there are symmetrical leaf bone-shaped ornaments and 8-square ornaments. Ornaments on door decorations in the form of flat

shapes, and exterior ornaments such as found on the front wall of the *Rumah Gadang* also vary (Fitriza, 2018; Fitriza *et al*., 2018).

Numeracy

Asesmen Kompetensi Minimum [minimum competency assessment] (AKM) is an assessment that measures the minimum ability needed for students to learn and is a simplification of the complex National Examination (Hasanah, Edwita, & Januar, 2021). AKM presents problems with various contexts in that students are expected to solve using their reading literacy and numeracy competencies. AKM questions are expected to measure not only specific topics or contents but also a variety of contents, cognitive levels, and contexts. Contents in reading literacy indicate the types of texts used; in this case, they are divided into two, namely informational texts and fictional texts. In numeracy, the contents are divided into four domains: number, geometry and measurement, data and uncertainty, and algebra (Wijaya & Dewayani, 2021).

Numeracy also refers to the definition of mathematical literacy in various sources. Numeracy is defined as a person's ability to use mathematical knowledge to explain events, solve problems, or make decisions in everyday life. According to the Organisation for Economic Co-operation and Development (2017), mathematical literacy is the capacity of individuals to formulate, use, and interpret mathematics in various forms of contexts. This includes mathematical reasoning and using mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena. It helps individuals recognize mathematics' roles in the world and make reasoned judgments and decisions needed by constructive, engaged, and reflective citizens. Numeracy can be defined as the ability possessed by individuals to use their mathematical knowledge in explaining events, solving problems, or making decisions in everyday life (Wijaya & Dewayani, 2021). Organisation for Economic Co-operation and Development (2017) stated that there are three processes in solving problems: formulate, employ, and interpret/evaluate. These processes are numeracy practices.

The numeracy AKM includes contexts close to the learners' world including social, cultural, environmental, science, and mathematical sciences. These contexts are categorized into three; namely personal, socio-cultural, and scientific (Wijaya & Dewayani, 2021). Personal contexts focus on a person’s activities, family, or group of people. The socio-cultural context relates to community or societal issues: local or regional, national or global. The scientific context is associated with applying mathematics in the universe and issues and topics related to science and technology (Novianti, 2021).

The cognitive level of numeracy mathematics literacy in AKM is divided into three levels: (1) Knowing, questions in the cognitive level of understanding that assess students' basic knowledge and understanding of processes, facts, procedures, and concepts; (2) Applying, questions at the application level that assess the mathematical ability to apply knowledge and understanding of relationships, facts, procedures, concepts, and methods in the context of real situations or daily life to solve problems or answer questions: and (3) Reasoning, questions in the cognitive level that assess students' reasoning abilities in analyzing information and data, expanding their understanding, and making conclusions covering situations that are more complex contexts (Anggraini & Setianingsih, 2022).

Wijaya & Dewayani (2021) mentioned four numeracy contents in AKM, namely: (1) Number consisting of the subdomains of representation, order properties, and operations; (2) Geometry and Measurement consisting of the subdomains of geometry, measurement, and spatial reasoning; (3) Algebra consisting of the subdomains of equations and inequalities, relations and functions (including number patterns), and ratios and proportions; and (4) Data and uncertainty that are assessed from the understanding of data and its representations starting from the presentation of simple data using straight lines and picture diagrams to evaluating (making sense of) more complex data and measures of data distribution. In addition, Uncertainty and probability start from recognizing possible and impossible events to calculating and using the possibility of compound events.

Learning progression relates to the process of continuity between levels and thinking skills. The continuity in the minimum competency assessment (AKM) can be seen from the aspects of text contents, the cognitive levels measured, and the indicators contained in the AKM questions. Differences start from the scope and context of reading, mental levels, and indicators of questions from various groups. For the elementary school, the cognitive story of the AKM starts from level 1 for grades 1-2, level 2 for grades 3-4, and level 3 for grades 5-6 (Deviana & Aini, 2022).

Numeracy Contents

The study of numeracy in *Rumah Gadang* is based on numeracy contents; namely numbers, geometry and measurement, algebra, and data and uncertainty. There are ten articles analyzed. The results of the discussion are as follows.

a. Numbers

There are four articles containing number contents which can be seen in Table 1.

Table 1. Articles Containing Number Contents

No	Authors	Year	Title
1.	Irianti *et al.*	2022	Kajian Etnomatematika Rumah Adat Gadang Suku Minangkabau [Ethnomathematics Study of Minangkabau *Rumah Gadang* Traditional House]
2.	Fauzan *et al.*	2020	Exploration of Ethnomathematics at *Rumah Gadang* Minangkabau to Design Mathematics Learning Based on RME in Junior High Schools
3.	Fauziah *et al.*	2020	Ethnomathematics in the Room of the *Rumah Gadang*
4.	Fitriza *et al.*	2018	Exploration of Ethno-Mathematics Embedded on Traditional Architecture of *Rumah Gadang* Minangkabau

In the study by Irianti *et al.* (2022), numbers can be found when building a *Rumah Gadang*. During construction, there is a rule where the unit used is ethos or cubit. Making the space requires five to seven ethos. The shortest *Rumah Gadang* has five rooms with a length of 12.5 meters, while the longest *Rumah Gadang* has seventeen rooms with a length of 59.5 meters. The *Rumah Gadang* has a width of ten to fourteen meters. The floor height is five to seven ethos, while the ceiling height is fourteen ethos from the ground. This can be used in number numeration problems, where utilizing the information and ethos units can give the size of the *Rumah Gadang* or measure the length and amount of the wood needed to build a *Rumah Gadang* so that students' number operations skills can improve.

In the study by Fauzan *et al.* (2020), numbers can be found on the stairs of *Rumah Gadang. Rumah Gadang* has stairs that are always odd, namely 3, 5, 7, or 9. The goal is that the lower part of the house can be used to raise chickens, goats, and cows, or a place to weave for women. By utilizing the size of the farm animals and the number of steps, it can be associated with the nature of the sequence.

In the study Fauziah *et al.* (2020), numbers can be found in the number of rooms in the *Rumah Gadang. Rumah Gadang* has a prime number of rooms. Rooms are places of privacy for people who are married or not. The number of rooms can be related to the counting operation on the number of family members in the *Rumah Gadang*.

And in the study by Fitriza *et al.* (2018), numbers can be found in the size of the space in *Rumah Gadang*. The number of rooms/*biliak* of a *Rumah Gadang*, in general, is odd; 3, 5, 7, 9. The length of the room of a *Rumah Gadang* is not always the same. Sometimes the length of the room getting to the tip increases or decreases. This can be related to the representation, where by using the formula that has been set on the length of the room in the form of a row, students can determine the length of the size of a room.

Based on the information above, it can be concluded that all of the number subdomains are met in the four articles. For representation, it can be seen in the formula on the length of the room that is shaped like a row. The nature of the sequence can be seen in the number of always odd steps. This can be utilized by determining the stair height criteria. In operation, two data can be used, namely the number of spaces and ethos units, to determine the length and amount of wood needed to build a *Rumah Gadang* and the number of bedrooms that are prime value, the total number of *Rumah Gadang*, and the total number of the residents.

b. Geometry and Measurement

There are ten articles containing Geometry and Measurement content which can be seen in Table 2.

Table 2. Articles Containing Geometry and Measurement Content

No	Authors	Year	Title
1.	Setiawan *et al.*	2022	Validitas Perangkat Pembelajaran Geometri Berbasis Etnomatematika Rumah Gadang [Validity of Learning Media of Ethnomatics-based Geometry Lesson of *Rumah Gadang*]
2.	Yenti *et al.*	2022	Pengembangan Media Interaktif Berbasis Etnomatematika Menggunakan Lectora Inspire Untuk Materi Segitiga Dan Segiempat [Development of Ethnomatics-based Interactive Media for Triangle and Rectangle Materials Using the *Inspire Lectora*]
3.	Irianti *et al.*	2022	Kajian Etnomatematika Rumah Adat Gadang Suku Minangkabau [Ethnomathematics Study of Traditional House of Minangkabau Tribe]
4.	Setiawan *et al.*	2021	The Development of Geometrical Learning Devices Based on *Rumah Gadang* Ethnomathematics for Grade VII Junior High School
5.	Z.	2020	Pendekatan Matematika Realistik Bernuansa Etnomatematika: *Rumah Gadang* Minangkabau Pada Materi Teorema Pythagoras [Realistic Mathematics Approach with Ethnomathematics Nuances: Minangkabau *Rumah Gadang* on the *Teorema Pythagoras* Material]
6	Fauzan *et al.*	2020	Exploration of Ethnomathematics at Rumah Gadang Minangkabau to Design Mathematics Learning Based on RME in Junior High Schools
7	Fauziah *et al.*	2020	Ethnomathematics in the Room of the *Rumah Gadang*
8	Z. & Muchlian	2019	Eksplorasi Etnomatematika Rumah Gadang Minangkabau Sumatera Barat [Ethnomathematics Exploration of the West-Sumatera Minangkabau *Rumah Gadang*]

No	Authors	Year	Title
9	Fitriza	2018	Ethnomathematics Pada Ornamen Rumah Gadang Minangkabau [Ethnomathematics of the Ornaments of Minangkabau *Rumah Gadang*]
10	Fitriza *et al.*	2018	The Exploration of Ethno-Mathematics Embedded on Traditional Architecture of *Rumah Gadang* Minangkabau

In Setiawan *et al.* (2022), geometry and measurement can be found in the *Rumah Gadang*. In the *Rumah Gadang*, some parts are in the forms of flat shapes, for example, a square. The square-shaped parts of the *Rumah Gadang* are carvings and windows. Various types of shapes in the *Rumah Gadang* can be used to find the area and perimeter of the *Rumah Gadang*.

In Yenti, Putri, & Maris (2022), geometry and measurement are also found in the *Rumah Gadang*. *Rumah Gadang* has many parts starting from carvings, stairs, roofs, and doors that show images of triangles and quadrilaterals. This can be used to determine the types of geometric shapes such as kites, rhombuses, triangles and others.

In Irianti *et al.* (2022), geometry and measurement can be found in: (1) The measurement subdomain can be found during the construction process, there is a change in units from ethos to meters. (2) The door has two flat shapes: a rectangle and an ellipse. This can be utilized for geometry, which counts the wood used in making the door and the paint used to paint the ellipse. (3) The carvings use the concepts of geometric transformation, translation (shift), rotation, and reflection. The type of the *Pucuk Rabuang* uses a geometry transformation that is rotated by 180 degrees. The *Siriah Gadang* carving uses geometric transformation of translation or shift. The *Bungo Panco Mato Ari* carving uses the concept of reflection or mirroring in making the pattern. The carving of the *Itiak Pulang Patang* type uses the transformation of real objects.

In Setiawan *et al.* (2021), geometry and measurement can be found in the carvings of *Rumah Gadang*. *Rumah Gadang* has many types of carvings with various shapes, such as geometric shapes. Carvings in the forms of geometric shapes can be used to help students understand geometry.

In Z. (2020), geometry and measurement can be found in: (1) From the shape of the *Rumah Gadang*, the Minangkabau people have implemented one of the mathematical sciences, namely geometry, in the construction of parts of their traditional house buildings. This can be seen from the shape of the building, carvings, the position of the supporting poles, ornaments, and so on, where flat building models include square, rectangle, trapezoid, triangle, isosceles triangle, equilateral triangle, pentagon, circle and

rhombus; spatial building models include cubes, beams and tubes; mathematical properties models include symmetrical properties, fractals; and the concepts of translation (shift). (2) The steps/stairs of the *Rumah Gadang* the carving board is a flat triangle, where there is the concept/rule of the Pythagorean theorem. The problem associated with this condition is that the height of the stairs and the base of the stairs are known, then students can be asked to determine the length of the wood for the banister.

In Fauzan *et al*. (2020), geometry and measurement subdomain, spatial reasoning skills can be found on the stairs in the *Rumah Gadang*. The trick is that, by utilizing the number of stairs and their length, the gradient of the stairs can be found.

In Fauziah *et al*. (2020), geometry and measurement can be found in the many types of rooms in *Rumah Gadang*. These rooms can be utilized in the material of similarity and congruence. Examples that can be used are in the bridal room, private room, and kitchen. The three rooms have different sizes; even the bridal room and the kitchen have different shapes, but the private rooms have the same shape. In addition to being able to be utilized for similarity and congruence material, the number of rooms in the *Rumah Gadang* can also be utilized in the coordinate system and direction material. By utilizing the positions and locations of the rooms, students can draw a floor plan of a *Rumah Gadang*.

In Z. & Muchlian (2019), geometry and measurement can be found in: (1) The shape of the body of a rectangular *Rumah Gadang* that enlarges upwards (inverted trapezoid) can be utilized for geometry material by calculating the surface area of the body of the *Rumah Gadang* so that room painting can be planned and done; (2) The stairs of a *Rumah Gadang* have the shape of a right triangle, which, if associated with mathematics, can be seen in the trigonometric comparison of right triangles.

The example of the problem is that the angle between the steps and the ground and the height of the stairs are known, while what is asked is the length of the banister; (3) The making of the *Bungo Duo Tangkai jo Buah Pinang* carving motif begins with a circle base pattern. After that, a way of creeping leaves and flowers is painted. From this pattern, there is symmetry between the right and left patterns. In mathematics, this can be used for spatial reasoning, where this motif is carved on the cartesian coordinate system, so the corresponding problem is to find a symmetrical line; (4) The *Jarek Takambang* carving motif has a circular base pattern of intertwined and connected circular leaf and flower motifs. From the motif, it can be seen that patterns are repeated, which brings to fractal geometry: (5) Some other mathematical elements that exist in the carving patterns include lines, including vertical and horizontal lines, parallel lines, and intersecting lines.

In addition, there are symmetrical elements and flat shapes such as squares, triangles, parallelograms, circles, and rhombuses. This can be utilized in spatial reasoning where the carving is drawn on a grid or cartesian coordinate system to find the position of the carving in question.

In the study by Fitriza (2018), geometry and measurement can be found in: (1) The ornament on the pole has two parts, the upper and lower parts. The upper part has a shape like a leaf bone. Leaf bones are symmetrical so that they can be used for the concept of mirroring in making them by knowing the position of one of them. The bottom part is octagonal. This can be utilized in geometry by finding the area so that the pole can pass through the ornament. (2) The ornaments on the door decoration are flat shapes. One of the flat shapes is the rhombus which has a centre. Through the rhombus, students can learn the concept of dilation where the rhombus will be dilated at its centre according to the size of the door. (3) Exterior ornaments such as those found on the front wall of the *Rumah Gadang* also vary. Various types of geometric shapes can be utilized, like the semicircle. (4) On carvings that use the concepts of geometric transformation, translation (shift), rotation, and reflection, the types of carvings found in the *Rumah Gadang* are: The carving of *Pucuk Rabuang* uses a geometry transformation that is rotated by 180 degrees. The *Siriah Gadang* carving uses geometric transformation, namely translation or shift. In the *Bungo Panco Mato Ari*, the carving uses the concept of reflection or mirroring in making the pattern. The carving of the *Itiak Pulang Patang* uses the transformation of real objects.

In the study by Fitriza *et al*. (2018), geometry and measurement can be found in: (1) The units used in the construction of *Rumah Gadang* are ethos (cubit), *dapos* (fathom), and *tampoks* or fingers. An example of one measurement is the length of the room, 3 ethos 1 *tampok*, and 3 fingers. Based on the information, it appears that the suitable material is measurement. One example of the problem is determining the length of the room from non-standard units to standard units; (2) In principle, the *Rumah Gadang* is built on tribal land extending from north to south, its *bumbungan* (horizontal wood roof) faces the Marapi mountain. In *nagari* Batipuh, *Tanah Datar* [flat ground] sleeping position in the *Rumah Gadang* is arranged, the direction being called *manggantang padi* where the sleeping position is believed to be between the mountain of Marapi and the Qibla direction [faced by Moslems when doing worship prayers]. This can be utilized in spatial reasoning material, where students are asked to determine the ideal sleeping position if the position of the mountain of Marapi and Qibla direction are known; (3) The roof of the *Rumah Gadang* is *gonjong*. If students want to find the area of the roof, the

formula used is the value of the square area minus the value of the semicircle area; (4) The poles in the *Rumah Gadang* are connected. This can be utilized for positioning materials, where students can be asked to determine one of the pole positions if the other pole positions are known; and (5) The ornaments and carvings can be used for geometry and transformed geometry.

Based on the information above, it can be stated that all the articles meet the criteria that the materials contain geometry and measurement contents. This even produces twenty-five geometry and measurement data, all of which meet the subdomains. In building geometry, one example can be seen in the ornaments and carvings used. For measure, one model can be seen in the change of nonstandard units (ethos) to standard unit (meters). For spatial reasoning, one model can be seen in the position of rooms and poles.

c. Algebra

There is one article that contains Algebra materials, namely The Exploration of Ethno-Mathematics Embedded on Traditional Architecture of *Rumah Gadang* Minangkabau (Fitriza *et al*., 2018)). In this article algebra can be found: (1) During the construction of *Rumah Gadang*, there is a science of *tajuruba* in determining the size of the house. The provisions are that the number of lengths, widths, and heights of the *Rumah Gadang* cannot be even. Furthermore, the sum of the length, width and height of the *Rumah Gadang* is reduced by the largest multiple of five with a note that the result of the reduction cannot exceed three. By utilizing This situation, it can be used in algebraic calculation operation problems. For example: height = 6, width = 14, and length = 17. Then, the number of measures = 37, and 37-35 = 2. Hence, the *Rumah Gadang* can be built; (2) The number of rooms/*biliak* of a *Rumah Gadang*, in general, is odd: 3, 5, 7, 9. The length of the room of a *Rumah Gadang* is not always the same. Sometimes the length of the room getting to the tip increases or decreases, where the change in length is regular. This is by the material of rows and series. An example of the problem gives the known lengths of the first and second room, while that of the third room is asked.

Based on the information above, it can be seen that the algebraic subdomains that are fulfilled are equations and inequalities as well as ratios and proportions. Equations and imbalances can be taken from the provisions on the length, width, and height measurements of the *Rumah Gadang*. Ratios and proportions can be taken from changes in room lengths in a *Rumah Gadang*.

d. Data and Uncertainty

There is one article that contains data and uncertainty contents, namely Ethnomathematics in the Room of the *Rumah Gadang* (Fauziah *et al*., 2020). In this article, data and uncertainty can be found in the different size of each *Rumah Gadang*. The *Rumah Gadang* has a different size in each region so if it is made in the form of a table, it will show the area that has the largest *Rumah Gadang*. This can be utilized for data understanding and representation.

Based on the information above, it can be concluded that only one subdomain of data and uncertainty is fulfilled, namely understanding the data and its representation. This can be taken in the data regarding the various sizes of *Rumah Gadang* in each region.

In all the ten articles that meet the criteria, it can be concluded that all numeracy contents are met. This can be seen in Table 3.

Table 3. Numeracy Contents Found in the Articles

Numeracy Content	Title
Numbers	a. Kajian Etnomatematika *Rumah Adat Gadang* Suku Minangkabau (Irianti *et al*., 2022) b. Exploration of Ethnomathematics at *Rumah Gadang* Minangkabau to Design Mathematics Learning Based on RME in Junior High Schools (Fauzan *et al*., 2020) c. Ethnomathematics in the Room of the *Rumah Gadang* (Fauziah *et al*., 2020) d. The Exploration of Ethno-Mathematics Embedded on Traditional Architecture of *Rumah Gadang* Minangkabau (Fitriza *et al*., 2018)
Geometry and Measurement	a. Validitas Perangkat Pembelajaran Geometri Berbasis Etnomatematika Rumah Gadang (Setiawan *et al*., 2022) b. Pengembangan Media Interaktif Berbasis Etnomatematika Menggunakan Lectora Inspire Untuk Materi Segitiga Dan Segiempat (Yenti *et al*., 2022) c. Kajian Etnomatematika Rumah Adat Gadang Suku Minangkabau (Irianti *et al*., 2022) d. The Development of Geometrical Learning Devices Based on Rumah Gadang Ethnomathematics for Grade VII Junior High School (Setiawan *et al*., 2021) e. Pendekatan Matematika Realistik Bernuansa Etnomatematika: Rumah Gadang Minangkabau Pada Materi Teorema Pythagoras (Z., 2020) f. Exploration of Ethnomathematics at Rumah Gadang Minangkabau to Design Mathematics Learning Based on RME in Junior High Schools (Fauzan *et al*., 2020) g. Ethnomathematics in the Room of the Rumah Gadang (Fauziah *et al*., 2020) h. Eksplorasi Etnomatematika Rumah Gadang Minangkabau

Numeracy Content	Title
	Sumatera Barat (Z. & Muchlian, 2019) i. Ethnomathematics Pada Ornamen Rumah Gadang Minangkabau (Fitriza, 2018) j. The Exploration of Ethno-Mathematics Embedded on Traditional Architecture of Rumah Gadang Minangkabau (Fitriza *et al*., 2018)
Algebra	The Exploration of Ethno-Mathematics Embedded on Traditional Architecture of Rumah Gadang Minangkabau (Fitriza *et al*., 2018)
Data and Uncertainty	Ethnomathematics in the Room of the Rumah Gadang (Fauziah *et al*., 2020)

Based on the information above, it can be seen that, in Number contents, all subdomains are fulfilled. Number contents can be found in the construction process, stairs, rooms, and sizes of the space of *Rumah Gadang*. For Geometry and Measurement contents, all subdomains are also fulfilled. Geometry and Measurement contents can be found in the shapes, carvings, stairs, roofs, doors, construction processes, rooms, ornaments and pillars of *Rumah Gadang*. However, in Algebra contents only two subdomains are fulfilled even though the Algebra content has three subdomains. For Algebra contents, it can be found in the construction process and the number of rooms/*billiak* of *Rumah Gadang*. Likewise, with Data and uncertainty contents, only one subdomain is fulfilled. Data and uncertainty content can be found in the size of *Rumah Gadang* which varies in each region. It can be concluded that *Rumah Gadang* is very suitable as a numeracy context, especially in Geometry and Measurement contents and Number contents.

CONCLUSION

Numeracy contents can be taken from all aspects of the *Rumah Gadang*. This is reinforced by the many studies on the study of Ethnomathematics in *Rumah Gadang*. The present study is expected to be able to help educators and researchers produce models, devices, and learning methods that can improve students' numeracy skills. One of the most suitable research ideas for the future is the development of numeracy question instruments based on the ethnomathematics of *Rumah Gadang*. Given that Ethnomathematics is culture-based mathematics, contextual findings in *rumah gadang* can also be used as a reference for creating Minimum Competency Assessment (AKM) questions in the socio-cultural contexts. It can be concluded that *Rumah Gadang* is very suitable as a numeracy context.

The *rumah gadang* components can be used in the contexts of numeracy, namely development process, carvings, stairs, roofs, doors, rooms, ornaments, pillars, shapes and sizes of the spaces of *Rumah Gadang* in each region. Considering that this study only analyzes nationally-indexed articles and has not analyzed internationally-indexed articles, it is hoped that there will be more researchers in the field of mathematics who can integrate mathematical material from contextual matters in *Rumah Gadang* in the future so that it can benefit educators and students during the teaching and learning process in wider contexts.

REFERENCES

Anggraini, K. E., & Setianingsih, R. (2022). Analisis kemampuan numerasi siswa SMA dalam menyelesaikan soal asesmen kompetensi minimum [Analysis of Senior High School students' numeracy skills in completing AKM test items] (AKM). *MATHEdunesa*, *11*(3), 837–849. https://doi.org/10.26740/mathedunesa.v11n3.p837-849

D'Ambrosio, U. (1999). Literacy, matheracy, and technocracy: A trivium for today. *Mathematical Thinking and Learning*, *1*(2), 131–153. https://doi.org/10.1207/s15327833mtl0102_3

D'Ambrosio, U. (2018). The program ethnomathematics: Cognitive, anthropological, historic and socio-cultural bases. *PNA*, *12*(4), 229–247. https://doi.org/10.30827/pna.v12i4.7851

Deviana, T., & Aini, D. F. N. (2022). Learning progression guru sekolah dasar dalam pengembangan konten soal asesmen kompetensi minimum [Learning progression of elementary-school teachers in developing contents of minimum competency assessment] (AKM). *Jurnal Basicedu*, *6*(1), 1285–1296. https://doi.org/10.31004/basicedu.v6i1.2095

Fauzan, A., Tasman, F., & Fitriza, R. (2020). Exploration of ethnomathematics at Rumah Gadang Minangkabau to design mathematics learning based on RME in junior high schools. *Proceedings of the 2nd International Conference Innovation in Education (ICoIE 2020)*, 279–283. https://doi.org/10.2991/assehr.k.201209.234

Fauziah, F., Niniwati, N., & Wahyuni, Y. (2020). Ethnomathematics in the room of the Rumah Gadang. *IndoMath: Indonesia Mathematics Education*, *3*(2), 100–109. https://doi.org/10.30738/indomath.v3i2.7880

Fitriza, R. (2018). Ethnomathematics pada ornamen Rumah Gadang Minangkabau [on the ornaments of Minangkabau *Rumah Gadang*]. *Math Educa Journal*, *2*(2), 181–190. https://doi.org/10.15548/mej.v2i2.187

Fitriza, R., Afriyani, D., Turmudi, & Juandi, D. (2018). The exploration of ethno-mathematics embedded on traditional architecture of Rumah Gadang Minangkabau. *Proceedings of the University of Muhammadiyah Malang's 1st International Conference of Mathematics Education (INCOMED 2017)*, 270–276. https://doi.org/10.2991/incomed-17.2018.57

Hamzah, A. (2018). *Metode penelitian kepustakaan library research*. Literasi Nusa Abadi.

Hasanah, U., Edwita, & Januar, A. (2021). Pendampingan guru mengembangkan assesment kompetensi minimum (AKM) berorientasi pisa untuk meningkatkan kualitas hasil pembelajaran di sekolah dasar wilayah Kabupaten Bogor [Advocation of teachers in developing minimum competency assessment oriented on pisa to improve the quality of learning outcomes at the elementary school in the Regency of Bogor]. *Jurnal Abadimas Adi Buana*, *5*(01), 90–99. https://doi.org/10.36456/abadimas.v5.i01.a3634

Ilham, A. N., & SB, A. S. (2012). Tipologi bangunan rumah tinggal adat sunda di Kampung Naga Jawa Barat [Building typology of Sundanese traditional houses at the village of Naga, West Java]. *Jurnal Tesa Arsitektur*, *10*(1), 1–8. https://doi.org/10.24167/tesa.v10i1.9

Irianti, F., Dewi, M. A., & Surya, C. S. (2022). Kajian etnomatematika Rumah Adat Gadang suku Minangkabau. *Prisma, Prosiding Seminar Nasional Matematika*, *5*, 222–226. https://journal.unnes.ac.id/sju/prisma/article/view/54275

Lestari, G. (2016). Bhinnekha tunggal ika: Khasanah multikultural indonesia di tengah kehidupan SARA [Unity in Diversity: Wealth of Indonesia multicultures amongst the life contexts of tribes, religions, and races]. *Jurnal Pendidikan Pancasila Dan Kewarganegaraan*, *28*(1), 31–37. https://doi.org/10.17977/JPPKN.V28I1.5437

Marthala, A. E. (2013). *Rumah Gadang: Kajian filosofi arsitektur Minangkabau* [*Rumah Gadang*: Phylosophical study of Minangkabau architecture]. Humaniora. http://repository.unp.ac.id/id/eprint/17882

Ministry of Education and Culture (MoEC). (2020). *Asesmen nasional sebagai penanda perubahan paradigma evaluasi pendidikan* [National assessment as a mark of paradigm changes in education evaluation]. Kemendikbud.

Nasoha, S. R., Araiku, J., Yusup, M., & Pratiwi, W. D. (2022). Kemampuan numerasi siswa melalui implementasi bahan ajar matematika berbasis problem-based learning [Students' numeracy abilities via implementation of mathematics materials based on problem-based learning]. *Indiktika : Jurnal Inovasi Pendidikan Matematika*, *4*(2), 49–61. https://doi.org/10.31851/indiktika.v4i2.7903

Novianti, D. E. (2021). Asesmen kompetensi minimum (AKM) dan kaitannya dengan kemampuan pemecahan masalah matematika [Minimum competency assessment and its relation to mathematics problem-solving skills]. *Seminar Nasional Pendidikan LPPM IKIP PGRI Bojonegoro*, *2*(1), 85–91.

Organisation for Economic Co-operation and Development. (2017). *PISA 2015 assessment and analytical framework*. OECD Publishing.

Purwanto, A. J. (2021). Pemahaman siswa kelas XI SMK Negeri 1 Pujer dalam menyelesaikan soal AKM numerasi [Comprehension of Year XI students of State Vocational School 1 Pujer in completing the AKM numeracy test items]. *Journal of Mathematics Education and Learning*, *1*(2), 109–115. https://doi.org/10.19184/jomeal.v1i2.24272

Putri, L. I. (2017). Eksplorasi etnomatematika kesenian rebana sebagai sumber belajar matematika pada jenjang MI [Ethnomathematics exploration on *rebana* drum art as a mathematics learning source at the Islamic basic education level]. *Jurnal Ilmiah Pendidikan Dasar* [Scientific Journal of Elementary Education], *4*(1), 21–31. http://dx.doi.org/10.30659/pendas.4.1.%25p

Sari, D. R., Lukman, E. N., & Muharram, M. R. W. (2021). Analisis kemampuan siswa dalam menyelesaikan soal geometri pada asesmen kompetensi minimum- numerasi sekolah dasar [Analysis of students' competencies in completing geometry test items of the minimum competency assessment of the elementary school]. *FONDATIA : Jurnal Pendidikan Dasar* [Journal of Elementary Education], *5*(2), 153–162. https://doi.org/10.36088/fondatia.v5i2.1387

Setiawan, H., Fauzan, A., & Arnawa, I. M. (2021). The development of geometrical learning devices based on Rumah Gadang ethnomathematics for grade VII junior high school. *Journal of Physics: Conference Series*, 1–7. https://doi.org/10.1088/1742-6596/1742/1/012003

Setiawan, H., Jamaris, J., Solfema, S., & Fauzan, A. (2022). Validitas perangkat pembelajaran geometri berbasis etnomatematika Rumah Gadang. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *6*(3), 3484–3494. https://doi.org/10.31004/cendekia.v6i3.1881

Sugiyono. (2011). *Metode penelitian kombinasi (mixed methods)*. Alfabeta CV.

Wijaya, A., & Dewayani, S. (2021). Framework asesmen kompetensi minimum (AKM). In *Badan Penelitian dan Pengembangan dan Perbukuan Kementerian Pendidikan dan Kebudayaan*.

Yenti, I. N., Putri, M. V., & Maris, I. M. (2022). Pengembangan media interaktif berbasis etnomatematika menggunakan lectora inspire untuk materi segitiga dan segiempat. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *11*(4), 2847–2856. https://doi.org/10.24127/ajpm.v11i4.6030

Yuningsih, N., Nursuprianah, I., & Manfaat, B. (2021). Eksplorasi etnomatematika pada rancang bangun rumah adat Lengkong [Ethnomathematics exploration on the framework of Lengkong traditional house]. *Jurnal Riset Pendidikan Matematika Jakarta*, *3*(1), 1–13. https://doi.org/10.21009/jrpmj.v3i1.19517

Z., Y. R. (2020). Pendekatan matematika realistik bernuansa etnomatematika: Rumah Gadang Minangkabau pada materi teorema pythagoras. *Jurnal Azimut*, *3*(SMAR), 22–29. https://doi.org/10.31317/jaz.v3ismar.636

Z., Y. R., & Muchlian, M. (2019). Eksplorasi etnomatematika Rumah Gadang Minangkabau Sumatera Barat. *Jurnal Analisa*, *5*(2), 123–136. https://doi.org/10.15575/ja.v5i2.5942