

Macimise

**Mathematics and Culture in Micronesia: Integrating Societal Experiences EDCS
606Spring 2010Dr. A.J. (Sandy) Dawson, Director, Dr. Donald Rubinstein,
Instructor, Dr. Neil Pateman, Co-instructor, Dr. Joe Zilliox, Co-instructor**

Mathematical Aspects of

FAHFAH

**Tulensru Waguk
April 30, 2010**

Mathematical Aspects of Fahfah

Introduction: This paper describes the different types of *fahfah* (a special delicacy in Kosrae) dishes, the making of *sranomtuh* (pounded taro with caramel topping), the distinct weaving procedures and patterns in the various *fahfah* platters, and the mathematical implications involved in *fahfah* making. One of the most important and highly valued delicacies of Kosrae is *fahfah*. *Fahfah* indicates the importance and value of a festive gathering. It also shows the sincerity of one's feelings toward friends, visitors, and relatives. Anytime *fahfah* is present in a gathering, it means the gathering is of great importance and the attendants are special and important. History tells that the skills of making *fahfah* and the skills of weaving *fahfah* platters have been passed down from generation to generation ever since Kosrae's pre-contact period.

Cultural Historical Context: In the early days, the king (*Tokusra*) would designate individuals from each village to serve as his *fahfah* makers. If they did well, they would be rewarded. Harvey Gordon Segal in his book, *Kosrae: The Sleeping Lady Awakens*, tells the legend of the Lisnei clan. A girl from Muhtuhnsrem in Lelu was very beautiful. Two men spied on her while she was bathing and later told the King of her charms. The King wanted to see her right away, but *fahfah* was being prepared so he told his cooks to hurry it up. So the *fahfah* cooks didn't put on the special sauce (squeezed sugarcane and coconut cream), but instead just used the coconut cream. The King ate it anyway and went and found the beautiful girl Owah. He took her for his wife. From this union, the Lisnei Fahfah subclans descended. (Segal, p. 24)

In 1842, the crew of the whaler, “Potomac,” was invited to a feast. They went to one of the big meeting houses in Lelu and were feted with cooked breadfruit, some covered with coconut syrup, *fahfah* and dog meat (a new delicacy in Kosrae). They watched dancing and wrestling while eating. (Segal, p. 74)

Feasts and food-giving were once involved with tribute to the *Tokusra*, but it has remained and continued as a family routine. It is most important at weddings, at children’s one-year-old birthdays and funerals and also when someone in the family is leaving or returning (generally off-island). (Segal, p. 74)

Feast food today calls for pig meat, breadfruit, taro, sometimes canned meat or chicken, fish and always rice. Most important would be *fahfah*, a Kosraean dish made from pounded taro, covered with sugar caramel, a kind of sweet poi that makes the feast extra special. (Segal, p.258)

On the cover of the “Kosrae: Jewel of Micronesia” pamphlet put together by the Kosrae Visitor’s Bureau is a picture of a *fahfah* pounder (*tok*). The centuries-old *fahfah* pounder is a cultural icon particular to Kosrae.



Originally a royal cooking tool, the stone pounder is used today by skilled artisans to make *fahfah*, a local delicacy of pounded taro topped with caramel. Only select men can make the culinary treat, since the rhythmic pounding can last for hours. The Kosrae Visitor's Bureau has adopted the stone pounder to represent the island's unique cultural past.

Custom dictates that preferably church members should make *fahfah* because they are clean. This is not always observed, but among older people it is still important. In the old days, the *Tokusra* recognized skilled *fahfah* men with money. (Segal, p. 258)

Research Methodology

The research was designed to collect information regarding *fahfah* making, weaving of *fahfah* containers, and to discover ideas and views for an indigenous mathematics curriculum. A set of interview questionnaires were designed. Before the interviews were conducted, the interviewees were contacted either by phone or in person purposely to arrange for the interviews. Out of the thousand or so people in the village of Utwe, I decided to interview 10 individuals. And since

fahfah making is a man's job, I decided to interview more men than women, so 8 men and 2 women were interviewed. The people targeted for the interview were skilled and expert *fahfah* makers. Two old women were also interviewed. I also did a random survey to collect the community's general knowledge of *fahfah*. Although I intended to take a small stratified random sample, the survey was generally done with a simple random selection technique. In a simple random selection a small group is picked randomly to represent the whole population. For the purpose of verifying data and qualifying information, people from the other villages were also interviewed. From the other three villages, I wanted to just interview one man from each village. One 13-year-old male student was also interviewed just so I could get a picture of what knowledge and skills a 7th grader has in regards to *fahfah*-making and the weaving of *fahfah* platters. The ages of the people interviewed range from 70 years old to 13 years old. The information collected from the interview questions were utilized in the description of *fahfah* and the procedures for weaving *fahfah* platters.

Other data elicited in the interview included name and age of the interviewee.

1. What is your occupation?
2. What do you do during your free time? What is your hobby?
3. Are you a *fahfah* maker? If yes, how have you become a *fahfah* maker?
4. What do you know about *fahfah* making? What are the customs and traditions involved?
5. How many other *fahfah* makers are here in your village?
6. What jobs do the women have in *fahfah* making?
7. What are the differences between the 8 types of *fahfah*? What are the similarities?

8. What materials are used for weaving *fahfah* platters? Is weaving *fahfah* platter a man's job or a woman's job?
9. Is there only one type of *fahfah* platter or is there more? Is there just one weaving pattern in all types of *fahfah* platters?
10. When is a *kuom* (a type of locally woven basket) used?
11. Do you think the knowledge and skills of *fahfah* making and traditional weaving should be taught in school?
12. What are some traditional ways of counting, estimating, and measuring used in both *fahfah* making and the weaving of *fahfah* platters and local baskets?
13. If there is a need to incorporate indigenous mathematics into the school mathematics curriculum, would you be willing to help in the effort? Why and why not?
14. Is there any other thing you want to share?

Other sources came from the internet and other printed literature, but were only used in the introduction and history of *fahfah*-making and traditional weaving. Several government offices and agencies were visited. Some places visited were the Historic Preservation Office, Kosrae Visitors Bureau, Rose Mackwelung Library, Kosrae Department of Education, Kosrae Island Resource Management Unit, and Utwe Senior Citizens complex.

Difficulties encountered

There is no firsthand information regarding the royal *fahfah* ceremony. There is limited literature on *fahfah* and local weaving of *fahfah* platters and trays. Since it was a simple

random selection, some people interviewed were not *fahfah* makers. Therefore, the information collected from them is limited and may not be treated as reliable and valid. There has never been any written records of the *fahfah*-making process. The steps and procedures of *fahfah*-making have never been recorded. People are unaware that *fahfah* making and the weaving of *fahfah* platters and baskets have mathematical implications, although they have been unconsciously doing some counting, estimating, and calculation. Some *fahfah*-makers interviewed were young and do not know anything about the history and traditions of *fahfah*-making. Limited information was gathered from the student because he is still young and not yet expected to learn the skills of *fahfah*-making. It was difficult to interview all the *fahfah* makers in my village and the other villages as well due to conflicts in schedules and preoccupation with community activities. Distance and travel time also affected the interview schedules, and as a result, the simple sampling technique did not provide sufficient information to represent the village population.

Therefore, I feel that the research is not complete to the fullest; however, with the knowledge and skills available from the senior citizens, and the local people interviewed, I still believe that the information collected is adequate enough to be used as base data for the development of the ethnomath curricula. A few of the people interviewed have been able to recall the ceremonial *fahfah* dish preparation for the king. The various *fahfah* platters have never changed; therefore, the weaving patterns remain the same as well. Although some of the weaving skills are taught and learned in school, more practice and learning are done at home. Since *fahfah* is favorable and prepared in occasional meetings, celebrations, dedication

ceremonies, and other family, community, and state parties, the skills of *fahfah* making and the weaving involved remain practiced at home.

The Tradition and Processes of *Fahfah*-Making: In Kosrae, the skill of making *fahfah* is not just learned by anyone or any family. Neither is it done by anyone! One would have to be from a selected family to be allowed to make *fahfah*, and this trade is considered a man's work. The males who could learn the skill and perform it would have to be around the ages of 18-50. If one is in his 60's or above, he would be considered too old and unclean.

Cleanliness is very important in the preparation of *fahfah*. There are certain activities and duties that a *fahfah*-maker would have to refrain from doing or taking part in. He would stay away from working at graves, carrying or burying dead bodies, building toilet rooms or houses, etc. He would have to be very clean and free of disease. When one prepares *fahfah*, he needs to use banana leaves around his head, his neck and also around the waist to emphasize cleanliness and its importance in preparing the *fahfah* dish. The floor around the pounding stone would be covered two or three feet away from the center where the *fahfah*-maker would be sitting. The *fahfah*-maker may only be assisted by a designated individual; therefore, no one is allowed to come near the area where the *fahfah* is being prepared. When the person designated to assist approaches the *fahfah*-maker, he should not stand straight up near the *fahfah*-maker or bend over to assist him. He should kneel while assisting the *fahfah*-maker. This tradition is the same with all types of *fahfah* that are made of pounded soft taro.

Fahfah may be prepared in various forms. There are about eight types of *fahfah*:

1. *Sranomtuh*, pounded baked soft taro with coconut syrup (caramel) topping

2. *Erah*, pounded soft taro mixed with baked ripe banana with coconut cream topping
3. *Srohnoh kuhtak*, pounded soft taro alone with coconut milk topping
4. *Ikacsrihngsrihng*, pounded soft taro and chunks of baked soft taro with coconut milk topping
5. *Fahfah pot*, pounded baked banana with coconut milk topping
6. Suklac, ground hard taro mixed with mashed ripe banana baked in underground oven, then pounded with cooked coconut cream topping.
7. *Fahfah nguhn*, Cooked and prepared corn starch or tapioca starch with syrup or coconut milk topping
8. *Moriki*, pounded baked breadfruit with heated coconut cream topping

Sranomtuh is described in detail below as a sample of the common preparation process followed in almost all of the eight types of *fahfah* made of pounded soft taro. *Srano* means “juice” and *tuh* means “sugar cane,” so *sranomtuh* means “juice of sugarcane.” It is called this because sugarcane was used in place of sugar in the old days. *Sranomtuh* is also known as *fahfah fiti*. This is the type of *fahfah* that requires the least amount of work; therefore, it can be learned easily. The ingredients needed for this type of *fahfah* include *kuhtak* (soft taro), *kaki* (coconut cream), and sugar. The *fahfah*-pounding tools needed are the *tahpweng* (flat stone) and the *tok* (pounder or pounding stone).

Soft taro grows almost everywhere on Kosrae, but it grows best where there is rich silt and mud. Taro patches are grown and cultivated in swampy areas. A fifty-square-foot area may contain 1000 taro plants. Soft taro can grow to a height of 3 or 4 feet. It usually takes at least 6

months for a soft taro to mature. Harvested soft taro could either be small mature ones from the shoots or big ones from the main stem. When harvested, they are separated into *oht* (shoots) and *kuhtak* (main taro corm). The *oht* are tied in bundles of 20 or 25 depending on their size, and the *kuhtak* are tied in bundles of four or five. A bundle of the small ones (*oht*) is counted as one *srihpwacp*. Usually 4 or 5 *srihpwacp* are harvested at a time and is enough to feed 50 or more people. A bundle of the bigger taro is called a *tah*. A *tah* may either be 4 or 5 taro corms depending on the size of the taro.

Once all ingredients and supplies are in place, the *fahfah*-maker can begin the preparation of the *fahfah* dish. This means the soft taros are cooked and the coconut caramel (*el*) is ready.

The soft taro need to be cooked and peeled before they can be pounded into *fahfah*. The soft taros are cooked in an underground oven (*um*). The place for the underground oven is called a *fucnyuc*. A *fucnyuc* with a diameter of 4 feet may need 100 rocks or less. To build an *um*, the rocks are taken out of the *fucnyuc*, then the fire is built in the center of the *fucnyuc*. Firewood is placed over the fire. The pieces of firewood are laid in rows with each layer or row placed crossing over each other. Usually there are three layers or rows of firewood. The rocks are then placed on the firewood so that they get heated from the burning firewood. It usually takes one hour to totally burn all the firewood and for the rocks to be red-hot and ready. The soft taros are then cut from the stalks or stems and prepared for the *um*. To prevent the taros from burning, they will be soaked in water. Usually the taros will be gathered in a pile and water is poured or sprayed on them. The rocks in the *um* are then spread with a long wooden

pole about 5 or 6 feet long. The *taros* are then placed on the hot rocks. Several rocks are placed on the taros and then covered with leaves.



Only this special type of wide leaf from a giant taro is used for covering an *um* with soft taros. The leaf from a giant taro is called a *sra onak*. When other leaves are used, the taro would not be cooked properly. Fifteen of these leaves would be good enough to cover an *um* with a diameter of 4 feet. After an hour the taros should be cooked.



After the cooked soft taros are taken out of the *um*, they should be left aside to cool a bit, then they can be peeled. It is not good to leave the peeled taros too long under the open air because they may become too dry and chunky when pounded.



Once the taros are peeled, the *fahfah*-maker can begin pounding them. *Sranomtuh* has its own unique way of pounding, and so with each type of *fahfah*. *Fahfah*-makers can tell what type of *fahfah* is being prepared just by listening to the rhythm of the pounding. *Fahfah* pounding is very hard work as it takes energy and strength to pound many soft taros. It also takes patience and stamina.



While the *fahfah* is being prepared, the coconut caramel is also prepared. *Kaki* (coconut cream) is used as topping for a *sranomtuh*. 20 copras is an adequate number for 2 *wels*. Ten (10) or fifteen (15) pounded *oht* make one *wel*, so to make two *wels*, there needs to be twenty or thirty *oht*. Coconut milk is mixed with sugar and heated. More sugar would be added to the coconut milk gradually until the mixture turns red. Once the mixture turns red or brown, it is an indication that the coconut caramel is ready to be used as topping for the pounded taros.

After the soft taros are pounded, the *fahfah*-pounder then forms them into little balls and arranges them around the woven *fahfah* platter (*fuhsranyac*). Then the locally-prepared syrup made from coconut cream and sugar can be poured on top of the *fahfah*.



When all is done, the *fahfah* is ready to be enjoyed. Traditionally the *sranomtuh* is put in a locally-woven *fahfah* platter called *fuhsranyac* and served.

Fahfah Platters: *Fahfah* platters may come in various forms. The making and weaving of *fahfah* platters are based on the materials used. Below is a picture of an *ac* plant. The leaves of this plant are usually used to weave platters for all types of *fahfah* that are made of soft taro. *Ac* is a type of reed with slender leaves growing wild in the rainforests, on flat lands and mountains. Nowadays, some people grow this plant and cultivate them at their homes. The *ac* plant can almost grow everywhere. This plant can be easily grown by planting the stems in the ground. They grow from buds in the nodes of stems just like sugarcane does.



A *sranomtuh* platter is made from woven leaves from the *ac* plant. Below are some pictures showing some steps of the weaving procedures. The slender leaves are stripped from the stalk or stem. A single *ac* plant may produce 14 or more leaves. The young leaves are also taken out for tying. The leaflets are then intertwined. Seven leaflets would cross over seven other leaflets in a certain weaving pattern forming four edges. The four edges are then tied separately forming four handles.



The pictures below show some steps for weaving a *fahfah* platter from young nipa palm leaves. Nipa palms grow in mangrove areas. The widest part of a nipa palm leaflet may reach

four inches. The leaflets used for weaving *fahfah* platters are not the full-grown or wide green leaflets but the young yellowish leaflets from the youngest leaf in the middle of the nipa palm. The leaflets of nipa palms are intertwined a little bit differently. Since the leaflets are wider, there would be fewer leaflets used in the weaving. Usually four or five leaflets may be used. The sides of the leaflets would be stripped and used for tying the edges.



Although the leaflets from the nipa leave and the leaves from the *ac* plant are intertwined differently, both of them serve the same purpose. The leaves are intertwined to make a *fuhsranyac* (a locally woven platter for containing *fahfah*). The size of the leaves or leaflets determines the number of leaves or leaflets to use.

When the *fahfah* is put in the platter or *fuhsranyac*, then the *fuhsranyac* is put in a *kuom*. A ***kuom*** is a type of basket or local tray made from woven coconut fronds. The length of the *kuom* is not measured precisely; however, just by personal judgment and estimation, the coconut frond is always cut to three (3) or four (4) feet in length. Coconut fronds have alternate leaflet arrangement, and when weaving a *kuom*, both sides of the leaflet are used. One side would be intertwined first and then the other side would be woven in the same weaving pattern as the first side.



A *kuom* is used to contain the *fuhsranyac* or *fahfah* platter.



One *kuom* contains four *fuhsranyac*; therefore, one *kuom* is equal to four *fuhsranyac*.

When three *kuoms* are needed for a festivity, it means that 12 *fuhsranyacs* will be needed.

After gathering all the information from the interviews and other resources for this paper, I am sure that the mathematical aspects of *fahfah*-making and the traditional weaving involved will be of great help with the teaching and learning of math in the elementary grades. The knowledge and skills that will be taught and learned from *fahfah*-making and weaving of local platters and trays will not only be interesting but also will be very relevant. Since Project MACIMISE will focus on the development of curricula for indigenous mathematics in the Pacific region for grades 1, 4, and 7, I went ahead and spent some time reviewing the existing

mathematics curricula for these levels and created some possible units as beginning points.

Hopefully this will be of great help with the MACIMISE project.

It is apparent that the traditional knowledge and skills involved in traditional activities such as *fahfah*-making and weaving of *fahfah* platters are diminishing and if nothing is done to recapture, uncover, and recover the mathematical ideas that exist within such activities—as Dr. A.J. (Sandy) Dawson mentioned in his article in *Pacific Education*, “Maximizing the Power of Indigenous Mathematics”—then Kosrae’s precious indigenous knowledge and skills might continue to diminish.

Possible First Grade Indigenous Mathematics Scope and Sequence

- Counts with different indigenous counting systems.

Counting things individually (need to be researched)	Counting things individually (need to be researched)	Counting things individually (need to be researched)	Standard English Numbers
<i>sie</i>	<i>soko</i>	<i>sra</i>	One
<i>luo</i>	<i>lukoac</i>	<i>lo</i>	two
<i>tolu</i>	<i>tolkoe</i>	<i>tol</i>	three
<i>ahkosr</i>	<i>ahkosr</i>	<i>ahng</i>	four
<i>limekohsr</i>	<i>limekohsr</i>	<i>luhm</i>	five

- Performs addition and subtraction operations using *fahfah* and weaving of platters.
Students may count and add the number of taros collected. Subtract them from the number of spoiled taros discarded.
- Counts individual leaves and leaflets, in pairs, sets, and groups
- Counts individual taro and count in groups.
- Skip counts by 2’s using alternative layout and parallel layout of leaflets in a *kuom*

- Splitting a *kuom* into two equal parts to produce equal halves
- Compares heights and lengths of *fahfah* pounding-stones and *fahfah* pounder.
- Compares *kuom* by heights and lengths
- Measures *kuom* with non-standard units of measures such as the hand span or foot of individual student
- Estimates and measures leaves in centimeters
- Draws a line of symmetry on woven *fahfah* platters
- Solves problems involving both standard and non-standard measurement (hand span, arm stretch, foot, inches, yard, etc.)
- Solves problems involving geometric concepts and geometric figures in weaving patterns

Possible Fourth Grade Indigenous Mathematics Scope

- Counts individual leaves and soft taro, in pairs, and in groups
- Uses indigenous counting systems.
- Adds, subtracts, multiplies, divides with materials used in *fahfah*
- States different units of time in terms of hour, minute, second, and day when cooking soft taro in underground *um*
- Recognizes nonstandard units of measure (hand span, arm stretch, foot, and etc.)
- Makes a symmetric figure with woven baskets
- Makes two shapes fit by sliding, by turning, and by flipping (transformation) using leaves

Possible Seventh Grade Indigenous Mathematics Scope

- Demonstrates use of indigenous counting systems
- Estimates lengths of hibiscus ropes and numbers of taro
- Adds, subtracts, multiplies, divides with materials used in *fahfah*
- Uses non-standard units of measure
- Solves geometric problems using weaving patterns.

The above are just general examples of mathematics expectations for the three levels. I believe that there are lots of indigenous mathematics involved in *fahfah* making and weaving of *fahfah* platters. Concepts of numbers could be introduced, basic operations could be exercised, calculations and geometry could be integrated and incorporated into the current mathematics curriculum. The efforts to design and develop a mathematics curriculum through indigenous activities will be advocated and supported by all stake holders since it will revive, capture, and preserve a lot of Kosrae's customs and traditions that we fear will be dragged deep down and become lost forever. As stated in the Fiji article on the web that rediscovered knowledge, skills, and customs would set the platforms for future generations and help revive important part of history that has been in "danger of being lost forever.

References

- Alik, Larry (age 40) Utwe Elementary School Science Teacher.
Interview April 28, 2010
- Amos, Ruth. (age 68) Senior Citizen. Lelu Community Rep.
Interview. April 16, 2010
- Donnegan, Joseph. (2009) Pacific Northwest Research Station. Forest Inventory and Analysis program. Pacific Islands Forest Inventory Database
<http://www.fijitimes.com/story.aspx?id=143080> Pacific Voyage
- Ismael, Grant (age 40) Administrator, Kosrae Visitors Bureau,
Interview, April 15, 2010
- Jonathan, Kit (age 30) Utwe Elementary School Maintenance,
Interview. April 28, 2010
- Kephas, Telsin (age 49) Kosrae High School Vocational Education Administrator, Malem Community Rep. Interview, April 26, 2010
- Kosrae Visitors Bureau, *Kosrae, Jewel of Micronesia*.(n.d.)
- Melander, Bernard. (age 48) Utwe Elementary School Janitor,
Interview, April 28, 2010
- Nithan, Maxon (age 32) Forestry Field Assistant, Kosrae Island Resource Management Authority, Interview. April 6, 2010
- Segal, Harvey Gordon. (1989, 1995) *The Sleeping Lady Awakens*
Library of Congress Catalog Number 88-83616, p. 24,74, 257,258.
- Segal, Martha. (age 46) School Clerk.
Interview April 21, 2010
- Skilling, Lugo (age 56) Education Administrator,
Tafunsak Community Rep. Interview April 26, 2010
- Tilfas, Rayson. (age 13) Utwe Elementary School,
Interview. April 28, 2010
- Waguk, Kotaro. (age 70) Senior Citizen. Former Fahfah Maker
Interview. April 10, 2010
- Waguk, Linson (age 47) Utwe Elementary School Math Teacher,
Interview, April 28, 2010
- Waguk, Tadao. (age 64) Senior Citizen. Oldest Fahfah Maker
Interview. April 10, 2010
- Waguk, Wilton. (age 58) Public Works Retiree.
Interview April 29, 2010

Note: All pictures and photos are my own, and some are of my self.

This material is based upon work supported by the National Science Foundation under **Grant No. 1239733**. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.



Pacific Resources for Education and Learning