

Students' Understanding of Geography Education on The Concept of GIS Data in Subject Geographic Information System

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Abstract

Geographic Information System subject (GIS) is a compulsory subject that must be completed in six semesters, consisting of three credits consisting of theory and practice. theoretical understanding is needed in order to attend the practicum well. This research aimed to know the students' understanding toward the concept of Geographic Information System data in the Geographic Information System subject. The method used in this research is descriptive research. The sample used in this study is purposive sampling which amounted to 32 students. Data were analyzed descriptively statistically using Ms. Excel. The data are analyzed in the form of test instrument and student test result and students assignment result. Overall, students understand the GIS data well enough. However, when it is viewed from the lowest percentage indicates that there are still many students who do not understand the output of GIS data and raster data model. Based on these findings, the need for appropriate learning strategies and adjusting the characteristics of students in learning allows to accommodate students' understanding of a theory. The proper learning strategy needs to be studied further.

Keywords: Understanding, Geographic Information System (GIS), Geographic Information System Data (GIS)

1. Introduction

Students are individuals who pursue education at higher education level on the basis of their desire to achieve their goals, and curiosity to the knowledge they are interested in. They are adults who have characteristics, 1) have self-direction skill; 2) independent and has a sense of responsibility for their actions and able to make their own decisions with the consequences (Pannen and Malati in Sutomo, 2009). On that basis, they are educated by the choice of actions they have decided with responsibility as a consequence.

University PGRI Palembang as the organizer of higher education, students are required to complete the subject taken in each semester according to their own speed of learning. It's in accordance with the Laws Number 12 of 2012 about higher education, stating that students can complete educational programs according to their individual learning speeds and do not exceed the stipulation deadlines set by Higher Education.

Geography education program of Universitas PGRI Palembang is the organizer of educational program that aims to produce graduates of Geography educational staff who have competence in the field of primary and secondary education. To make it happen students are required to complete the study by following / taking compulsory subject and or elective subject completed every semester for 8-10 semesters in accordance with the speed of each student's learning through lecturing process so that students understand the subject they attend.

Understanding of a theory can be obtained by students either structured or unstructured way. Structured way is done through face-to-face classes in the classroom and other strategies that can be applied, while unstructured one is obtained by the students themselves through self-study.

Bloom (Sudijono, 2009) says that comprehension is a person's ability to understand or understand something after something is known and remembered. Then, Winkel (2009) states that understanding includes the ability to capture the meaning of the material being studied. Understanding is included in the cognitive domain in Bloom's Taxonomy at the second level, which contains the ability to correctly interpret what has been learned without having to apply it (Dimiyati and Mujiyono, 2006). Thus, students are said to be able to understand or not to a theory can be seen after they have done the task given during the lecture.

In this case, one of the understanding that can be obtained by students is through Geographical Information System (GIS). The GIS subject is a compulsory subject in the 2011 curriculum which consists of three credits consisting of theory and practice. In theory, this subject discusses the background and definition of GIS, the role and concept of GIS, subsystems and components of GIS, GIS data, capabilities and workings of GIS, and Global Positioning System (GPS). In practice, students apply the theories they have acquired into a mapping program in the computer lab, in this case, it is to create a software-based map.

BAKOSURTANAL (Budiyanto, 2002) describes GIS as an organized collection of computer hardware, software, geographic data and personnel designed to acquire, store, repair, manipulate, analyze and display all forms of geo-referenced information. The concept is more applicative, so that students are able to apply GIS. Thus, in the

lecture students are expected to be able to understand the theories in advance so as to apply the theory into practice. Creswell (Pride, 2014) believes that the main focus of theory is in its application.

Based on the study, GIS subject in the academic year 2016-2017 is given in even semester. Before students learn GIS subject, students are required to complete prerequisite subject such as Cartography and Remote Sensing. Students who follow this subject are divided into 3 classes that are supported by three lecturers. Each of GIS lecturers holds one class. The lectures are conducted in a structured manner with various lecture strategies. To measure the ability of students, they are given the assignment, and tests in midterms and final exams semester.

This research was conducted in order to know the understanding of students in studying GIS especially the concept of GIS data. GIS data is one of the competencies that must be well understood by students who will often be used in the practice of making maps with software. Therefore, the need to know the how far the students understand the concept / theory before the implementation in the lab so they can attend the practicum well. Rappoport (Priede, 2014) theory informs practice, as it provides insight into the behavioral contextually and for the generation of an alternative way for new settings.

The research results of Pertiwi and Weganofa (2015) revealed about the students' understanding of qualitative research methods, students have difficulty in understanding qualitative research methods in several aspects, namely first is in understanding the natural setting of qualitative design with data sources of people / informants or texts; second is in terms of understanding human / researcher as the main instrument of research; the three students also have difficulties in understanding the characteristics of generative theory qualitative design by using the snowballing technique. It means that understanding of a theory is needed in completing a task, especially in learning.

From the description, this study aims to determine the level of understanding of students on the concept of Geographic Information System data in the subject Geographic Information System.

2. Research Method

This research is a descriptive research that aims to describe students' understanding of the concept of Geographic Information System data. The sample used in this study is purposive sampling which amounted to 32 students, the researcher uses this sample related as a lecturer who holds this subject.

The data collection used in this research is in the form of test and assignment. The test instrument contains ten questions about the concept of GIS data with 30 minutes answering times. Intrumen test is given to students after carrying out structured learning in the classroom. Independent assignment are given after the students complete the test and do it as a homework. The assignment is to identify the types of GIS data that appear on thematic maps under the heading "“ Identifikasi Perubahan Sempadan Sungai Musi Kota Palembang (1922-2012)“" which refers to an article by Mujib, Murjainah and Daulay (2016).

Data were analyzed descriptively statistically using Ms. Excel', it's purpose is to know which parts that have or have not been understood by students. The data were analyzed in the form of test instrument, students test result and students assignment result.

Intrumen test is analyzed by scoring, each question with score 1 for the correct answer and score 0 for who can not answer correctly, the results of the analysis are grouped based on the indicator problem consisting of understanding GIS data, GIS data sources, data types and output of GIS. Then, each indicator is in percentage.

Student test results obtained from the average number of questions answered correctly divided by the number of test questions, and then made in percentage based on value categories. The value category of the test refers to the assessment rules of the Teacher Training and Education Faculty of University PGRI Palembang. Furthermore, the results of the student self-assignment are obtained from the accuracy of the students in identifying the types of GIS data that appear on the map, then percentages.

GIS data is a representation of facts in a geographically referenced field. The acquisition of spatial data is obtained from field, map data, remote sensing, and statistical data. GIS data sources can be analog maps, satellite images and aerial photographs. The data is in the form of tabular data that are integrated with existing spatial data.

GIS data types consist of spatial data and attribute data. Spatial data is data consisting of explicit location of a geography that is arranged into coordinate form, while attribute data is picture data consisting of information relevant to a location, such as depth, location of sale and others and can be connected with certain location with a view to providing identification (Charter and Agtrisari, 2003). Attribute data provides an overview or explanation of information related to map features or GIS coverage. Attribute data can be stored in numbers and characters. Data attribute of an object can be qualitative and quantitative data.

Spatial data is divided into models of raster data and vector data. Vector data model is a representation of the world using points, lines, and polygons. Vector models are useful for storing data that has discrete boundaries,

such as country borders, land parcels, and streets. And then, raster data model is a representation of the world as a surface is divided into a regular grid of cells. Raster models are useful for storing data that varies continuously, as in an aerial photograph, a satellite image, a surface of chemical concentrations, or an elevation surface (www.support.esri.com).

3. Result and Discussion

The test analysis is done by scoring, score 1 for the correct answer and score 0 for the wrong one, the result of the analysis is grouped based on question indicator which consist of definition, data source, data type and data output of GIS data. The results of the test instrument analysis can be seen in Figure 1.

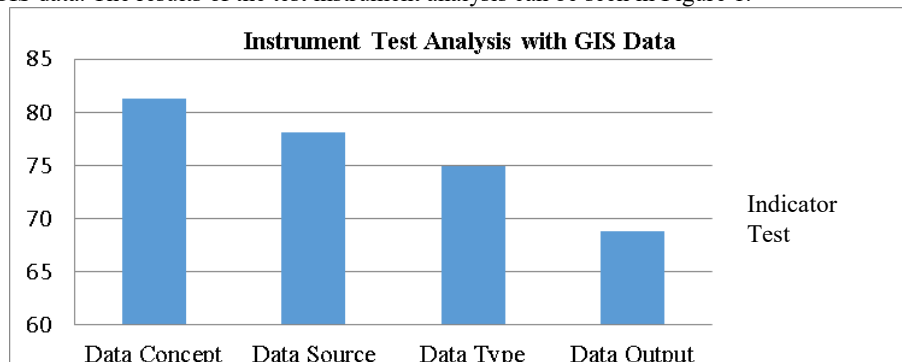


Figure 1. Test Instrument Analysis
 (Source : Data Network, 2017)

Then, the result of the student test is done by calculating the mean of the number of questions answered correctly divided by the number of test questions. The averages are categorized and given a category of values A, B, C, D, and E. The results of student tests can be seen in Figure 2.

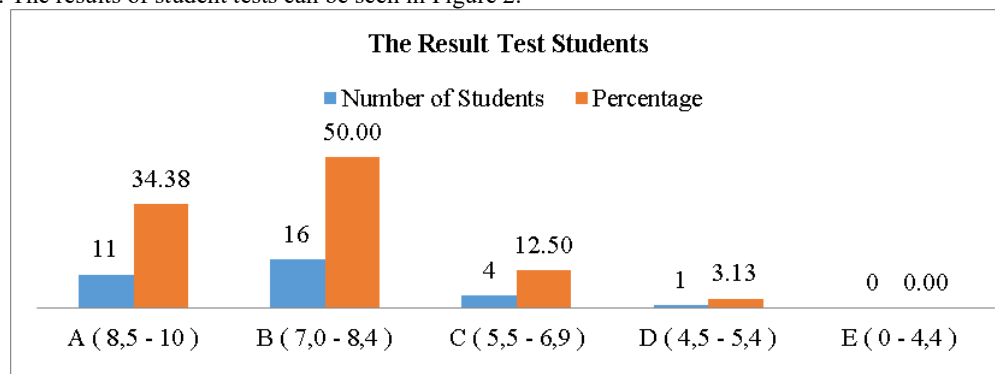


Figure 2. The Result Students
 (Source : Data Network, 2017)

The results students assignment which has been collected are evaluated based on the accuracy of the students in identifying the type of GIS data that appears on the map. The result of student task analysis in identifying GIS data type on a map can be seen in Figure 3.

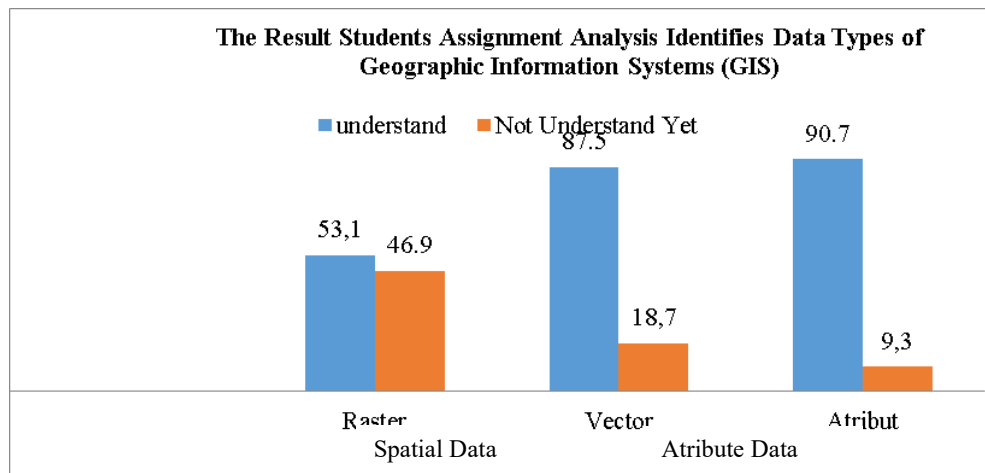


Figure 3. The Result Students Assignment Analysis
 (Source: Data Network, 2017)

This research is to describe the students' understanding of the concept of GIS data in the Geographic Information System subject by giving tests to the students after finishing the lectures. Sudjana (2010) classifies the understanding into three categories: 1) Understanding the lowest level is the understanding of translation; 2) The interpretive understanding is to relate the previous passages to the next known ones, or to connect some parts of the graph with events, distinguish between principal and non-essential; 3) The highest understanding is the understanding of extrapolation, it is hoped that one is able to look back in writing, can make predictions about the consequences or can expand the perception in terms of time, dimension, case, or problem.

In this category of understanding researchers conduct research on the understanding of translation. Understanding the translation of the ability to understand the meaning contained in it (Tohirin, 2001). Translation retention can also be from abstract conception to a symbolic model to make it easier for people to learn (Sanjaya, 2008). In order to know the understanding of students after the learning process in the classroom, then given the test so that students and lecturers get feedback after the implementation of learning.

The lecturing was conducted at lecture meeting with the discussion of GIS data which was delivered structurally in class with technologically assisted ie the researcher explained the concept of GIS data through slide (power point), giving example by showing thematic map. Then, at the end of the lecturing the students were given the test.

The result of the test instrument analysis in Figure 1 shows that the students who are able to answer the question with the question indicator about the understanding of GIS data is 81.3%; students who can answer questions with question indicator about GIS data source are 78,12% of student who can answer correctly; in the indicator of the question about the type of GIS data there are 75% who answered correctly, but on this indicator is also mostly on questions about the raster data model there are many students with a percentage of 59,4% who answered correctly, the rest are students who can not answer the question and who can answer the question but not right / wrong. It means, in this indicator many students who do not understand about the model of raster data. Similarly, in the question indicator about GIS data output there are 68.8% of students who answered correctly, it is seen from the answer sheet of many students who do not answer / empty the answer to the question about the data output and there are students who answered but wrong answer. When it's confirmed to the students there are some students who are still confused / not yet understand the concept of GIS data in particular the output form of GIS data and some are claimed that the answer time has been up. Thus, the overall result of the test analysis on the concept of GIS data is obtained 75.8% when grouped into a category with a scale of 100, it is included in the category well understood. It can be concluded that the student understands the concept of GIS data she has gained during classroom learning.

Then, the result of the student test in Figure 2 shows that there are no students who get the value with category E (0 - 4,4), but there is 1 student got D value (4.5 - 5,4) with percentage 3,13% and students who got a score of C (5,5 - 6,9) there are 4 students with percentage of 12,50% and student get B value there are 16 student with percentage equal to 50%, while student who got value A (8,5 - 10) there are 11 students. Then, the mean of class value indicate that student mean value at GIS data subject is 76. If it is seen from the class mean,it can be concluded that the students are enough comprehended for GIS data concept, although there are some students who get low test result.

The result of student assignment in identifying GIS data type found on thematic map “Identifikasi Perubahan Sempadan Sungai Musi Kota Palembang” whis is done by students independently, from 32 students there are 30 students who collect the task and the rest do not collect the task.

The result of the student assignment in Figure 3. shows that the students who collect the tasks can identify the spatial data in the form of vector data model, ie, line and polygon data, 87.5% who understand the data, seen on the student assignment sheet marked on the representative map of the type spatial data, such as line data of sub-district boundaries and areas of river border changes caused by erosion, sedimentation and river changes. Then, attribute data on the map is 90, 7% of students can identify attribute data on the map seen on the task by marking the map description part as attribute data. Furthermore, the students' understanding on the raster data model is 53.1% who understand the raster data model. However, there were 46.9% of students writing raster data on the line in front of the map, and the rest did not write raster data on the map.

Based on the result of test instrument analysis, student test result and student assignment in identifying GIS data type, there are some things that need to be observed; 1) the result of the test instrument analysis is 31.2% or 8 students who do not understand the output of GIS data and the raster data model there are still 21 (40,6%) of the student have not understood it yet; 2) the result of the test of the students with the average of grade 76 can be categorized quite well but there are some students who get low score; 3) student assignment analysis in identifying GIS data type on a map, there are 46.9% or 15 students who have not understood the theory especially on raster data model. The raster data model on the map is not visible on a map unless the map is enlarged several times from the original map so that grid-cell appears on the map because the grid-cell will be visible on the map displayed using computer technology and so on. Rasters are digital aerial photographs, imagery from satellites, digital pictures, or even scanned maps (ESRI, 2009).

The raster data model is a line data in the form of a square series stored as a pair of numbers denoting rows and columns in a matrix. The dot is expressed as a series of grid-cells connected to one side, and the polygon is expressed as a combined grid of cells that connect at all sides. The resolution of the raster data is determined by the size of the grid-cell. Whereas, vector data stores digital data in the form of coordinate sequences (x, y). The point is stored as a pair of coordinate and polygon numbers as a series of coordinates that form a closed line. The resolution of the vector data depends on the number of points that make up the line (Budiyanto, 2002).

The presence of students who do not understand the concept of GIS data, especially the raster data model and GIS data output need to be addressed by determining a more appropriate learning strategy that can accommodate the learning style of each student by involving students directly in the learning process, so it can improve students' understanding in understanding a theory. The proper learning strategy used in the subject needs to be studied further.

4. Conclusion

Understanding the students of Geography Education, University of PGRI Palembang after carrying out the lectures and given tests and assignments showed that students have understood the concept of GIS data quite well. Nevertheless, there are 31.2% or 8 students who do not understand the GIS data output and the question about the raster data model there are still 21 (40,6%) students who have not understood it, on the students' test result, there is student who get low score, then on the students' assignment in identifying data type GIS on a map, there are 46.9% or 15 students, including 2 students who did not collect the assignment ,who are not yet understand the type of GIS data especially raster data. It is needed a further study appropriate learning strategies to improve student understanding for future researchers.

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