The Utilization of Selected Maranao Arts and Practices In Teaching Ratio and Proportion, Triangle Similarities and Circles

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Abstract

This study is an emergent, exploratory, qualitative research. Ethnographic concepts were used to guide the work of the researcher in teaching geometry for one grading period. Mathematical concepts imbedded in some Maranao arts and practices were integrated in the teaching of some geometric concepts. A teacher-demonstrator conducted the class while the researcher acted as a participant-observer, recording daily observations in her field notes.

A questionnaire was administered and interviews were conducted to 32 third year Maranao students of Baloi National High School who were the subjects of the study. Interviews were also conducted with three Maranao families whose responses were utilized in the development of the lesson plans in the "culture integrated" math class. Pre and post tests on Achievement and mathematics Attitude Inventory were also administered.

The students were made to write journals where they could express their feelings towards the integration of their culture in the lessons.

Data obtained from responses to the questionnaire, interviews and journals were analyzed phenomenographically and by the triangulation method.

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Results of the study showed that the integration of selected Maranao arts and practices in the math lessons helped facilitate students' understanding. The feeling of "belongingness" was observed throughout the duration of the investigation. Treating them and their culture as important people made them proud and happy of being Maranaos. Students realized that it is possible to relate their culture to mathematics and learned more about their culture in the process.

Attitude of the students towards mathematics, however, was not affected by the integration of Maranao culture in the math lessons.

Keywords: Maranao arts and practices, phenomenography, triangulation method, "culture-integrated" math class

Introduction

The Philippines is composed of different tribal and ethnic communities having different cultural beliefs and traditions. Thus, culture plays a very important role in our educational system.

Culture is defined as a group of people whose shared beliefs and practices identify a particular place, class or time to which they belong. It is a particular set of attitudes that characterizes a group of people (Encarta, 2000).

Many students experience difficulties in learning mathematics that may have something to do with difficulties in processing mathematical ideas. An ethnomathematics approach is advocated as a means of addressing this concern (Davison, 1988). Ethnomathematics is the study of mathematics, which takes into consideration the culture in which mathematics arises (Casey, 2001).

Baloi National High School is one of the secondary schools in the division of Lanao del Norte. The school is located in Barangay Maria Cristina, Baloi, catering to students from neighboring barangays having different cultural beliefs and traditions. The Maranaos are the natives of Lanao.

The investigation focuses on the integration of the Maranao culture in the teaching of mathematics. The Maranao culture is distinct from other cultural groups in its art and designs. In this

study, some aspects of Maranao art and traditional practices where mathematics ideas are conveyed, are utilized in the teaching of mathematical concepts, with the hope of facilitating learning among Maranao students.

Objectives of the Study

This research aims to answer the following questions:

1. What aspects of the existing Maranao arts and practices could be related to geometric concepts?
2. How do Maranao students relate their existing culture in learning the concepts of mathematics?
3. How do Maranao students use mathematical concepts in the observance of their cultural practices?
4. How do Maranao students behave in their culture-integrated math class?
5. How do Maranao students interact in their culture-related math class?
6. What are their attitudes towards mathematics before and after the investigation?
7. How do Maranao students feel about the integration of their culture in the teaching of mathematics?

Significance of the Study

Hopefully, this study will eventually help students in their difficulties in processing mathematical ideas (Davison, 1988). Integrating Maranao culture in teaching mathematics may enable students to learn mathematics better.

This could also motivate and challenge teachers to be "much more creative in their choices of mathematics to be learned by students" (Powell and Frankenstein, 1977). To promote creativity implies helping people fulfill their potentials and rise to the highest of their capability (D' Ambrosio, 2000).

Results of the study will contribute in promoting and reinforcing cultural dignity among Maranaos. Maranao students as the young generations of today will learn to value their cultural heritage and

preserve this as the most valuable resource that they can pass on to the next generation.

Scope and Limitation of the Study

This study limits to one group of students, the third year Maranao students of Baloi National High School for the school year 2003-2004. This study takes into consideration the selected Maranao arts and practices that can be related to mathematical concepts.

Topics covered are limited to Ratio and Proportion, Triangle Similarities and Circles. Some Maranao arts and practices identified by students, folks, Saber (1973), Madale (1974) and Dimaro (1990) are integrated in the discussion of these lessons. Lesson plans used in the class were based on the RBEC lesson guides in teaching Geometry which was enhanced with the integration of the Maranao culture both during the discussions and in the tests given. Duration of the study is one grading period only.

Class observations were done daily by the researcher only. Language was another limitation on the part of both the researcher and the demonstration-teacher: neither of them speak the Maranao dialect. However, years of experience in teaching Maranao students in the area made them at ease in dealing with them in and out of the classroom

Methodology.

Research Setting

This study was conducted in Baloi National High School, located in Maria Cristina, Baloi, Lanao del Norte, during the school year 2003-2004. It is the only public secondary school in the municipality of Baloi. At present, the school has 20 teachers. Only one of these 20 teachers has Maranao blood or is a "mestiza" Maranao.

The school caters to students from the neighboring barangays in the municipality and some adjacent barangays of Iligan City like barangay Ditucalan and barangay Maria Cristina. During the school year 2003-2004, it had a population of 861 students, 29% or 254 of them were Maranaos.

Based on records, barangay Baloi has a population of 4,788 people. The community has 3 *mosques* situated in strategic places in the barangay. However, even if the Maranaos are the natives of the place, they constitute only 15% of the population.

Subjects of the Study

The subjects of the study are 32 Maranao students, comprising of 14 boys and 18 girls. All of the boys are pure Maranaos (born of both Maranao parents), while three among the girls are "mestizas" (born to a Maranao father and a Christian mother).

All of them speak the Maranao dialect at home except one "mestiza" who does not know the Maranao dialect because she grew up in Manila. All of them speak Visayan and Filipino dialects fluently especially when they are in school or when with their Christian friends.

Research Design

As an emergent, exploratory, qualitative research, ethnographic concepts taken from some aspects of the Maranao culture were integrated in the teaching of some lessons in geometry to investigate its effects on students' performance, behavior, attitude towards mathematics and their feelings towards the integration of their culture.

As a qualitative research, this study possesses certain characteristics described by Bogdan and Biklen (in Fraenkel and Wallen, 2003). Firstly, the lessons were *conducted in the natural classroom setting* and held during their regular class schedule. Interviews with three Maranao families, for the purpose of identifying aspects of the Maranao culture that could be integrated in the math lessons, were conducted in their respective households while they were doing their regular activities.

Secondly, data collected were described in forms of *words rather than numbers*. Thirdly, the researcher was concerned with the *process as well as the product*, thus, the observation of students' interaction in the classroom. Also, data collected was *analyzed inductively*, with the researcher being concerned with the *what, why and how* perspective of the students' thinking.

To enable the researcher to be a participant-observer, a teacher-demonstrator, one of the researcher's co-teachers, was employed to conduct the class.

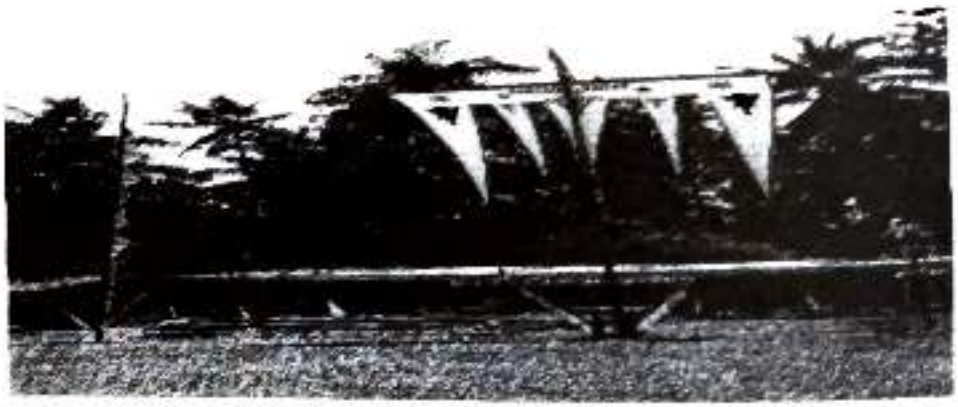
Development and Implementation of the Lesson Plans

The lesson plans used in the culture-integrated math class was following the prototype Revitalized Basic Education Curriculum (RBEC lesson guide in teaching Math III. These were initially enriched by integrating aspects of the Maranao arts and practices described by Saber and Orellana (1973), Madale (1974) and Dimaro (1990), either as part of the development of the concept or as illustrations in the exercises and examinations.

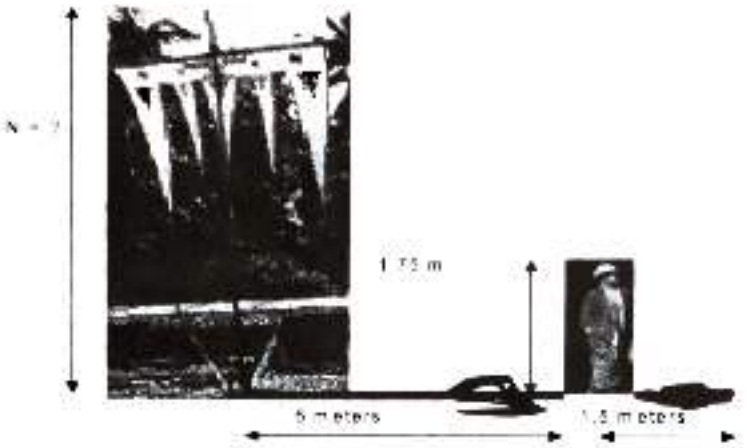
The following is an illustration of a problem integrating a Maranao concept:

The *sambolayang casts* a shadow of 6 meters with the ground at a certain time of the day. At this same time, Mohamad, standing a few meters away and who is 1.75 meters tall, casts a shadow of 1.5 meters. What is the height of the flag?

(Note: a sambolayang is a three or five-jointed rectangular flag. Its joints are tapered saw-like, with the middle joint usually longer than the others. See figure below)



The problem is then presented with the following figure:



To elicit more information about the Maranao culture, the researcher conducted interviews of three typical and traditional Maranao families. The Maranao students in the culture-integrated math class were also interviewed and made to accomplish a questionnaire to probe how much they know about their culture and, at the same time, gather more ideas for the lessons. The researcher also noted common practices observed by her Maranao friends and neighbors.

The researcher then prepared the lesson plans integrating the aspects in the Maranao culture in developing lesson plans in geometry, specifically, ratio and proportion, triangle similarities and circles. These were to be taught by the teacher-demonstrator to the culture-integrated math class. To prepare the teacher-demonstrator for each class, the researcher would discuss the lesson plan with her three days earlier. Before the start of each class, the researcher would again confer with her to clarify things and solicit feedbacks after each session as well.

English was the medium for classroom instruction. Exercises and activities were either done individually or in groups.

Sources of Data

Observation of the research situation was done by the researcher while watching the lessons conducted. The researcher acted as a participant-observer and, at the same time, recorded the events in her descriptive field notes. Photographs were also taken to document the events as the investigation progressed.

An interview schedule was used on the Maranao students in the math-integrated class and three families to cross-validate information cited by Saber and Orellana (1973), Madale (1974) and Dimaro (1990). Responses were tape-recorded to capture their answers accurately.

The same interview schedule was also administered as a questionnaire to the students. Students responded by writing their opinions, feelings, thoughts and ideas about their traditional practices and how these could relate to mathematics.

Another major source of data in the study was the students' journals. These generated information and enhanced students' writing abilities. Guide questions, which depended on the topic being discussed, were provided every time they were asked to write journals. Students were free to use any dialect or language they were comfortable with in writing journals so that they could express what they wanted to write.

Pre and post achievement test results were used to validate students' learning in math together with other student outputs in the activities and assignments.

Pre and post attitude towards math test results were used to determine if there was any change in the students' attitudes towards the subject.

Data Analysis

The method of analysis by *triangulation* is fundamental in this *quasi-ethnographic* study. Data gathered by the researcher from the different sources are used to cross-validate one another, and are analyzed phenomenographically, that is, by the commonality of the respondents' perceptions and reactions on the issue at hand which is, the integration of aspects of the Maranao culture in the math lessons. *Phenomenographic*

analysis maps the essential variation in the understanding, or conception, of a particular phenomenon in any given population (Fraenkel and Wallen, 2003).

Results and Discussion

Some aspects of the Maranao culture that could be integrated in the teaching of geometric lessons are the following:

1. flags displayed on special occasions like weddings, coronations and enthronements, death and mourning rituals and other festive occasions which relate to the concepts of triangles and rectangles

Photo above shows the enthronement of *Bae a Labi sa Gaus a* Ranao Ragat

2. house or venue decorations on special occasions which display different figures like circles, arcs, lines, different polygons and the famous *okir* design

Shown above are *likos or anturas* and *ampas* used to decorate the stage and reception hall in an enthronement ceremony.

3. designs in malongs and ornamental items also displaying different geometric figures
4. local musical instruments like the kulintang and gongs of different sizes which are mostly circular in shapes
5. observance of daily prayers relating to ratio
6. holding of the *kandori* during childbirth or naming of a child wherein the number of goats to be slaughtered depends on the child's gender which students relate to ratio

The students' results in the pre and post achievement tests as well as in the exercises and assignments manifested learning of the geometric concepts introduced.

Students also expressed in their journals having understood the concepts more clearly due to the integration of the concepts.

The respondents stated that they can use mathematical concepts in their business (reflective of the fact that Maranaos are business-minded), in computing and budgeting household expenses and in determining how much to pay for their fare; that they can see geometric

designs in their kombong, landap, langkit; and, in their *hesab* (Mathematics) in the Arabic school.

It was observed that students laughed when they heard the Maranao terms naming their flags in the lessons (sometimes they do because, according to some, it was the first time they heard the real name which was different from the common and more general term they know). It could be deduced that some traditional concepts, like the *sarimanok*, a famous Maranao art, have actually become alien to the new breed of Maranaos due to acculturation.

Students showed a feeling of "belongingness" during the discussions. They spoke to each other in Maranao, joked and were more relaxed with each other and showed more participation than usual by doing boardwork, responding to teacher's questions, performing the activity assigned to them and writing journals as required.

Pre and post attitude towards mathematics tests showed lack of sufficient evidence that the culture-integrated class did affect their attitude towards the subject.

Integrating their culture in the lessons made the students feel happy and proud of their being Maranaos. Moreover, it made them rediscover parts of their culture which so far have been unknown to them.

Conclusions and Recommendations

Having been given importance through the recognition of their culture, the students
felt prouder and more confident in their own worth and abilities.

Integrating aspects of the Maranao culture in the lessons could be the key to the better performance in mathematics, the preservation of the Maranao culture and to a more peaceful co-existence between Maranaos and non-Maranaos in the same community.

It is, therefore, recommended that culture-integrated lessons be advocated by teachers and administrators as well. This could be the vehicle for uplifting students' achievements and for the preservation of the cultural wealth of the country.

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