

CARTOGRAPHY EDUCATION FOR CHILDREN IN INDONESIA

Rizka Windiastuti, BSc, MIT, Ir. Sri Lestari Munajati, M.Agr,
Dra. Diah Kirana Kresnawati, M.Sc
BAKOSURTANAL, Jl. Raya Jakarta-Bogor Km.46
Cibinong 16911, Jawa Barat, Indonesia

rizka@bakosurtanal.go.id
munajati@bakosurtanal.go.id
dkirana@bakosurtanal.go.id

Abstract

Indonesia has been participating in Barbara Petchenik Children's Map Drawing Competition ever since 2003. In order to participate in the event, BAKOSURTANAL (the National Coordinating Agency for Surveys and Mapping of Indonesia) as a member of ICA has been organizing national children's map drawing competition with the same theme as the ICAs.

Beyond expectation, many children participated in the national competitions. For example the organizing committee received 1377 drawings in 2007 and 1179 drawings in 2009. The judges assisted by the committee had to work extra hard to finally get 5 best drawings to be enrolled in the Barbara Petchenik competition and 3 best drawings for each age group. Many of the drawings were of very high quality, making it very difficult for the judges to determine the winners.

Maps, for many children in Indonesia are not unfamiliar things as they have been introduced to maps since they are in the kindergarten. Learning maps in Indonesian schools is included in Geography subject, which is a part of social science education. However, some schools also introduce the basic of cartography as part of Art subject (drawing), and in some schools students are also taught to produce maps as artworks from various items such as buttons, seeds, newspaper pulp, etc.

The objective of this paper is to explain how cartography education has been introduced to children in Indonesia. Observations were conducted at some kindergarten and elementary schools in Bogor and surrounding areas. Interviews were carried out to some Geography and Art teachers to find out how to teach cartography to children, especially of very young ages. Some children were also asked about how they think and feel about the art of map drawing.

This paper will also elaborate the writers' experience when being involved in organizing the national map drawing competitions in Indonesia, especially the one held in 2007 and 2009.

I. Introduction

Map is generally defined as a visual representative of an area on earth, whereas cartography is the study and practice of making maps. In order to communicate spatial information effectively, it is necessary to combine science, aesthetics, and technique of cartography.

Map is one of the most prominent media for the transference of spatial data and has become increasingly important in various fields. And a geospatial infrastructure is an enabling infrastructure which meets the community's needs regarding geospatial information (Voženílek, 2005).

Maps help us to decide what to analyze, then support a decision formulation in a spatial way and communicate the decisions about to be made (Menno and Ormeling, *et al*, 2007).

Voženílek (2005) considered the most critical cartographic research issues to be as follow:

- the characteristics of the data to be handles
- the visual design and the user interface
- the reason behind representation
- user interaction with dynamic representations
- the changing technology which supports new forms of representation.

Recently, GIS technology has been more and more popular, which brings hope about knowledge based system. This also applies for the science of cartography where the existence of knowledge based cartography as software, GIS has been viewed as a solution that can guarantee that the map production is user friendly even for a user that has very view knowledge of cartography (Menno and Ormeling, *et al*, 2007).

With more advanced technology, the map education for children, especially in the elementary school needs to be improved in order to make the students more aware of their environment, specifically in using maps. Therefore this paper will describe map education in elementary school in Indonesia and how the understanding of maps in children's point of view is expressed through map drawing competition for children.

The objective of this paper is to explain how cartography education has been introduced to children in Indonesia in order to see the understanding quality of children to cartography and to geospatial information in general.

II. Methodology

The methodology used to research about cartography education in Indonesian elementary school is through assessment of the schoolbooks generally used in state elementary schools related to cartography or at least to map (geography). In Indonesian education curriculum, geography is included in social science education. Every chapter in the book was then assessed and a simple matrix was created to see what was taught and how far was the explanation of each class grade. From the matrix, we could figure out how much cartography was taught in Indonesian elementary schools.

Observations were conducted at some kindergarten and elementary schools in Bogor and surrounding areas. Interviews were carried out to some Geography and Art teachers to find out how to teach cartography to children, especially of very young ages. Some children were also asked about how they think and feel about the art of map drawing.

Another method used to find out how well Indonesian children understand maps and cartography is by observing the results of map drawing competitions for children that have been organized by BAKOSURTANAL since 2003, and interviewing some participants, especially winner candidates, and their drawing teachers.

III. Cartography education in Indonesian school

3.1. From Kindergarten To the 2nd Grade

In Indonesia, children have been introduced to maps as a way to familiarize the country to the children. This is important as Indonesia is a big country that consists of thousands of islands and cultures. The map introduction in kindergarten level is usually by letting the children color the map of Indonesia or by making a puzzle out of the map. When coloring the map, children are free to use any colors, thus creating a colorful map. Even though they are told which parts of the map are lands and which parts are waters, they are not required to color the map accordingly. This is because the kindergarten students are about 4-6 years old. Therefore, the map education is just up to the point of introducing the shape of their country.

Early in elementary school, in 1st and 2nd grade, learning about map is still included as a part of art education. Students are assigned to draw maps, and in some schools, they are also taught to produce maps (mostly map of Indonesia) as artworks from various items such as buttons, seeds, newspaper pulp, etc. When creating maps from newspaper pulp, students already taught to resemble the earth surface (not flat), even though it is just based on their imagination and not on the real contour data of the lands.

3.2. The 3rd Grade

In the 3rd grade, basic geography has already been included as a part of social science education. Chapter 3 of the social science book for the 3rd grade explains about location chart and map. This chapter contains the definition of location chart, direction, and introduction to various chart and how to draw charts. It is explained that location chart is a drawing which shows the location of an object, usually includes the north direction, so people who see the chart would understand how to get to the place on the chart.

Furthermore, here is explained about the 8 directions: north, east, south, west, northeast, southeast, southwest and northwest. In order to find out the direction, sunshine is used as a guide because in Indonesia, which is located in equator area, the sun rises in the east and sets in the west.

Various kinds of chart are also introduced in the 3rd grade, such as house chart which is used to see location of various rooms in a house, neighborhood chart to see various facilities in the neighborhood, classroom chart to see location of class facilities and students in the class, and school chart to see location of the school in relative to other buildings around the school. As an exercise, 3rd grade students are assigned to draw a chart to explain a location of a specified object.

From this chapter, it is summarized that the similarity between a chart and a map is that both deals with directions and are used as a tool to help people finding a location of an object. When drawing a chart, it is important to include the north direction and to give details about the shape of a building or a landmark, numbers and other necessary annotations.

In this chapter, the focus is about charts as a simple map. The differences between maps and charts are not explained in details. Coordinate systems and scales are not yet introduced. Students are taught about the direction and some tools to find directions such as sunshine and a compass.

In addition to Chapter 3, Chapter 1 talks about natural and human-made features around us. Understanding the difference between natural and human-made features can become a basic in understanding maps later on.

3.3. The 4th Grade

In the social science school book for the 4th grade, geospatial education is taught in chapter 1, which is about local map. The sub-chapters contain introduction to map, how to draw a map, scale and how to enlarge or minimize a map.

In the sub-chapter about introduction to map, it is explained that the definition of a map is a visual representative of the earth drawn in a flat surface in a specific scale. It is also

described about the map sheet name, map border, color scheme, map legend and map scale. However, coordinate system of the map has not been included.

The students are taught to draw maps imitating a map sample (atlas). Vertical and horizontal grids are added to the map sample, and the same grids are also drawn at the students' drawing paper. The smaller the grids are, the easier and more accurate the students can draw the map. Furthermore, the students are also taught how to enlarge or minimize a map by changing the density of the grids. However, at this level students are not yet taught about the requirements when enlarging/minimizing the map, such as the content of the map itself. Then the students are also taught to color the map appropriate to cartographic rules.

About map scale, in this book it is explained that a scale is the ratio between the distance on the map and the real distance on earth. The type of scale stated here are just small and large scales, whereas graphical and numeric scales are not mentioned.

3.4. The 5th Grade

In the social science school book for 5th grade, the chapters directly related to maps are chapters 1 and 2. Chapter 1 is about the greatness and residuals of ancient kingdoms in Indonesia. There are 4 sub-chapters in this chapter, but only 3 relate to geospatial information, which are about Hindu kingdoms, Buddha kingdoms and Islam kingdoms.

In this chapter, it is explained about the distribution of various ancient kingdoms in Indonesia, which is drawn spatially in the area within Indonesia territory. Although the map is drawn as a global map, no information about the scale and coordinate system used, and only colored in grayscale, but the map is informatively and spatially describes the boundary of the ancient kingdoms.

Chapter 2 explains about the natural and man-made features and also about the different time zone in Indonesia region. In the sub-chapter about natural features, it is explained about various natural features such as river, coastline, sea, highland, valley, mountain, etc, and also described about how to draw maps using symbols to represent the features. In the sub-chapter about time zone, it gives detail spatially about the 3 time zones in Indonesia: west, center and east.

3.5. The 6th Grade

In the 6th grade, which is the last year in elementary school, more mapping education is given. There are 5 chapters in the school book that are dealing with maps, which are chapters 1, 2, 3, 4 and 6. Chapter 1, which is about the development of Indonesia's region, tells about the changing of the provinces areas in Indonesia and also about the changing of the sea territory of Indonesia. Chapter 2 and 3 tells about natural and social features of neighboring countries and of the world. Chapter 4 is about natural disasters

in Indonesia and neighboring countries, while chapter 6 talks about export and import activities of Indonesia.

In chapter 1 the territories of Indonesia's provinces are displayed on a map. The development of many regions in Indonesia has caused the changes of the number of provinces in Indonesia. In earliest government there were 11 provinces. In 1976 the number of provinces increased to 27. In 1999 it increased again to 29, and in 2004 up to now Indonesia consists of 33 provinces as shown in Figure 1.



Figure 1. Territory of Provinces in Indonesia

The neighboring regions associated to a province are drawn as a diagram. For example, West Sumatera Province (Sumatera Barat) has Riau Province on its north, Jambi and Bengkulu Provinces on its south, Hindia Ocean on its west and Riau Province on its east, as shown on

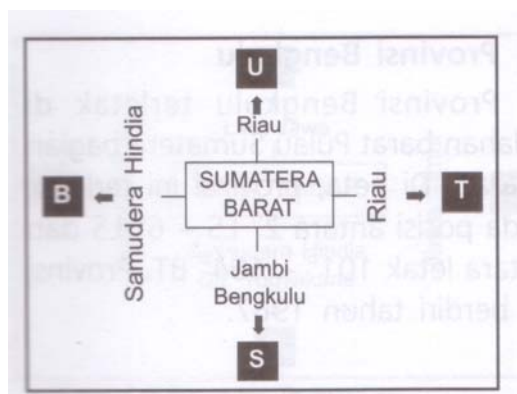


Figure 2. Diagram of Neighboring Regions

Sub-chapter about the sea territories of Indonesia explain the rules in determining Indonesia's territory based on Djuanda Declaration stated on 13 December 1957 as follow:

- Inner waters are parts of Indonesia because it connects an island with the others,
- Straight lines connecting the outermost point of the outermost islands determine sea territories of Indonesia
- Boundary of Indonesia is measured 12 miles from the outer baseline of the outer islands.

Unfortunately, these rules are not explained in detail as a map so that the position and boundary of Indonesia can be seen more clearly spatially.

In Chapter 2 a map of Indonesia and neighboring countries (in this case the 13 ASEAN countries) is introduced. However, it is in a very large scale and is not presented in colors. The globe is also shown to display the position of ASEAN countries on earth. Here, coordinates of the countries are written although the north direction is not drawn.

In Chapter 3 students are taught about main characteristics of natural features in different countries in the world (including the number of populations and areas of the countries), developments of the countries, also drawing continent and world maps by transforming a globe into a flat surface. However, here the coordinates, scale and north direction are excluded. Map of Asia Continent and some country maps are also displayed, showing the coordinates and north direction, but some maps do not include the scale as shown in Figure 3.



Figure 3. Sample of a Country Map

In Chapter 4 about natural disasters happened in Indonesia and surrounding countries, shown the distribution of the natural disasters such as earthquake, volcanic eruption,

typhoon, flood, etc. However, they are displayed in a table and not spatially on a map which could have been understood more easily by students.

In Chapter 6 about export and import activities of Indonesia, explained about some kinds of commodities exported and imported by Indonesia. However, similar to the natural disasters case in Chapter 4, the distributions of the commodities are only presented in the form of table.

In summary, map educations in Indonesian Elementary School starts formally as part of social science education in 3rd grade and in the textbook used in general by state elementary schools, there are 2 out of 9 chapters related to maps (22.2%). In the schoolbook for 4th grade students there are 4 out of 10 chapters (40%) are related to maps. In the 5th grade, spatial information is covered in 2 out of 7 chapters (28.6%) and in the 6th grade 5 out of 6 chapters (83.3%) involve spatial information even though many information are only presented in table format.

IV. Map drawing competition for children

4.1. Overview

As part of map socialization, especially to children, BAKOSURTANAL has organized national map drawing competitions for children since 2003. It was initially held in order to participate in the Barbara Petchenik Competition (BPC) organized by ICA. In addition to participating in the BPC every 2 years since 2003, BAKOSURTANAL also organized local map drawing competitions every years when no BPC is held. The main difference between the national and local competitions is that in the national competition, children drew at home or school then sent their drawing before the deadline thus giving them plenty of time to draw, while in the local competitions the children came to the competition venue and drew there within a limited time (about 2-3 hours).

In both competitions (national and local), participants were grouped based on the ages. For national competitions, the age groups followed the rules of BPC (under 9 years, 9 to 12 years, and 13-15 years of age). The first and second groups were mostly followed by students of elementary schools even though many kindergarten and junior high students were also included in these age groups. Where as for local competitions, the age groups were usually based on the children school grades (1st-3rd grade, 4th-6th grade and 7th-9th grade).

Beyond expectation, all map drawing competitions held by BAKOSURTANAL interested many children to participate, especially the national competitions where the number of participants is not limited. This paper will expose the national competitions in 2007 (followed by 1377 drawings) and in 2009 (having 1179 drawings).

4.2. Cartography Education in Map Drawing Competition

Selecting thousands of drawing to determine 5 or 6 winners were not that easy. The judges assisted by the committee had to work extra hard to finally get 5 or 6 best drawings to be enrolled in the BPC and 3 best drawings for each age group. Many of the drawings were of very high quality, making it very difficult for the judges to determine the winners.

Therefore the committee had to create judging procedure, including selection criteria, in order to assist the judges determining the winners. The main emphasis of the selection criteria was the cartographic elements of the drawings, including world map composition, scale proportionality, relative position and color. In addition, there are 2 other criteria which are theme suitability and creativity.

Observing results of the competition in 2007, 282 out of 1377 drawings (20.48%) passed the selection criteria while in 2009 the number increases to 413 out of 1179 (35.03%). The percentages could represent how many children understood the concept of cartography, although those could also show how many children were able to imitate maps in their drawings without knowing cartography at all.

One of the procedures to verify that the drawings were indeed drawn by children, was that some committee members had to visit the winner candidates determined by the judges. The verifications were done through drawing test and interviewing the children and sometimes their parents and teachers. From the interview, it was proven that the children did understand what they drew, for example they knew why they had to color the ocean in gradation (i.e. to show the different depth), etc. Although some of them admitted that some ideas of their drawing came from their parents or teachers, they did learn about cartography in the process of finishing their drawings.

Amazingly, all children who were nominated as winners also performed well in other subjects in their schools, including the social science. Some of the students admitted, however, that the social science education was not their favorite subject because it was not presented in a fun way.

V. Conclusion

Cartography education in Indonesia has been introduced since kindergarten in very simple and fun ways. In early elementary school (1st and 2nd grade), cartographic or map drawing is taught as part of Art education. Starting from 3rd grade, maps or geospatial information are taught as part of Social Science education. Students are taught about charts or simple maps and how to draw maps, even how to enlarge and minimize existing maps. However many maps included in the schoolbook do not consistently include cartographic components such as coordinate, scale, north direction, color, etc.

Cartography education can also be obtained by participating in map drawing competitions, because even though the children initially copy the maps from existing atlases, they will learn the reasons why, for example, the colors of the ocean have to be different.

Map introduction to students of Indonesian elementary school has been provided sufficiently. However, the use of cartography in displaying spatial information in the schoolbooks needs to be improved. Children would usually more easily understand pictures than tables. By using cartography, social science education can be more fun than it is now.

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