

Introduction

THE WEAVING MAT

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How I created my unit

These plans were designed for one female group at the fourth grade level attending Rairok Elementary School. The principle guiding the design was to use indigenous cultural-based activities as a starting point for learning mathematics. In this particular case the cultural activity included the weaving of a local mat (Jaki) as a way to introduce indigenous measuring units.

I decided to design these lessons for female students only because it is our custom that weaving a Jaki is a female activity and responsibility. The male students from this class were sent to other 4th grade sections until these lessons were completed. This allowed the teacher to provide good lessons and to assess any differences in learning culturally-based mathematics among individuals, while taking advantage of pair learning, and some whole group instruction.

Materials for the weaving process were colored paper strips, glue, posters, and maan (pandanus) leaves to use in making a real Marshallese Jaki (mat) at the end of the project.

Four traditional measuring units were built in to the plans; jetan, makoj, nene and ba. Students were given the opportunity to develop cultural knowledge, which is one of the school's learning goals. Patterns, symmetry, and measurement form the mathematical content embedded in the weaving unit plan.

Unit Overview

THE WEAVING MAT

Enduring Understandings

The idea of Marshallese unit of length
Some of the components of symmetry

Knowledge

Traditional units of length in mat-making: *jetan*, *makoj*, *nene*, *ba*
Cultural awareness, specifically how to prepare real materials (from pandanus leaves) and processes for weaving and designing patterns

Skills

Making a simple symmetrical design
Measuring mats and other objects

Learning Strategies

Exploring and discovering
Modelling and observing
Participating in a group

Rationale

Weaving is a common activity with some women on the Marshall Islands today, so children may know about mat-making and even be familiar with the *kemem* (first birthday) ceremony. The design and making of the mat presents opportunities to work with symmetry, measurement and pattern concepts.

Goal

Students will be able to use traditional units of length measurement: *jetan*, *makoj*, *nene*, and *ba*. They will identify reflections and rotations in symmetrical patterns and use reflections and rotations to make their own symmetrical patterns.

Essential Questions

What does a weaver have to think about when making a *kemem jaki* or mat?

What measurements need to be made?

Background to this Unit

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These lessons were designed for female students only because it is our custom that weaving a *Jaki* is a female activity and responsibility. Male students were sent to other 4th grade sections to allow the teacher to guide the lessons and to assess any differences in learning culturally-based mathematics among individuals, while taking advantage of paired learning and whole group instruction.

Assessment

The teacher observes students' participation, process and progress as they develop and apply specific skills and knowledge. The teacher asks specific questions to confirm learning and assigns writing and initiates conversations to support learning process (e.g., reflection, knowledge).

Lesson One

THE KEMEM CEREMONY

Focus

Kemem Jaki (the birthday ceremony mat)

Objectives: *Students will*

- begin to think about how Marshallese women need to measure and plan their jaki.

Materials Needed

2-3 examples of *kemem jaki*

Poster illustrating a *jaki* in the *kemem jaki* story

Paper and colored pens

Teacher Activities

1.1. Talk about the *kemem* ceremony.

Ask specific questions:

- What is a *kemem jaki*?
- When, why, or how it is used?
- What is it made from?

1.2. Read the first chapter of the *Kemem Jaki* Story.

Encourage thinking by asking questions:

- What is the story about?
- What are some similarities between the two characters in the first part of the story?

1.3. Ask students to draw a picture of their own *kemem jaki* (or one they have seen or remember)

1.4. Ask 2-3 students to talk about their drawings and, in their own way, describe shapes and size of the mat.

Write on the board the words used by students to describe the shapes used to make their *jaki*, and the shape words they use give its size.

Student Activities

1.1. *Share their experiences of the kemem ceremony and the kemem jaki in particular.*

Respond to questions to add to discussion.

1.2. *Listen to the story and think. Respond to the teacher's questions by proposing ideas*

1.3. *Draw, individually, one or more pictures of kemem jaki.*

1.4. *(If asked) go to the front and talk about the patterns and sizes of the kemem jaki in their drawings.*

[Students might use English words like triangle, rectangle]

Teacher Activities

1.5. Ask students to work in pairs to design together a new *kemem jaki* with its own pattern.

Walk around prompting students to talk about designs with each other, using the words written on the board.

1.6. Conclude the lesson.

Review shape names and measurement words.

Prepare students for the next lesson:

- Tell them that they will hear chapter two of the *kemem jaki* story.
- Hand out paper for them to sketch at home.

Student Activities

1.5. *Work in pairs and talk about the process, using words from the board.*

1.6. *Listen and ask questions.*

Copy important terms into notebooks.

Get paper for homework.

Homework: Students make a sketch of a *kemem jaki* at home.

Lesson Two

WEAVING AND DESIGNING A MAT

Focus

The way Marshallese women weave a *jaki*

Objectives: *Students will*

- observe an expert weave.
- make a first weaving with paper to understand principles behind weaving, difficulty of weaving, possible kinds of patterns.

Materials Needed:

Second poster illustrating the *kemem jaki* story

Strips of colored paper (a large supply)

*Note: arrange for an expert weaver, if needed, to talk about and demonstrate making a *kemem jaki*.*

Teacher Activities

2.1. Ask students to show the sketches or drawings of *kemem jaki* that they brought from home.

Review learning about the mat and introduce the expert.

2.2. Read the second chapter of the *kemem jaki* story.

Ask question about the story:

- How did the magic light appeared on the *jaki*?
- What was the first strange thing that happened to the *kemem jaki* in the second part of the story?

2.3. Invite an expert to talk about making a *kemem jaki* and begin demonstrating how to make a *jaki*.

Student Activities

1.1. Show students' drawings and talk about them.

2.2. Listen to the story and then respond to the questions about the *kemem jaki*.

2.3. Listen and observe, asking questions about the weaving.

Note: RMI women do their weaving and designing at the same time. They must arrange colored and plain weaving strands in and across or in a parallel position at the beginning so that when the mat begins to develop, the patterns and shapes also appear.

Teacher Activities

2.4. Give out strips of colored paper and ask students to design and weave and a small mat in whatever colors they want.

Move around the room with the expert looking at the student's mats and helping them if they can make different patterns.

Encourage students who know how to design and weave to help the other students.

2.5. Select some of the mats that have been made or are being worked on. Point out some designs and patterns.

2.6. Prepare students for the next lesson:

- Tell them that they will hear chapter three of the *kemem jaki* story.
- Give them strips of paper to continue their project at home.

Student Activities

2.4. Determine perimeter and area.

Record data and the process.

Share ideas and listen to others.

Compare and contrast findings and ways of measuring.

2.5. Work with group to present result and explain process.

Listen, ask questions, and share ideas.

Homework: Students continue their projects at home.

Lesson Three

MORE WEAVING AND DESIGNING

Focus

Traditional ways Marshallese women design a *jaki*

Objectives: Students will

- think about how Marshallese women plan weaving and create designs.
- continue to practice weaving and designing with paper strips.

Materials Needed

Third poster illustrating the *kemem jaki* story

Strips of colored paper

A woven mat sample

Tape or thumbtacks (to attach *jaki* to wall)

Note: Arrange for an expert, as needed to continue working with the students.

Teacher Activities

1.1. Review what students have been doing in the unit.
Invite them to show their projects to the class.
Introduce the guest expert again.

1.2. Read the third chapter of the story.
Ask questions so students connect the story and the activity.

Sample Questions

- What are some fun activities that people did during the *kemem* ceremony?
- How did the *jaki* behave at the end of the *kemem* party?

1.3. Ask 2-3 volunteers to step forward to explain how they feel about their first attempt of weaving.

1.4. Have students work in pairs to continue weaving and designing their work from the previous lesson.

Give them more colored strips to make designs.

Go around the groups with the expert weaver helping those who are having difficulty.

Student Activities

1.1. Listen. Share their projects, four students at a time.

Listen to the weaver.

1.2. Listen to the story.
Answer the questions and discuss.

1.3. Listen. Show their *jaki* and tell how they feel or doing project at home.

1.4 Work in pairs adding more colored strips to make new designs or learn how to make designs using more-than-one strand pattern.

Lesson Four

MEASURING THE MAT

Focus

Specific ways to apply measurement when making a *jaki*

Objectives: *Students will*

- learn how to measure their own woven *jaki*.
- use both standard units and indigenous units to measure.

Materials Needed

Fourth poster illustrating the *kemem jaki* story

Woven mats (students')

Charts to record data

Various items: pencils, small/medium rocks, leaves, tables

Tools for measuring: string, rulers, meter sticks

Pencils, notebooks

Teacher Activities

4.1. Explain that they will measure their *jaki* using different measuring units and examine them for patterns and symmetry.

4.2. Introduce basic mathematical principles.

Introduce the words length and width. (See next page for Marshallese measures used for weaving.)

Discuss the ideas of reflection and symmetry.

4.3. Read chapter 4 of the *kemem jaki* story.

Ask questions about the story:

- What amazing thing happened to the magic *jaki* in the chapter we read today?
- What was a secret thing about Betty that her mother wanted to know?

4.4. Explore what students know about local measuring units.

- How do you know about local units of measurement?
- Where does each unit start and where does it end?

Student Activities

4.1. *Listen.*

4.2. *Listen and respond. Contribute to the discussion.*

4.3. *Respond to the story and answer questions.*

4.4. *Listen and participate in the discussion.*

Mathematics Principles: Traditional units of length in mat-making

Jetan: beginning from the tip of a thumb finger and going down to the tip of the middle finger in the same hand. When measuring, we straighten these fingers out flat on something (palm face down) to measure the length of its circumference or area span.

Makoj: beginning from the tip of the middle finger to the first line or from line to line of the same finger. The middle finger has three lines which both are separated by three **makoj** sections.

Nene: beginning from the tip of a thumb finger to the tip of the opposite thumb finger. We straighten out both arms to make a position of 120 degrees. This measuring unit begins from tip-to-tip of thumb fingers in both hands.

Ba: Ba (hand/palm) unit measurement, used only when women are weaving their *jaki*. We flatten both palms on something so that the fingers are facing down as far as pointing forward while the thumb fingers meet each other in an across position to creates a “ba” measurement unit.

Teacher Activities

4.5. Invite 1-2 students to demonstrate how they use local unit measurements.

Write information about local units on the board.

4.6. Put students into pairs to work cooperatively, talking about the indigenous measuring units.

Direct students to experiment using body part measurement (indigenous methods) on *jaki* and other objects that they choose.

Have them talk aloud their understanding and practice with indigenous measuring units.

Check to see if they are having trouble in measuring their own *jaki* and other objects.

4.7. Ask students to look for a line of symmetry in their *jaki*, either by folding or using a mirror.

4.8 Conclude the lesson.

Review the local measuring units, asking about each one.

Prepare students for the next lesson: hearing the final chapter of the *jaki* story and weaving their last *jaki* in pairs using strands made from *maan* (pandanus leaves).

Student Activities

4.5. Use their hands/palms to learn about and practice the units - *jetan*, *makoj*, *nene*, *ba*.

4.6. Begin measuring their mats - determining both width and length.

Record information on a chart – write down in both indigenous and standardized systems.

Continue to practice, measure items and record measurements on the chart.

Notice different ways of measuring, e.g., how *jetan* is actually used when measuring certain things.

4.7. Find a line of symmetry that shows the *jaki* has identical halves.

4.8 Copy notes from the board.

Respond to questions that review each measuring unit.

Listen.

Lesson Five

MAKING REAL MATS

Focus

Applying learning of all lessons to weave a real mat)

Objectives: *Students will*

- apply techniques learned from Marshallese women.
- weave a real mat made from maan (pandanus leaves).

Materials Needed

Fifth poster illustrating the *kemem jaki* story

Maan (pandanus leaf strips) - a good supply

Rulers, yard and meter sticks.

Woven mat samples (students')

Teacher Activities

5.1. Remind students about the unit (Making a Mat)

Show them *maan* strips.

Explain that they will can use any of the measuring units they have been learning about.

Ask students to review the different units in pairs or groups

5.2. Read chapter five of the *kemem jaki* story.

Ask questions:

- Did the magic jaki really respond to what the mother suggested, how?
- What did you like about the story?

5.3. Invite students (2-3 students) to show their weaving and explain how they built it.

Student Activities

5.1. *Listen and confirm understanding.*

Remind each other about the different units, identifying local (indigenous) and standard measuring systems.

5.2. *Listen to the story and respond to the questions.*

Discuss the whole story.

5.3. *Report on how they made their first jaki, or how they started, or how the strands overlap each other.*

Teacher Activities

5.4. Put students into pairs to begin weaving the final mat. Hand out real *maan* strips, and encourage students to share their knowledge and help each other.

Go around the class to see if some students still need help with the plan for their weaving.

Observe student actions to be sure they are successfully managing their project.

5.5. Refer to the mats posted on the wall from the last weaving assignment.

Ask students to name the shapes on the woven mats.

Plenary for Unit: Weaving Mats

Review learning.

Encourage students to talk about the mathematic principles that they have learned.

Invite them to share their experiences of learning through weaving and designing mats.

Distribute more *maan* strips for those who need to complete their project (re-connecting parts and/or doing overlay).

Encourage students to continue to work at home and to enjoy the project.

Student Activities

5.4. Work in pairs to weave the jaki with real maan.

Talk about the process and help each other.

5.5. Name the designs of the maps, identifying shapes.

Ensure they have notes of each in their notebooks.

Review and ask any final questions.

Share experiences.

Complete the mats at home if necessary.