Analysis the Effect of Mathematics Subjects on Islamic School in Pekanbaru Region Using Spatial Analysis

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Abstract: This study focus to reveal the capabilities the students of Madrasah and Sekolah Islam in understanding mathematics subjects throughout the Pekanbaru area using spatial analysis. The national examination mathematic will be mapped to all regions in Pekanbaru. The same mapping for public schools will also be produced, so that a comparison of the national examination mathematict (NEM) for the three types of schools can reveal more clearly the ability of Islamic school students to understand mathematics. Study results also indicated that students of Madrasah has the highest a NEM on the small ares in north and isolated areas on the south Pekanbaru region. While students of Sekolah Islam have the higest NEM on few ares in west Pekanbaru region. However students of the Public schools have the best abilty in understanding mathematics subjects, especially in a few area on the south Pekanbaru region.

I. INTRODUCTION

Indonesia is the most populous Muslim country in the world with over 200 million Muslims. With more than 50,000 Islamic schools in the country, the religious teachings in these schools have a direct and long-lasting impact on the Islamic orientation and lives of Muslims in the country and elsewhere. It is therefore instructive to critically examine the educational philosophy, curriculum and pedagogy of Islamic schools in Indonesia.

Madrasah is an Islamic educational institution [1, 2] first entered Indonesia in the late 18th century brought by the Middle East alumni. They wanted to reform Islamic education by adopting the reform in Al-Azhar University Cairo, offering a curriculum that provides general lessons in addition to religious lessons as its primary mission [3], which teaches students the basics of Islamic values and general science. Madrasah has three levels of education similar to

public schools: primary level (Madrasah Ibtidaiyah/MI), junior high school level (Madrasah Tsanawiyah/MTs) and high school level (Madrasah Aliyah/MA).

Madrasah in Indonesia uses madrasah curriculum, which consists of 30% religious lessons and the rest are normal subjects including mathematics [4]. It is run by the Department of Religious Affairs, whereas public schools are administered by the Department of Education. Furthermore, it is suggested that religious learning in madrasah has five to six hour meeting a week, while in general school religious learning has only two hour meeting a week.

In the last decades of the 1980s, a new type of Islamic school labeled as the Integrated Islamic School or sekolah islam has spread in Indonesia. Administered by the Department of Education, such schools are out of the pesantren tradition but neither is it similar to madrasahs. Unlike the madrasah, this class of education appears elite and reach middle-to-up class Muslim society. Suyatno [5] has an excellent analysis regarding why this type of school has emerged in Indonesian education and has became more popular. The students in Sekolah Islams do not concentrate on learning Islamic courses such as Islamic jurisprudence or Islamic theology. Rather, their attention is on general subjects such as mathematics, science, history, social studies, and foreign languages. On the other hand, Sekolah Islams surpass the public schools by allocating more hours to religious instruction: an average of 4 or 5 lesson hours as compared to 2 lesson hours per week in the public schools. On top of that, they include Arabic language and Qur'anic studies in their curriculum. Sekolah Islams combine a quality general education with Islamic ethos and morals; importance is placed on Islamic practices such as prayer, and attempts are made to infuse Islamic principles and values into the curriculum. This type of school is also known for offering its students a rich variety of extra-curricular activities so as to inculcate Islamic values through these activities. Although it successfully introduced mathematics to be taught in the Islamic education system in Indonesia, madrasahs seem still as having dualism and separation in its curriculum. A total of 70% of its curriculum contents contain common subjects which are entirely separated from its 30% of Islamic studies. As a consequence, the disciplinesm such as science and mathematics, which are actually quite related with many Quranic verses and Islamic practices and values, become value free and meaningless for Muslim students.

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Based on the opinions and the results of research on impact learning science subjects on madrasah and sekolah islam , it seems that there is a difference in learning results, which is affected by learning strategy on both types islamic school. Therefore, it is necessary to conduct a research, especially on mathematics subjects, that aims to investigate quantitatively the differences in the learning results of Madrasah Tsanawiyah (MTs) and Sekolah Islam students in Pekanbaru Indonesia. There are several studies that reveal the ability of students in Islamic schools to understand mathematics [6, 7], but the study was limited to some Islamic schools not as a whole for a particular region.

This study aims to reveal the capabilities of Madrasah students and Sekolah Islam in understanding Mathematic subjects throughout the Pekanbaru area using spatial analysis. The national examination mathematic will be mapped to all regions in Pekanbaru. The same mapping for public schools will also be produced, so that a comparison of the national examination mathematict (NEM) for the three types of schools can reveal more clearly the ability of Islamic school students to understand mathematics.

II. STUDY AREA AND DATA

This study was conducted in Pekanbaru, Pekanbaru city is the capital of Riau and is located 00 32' 0.6180'' N and 101 26' 50.6508'' E. Pekanbaru has a tropical rainforest climate, as with many cities with an equatorial climate. The geographical coordinates and the National Examination Mathematics (NEM) some of the selected Madrasah, Sekolah Islam and Public School (junior high school) are provided in Table 1, Table 2, and Table 3 respectively. The data of the NEM in 2017/2018 academic year collected from the NEM Results Report released by the Center of Education Assessment, Ministry of Education and Culture of Indonesia. Location for three types of the schools on this research namely Madrash, Sekolah Islam and Public Schools are provided in Fig 1, 2 and 3 respectively. The point locations for the three types of schools used in this study as shown in Figures 1, 2 and 3 are located in almost the same area in the Pekanbaru region.

Table 1. Some Geographical coordinates and NEM of Madrasah on Pekanbaru

Sekolah Islam	NEM	Latitude	Longitude
MTS NEGERI 1PEKANBARU	73.29	0.511398	101.453651
MTS NEGERI 3PEKANBARU	51.33	0.470775	101.460790
MTS NEGERI 2PEKANBARU	44.38	0.626801	101.423679
MTS DARUL HIKMAH	41.56	0.469982	101.399077
MTS HASANAH	35.39	0.504412	101.447018
MTS BUSTANUL ULUM	36.16	0.507994	101.505548
MTS MASMUR PEKANBARU	34.97	0.509400	101.478424
MTS AL-MUNAWWARAH	30.93	0.492982	101.482014
MTS AL HUDA PEKANBARU	36.49	0.463796	101.368174
MTS MUHAMMADIYAH 1	31.63	0.465882	101.460780

Table 2. Some Geographical coordinates and NEM of Sekolah Islam on Pekanbaru

Sekolah Islam	NEM	Latitude	Longitude
SMP MUHAMMADIYAH 1	35.9	0.51137	101.4379520
SMP MUHAMMADIYAH 2	30	0.46587	101.4613296
SMP BABUSSALAM	43.75	0.46587	101.4613296
SMP ISLAM AS-SHOFA	60.5	0.50084	101.3983124
SMP ISLAM YLPI	28.71	0.53184	101.4409474
SMP MASMUR	32.88	0.50963	101.4385608
SMP NURUL FALAH	30.99	0.53800	101.4389339
SMPIT AL-ITTIHAD	59.29	0.57578	101.4349259
SMP ANNUR PEKANBARU	32.13	0.52711	101.4500841
SMP IT DAR AL-MAARIF	30.54	0.50921	101.4386982

Table 3. Some Geographical coordinates and NEM of Public Schools on Pekanbaru

Public School	NEM	Latitude	Longitude
SMP N 1 PEKANBARU	69.62	0.5262775	101.4536837
SMP N 2 PEKANBARU	46.24	0.5322606	101.4419625
SMP N 3 PEKANBARU	52.4	0.5242678	101.4320133
SMP N 4 PEKANBARU	81.44	0.5262063	101.4562976
SMP N 5 PEKANBARU	61.31	0.5269467	101.4537264
SMP N 6 PEKANBARU	55.24	0.5720811	101.4372415
SMP N 7 PEKANBARU	32.01	0.5358935	101.4654049
SMP N 8 PEKANBARU	68.22	0.4623263	101.4344984
SMP N 9 PEKANBARU	49.13	0.4940175	101.4870843
SMP N 10 PEKANBARU	57.12	0.5270512	101.4562129

This showed that the location of the school based on the three types of schools to be studied has almost the same location for the Pekanbaru region, and indirectly this is expected to reduce misinformation caused by the extent of the geographical area of Pekanbaru. Based on the similarity of location, it is expected that research to analyze the ability of students in schools based on Islam in Pekanbaru can be done well.
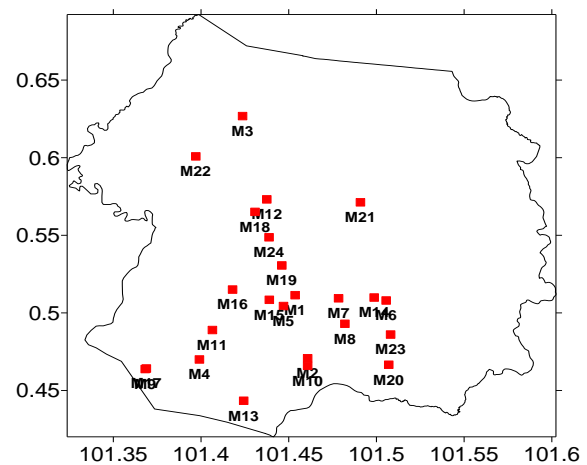

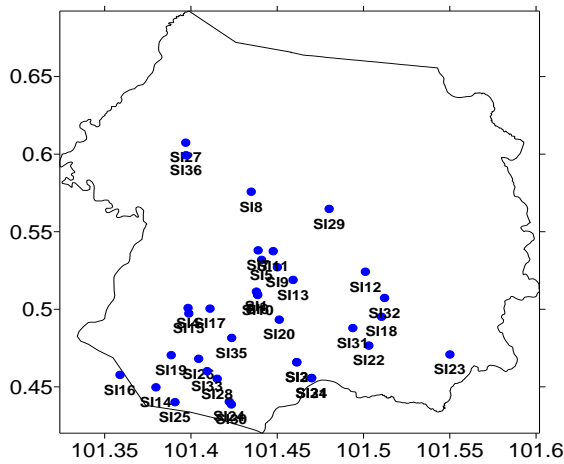Fig 1. Madrasah coordinates on Pekanbaru region

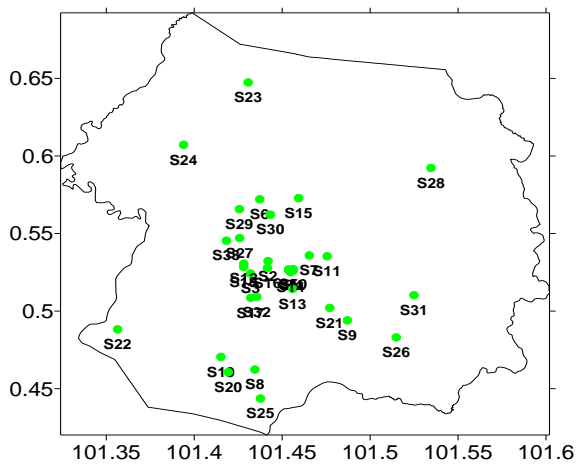Fig 2. Sekolah Islam coordinates on Pekanbaru region

Fig 3. Public School coordinates on Pekanbaru region

III. METHOD

Spatial analysis is analysis of data in which the location or coordinates (latitude and longitude), and distance between objects that can be found from knowing the coordinates. Spatial analysis includes techniques for visualizing or mapping data, determining if data exhibit spatial autocorrelation, and modeling spatial relationships [8]. In education, spatial analysis as well as maps of the spatial distribution of phenomena such as school achievement level can be useful to education planners and managers [9]. As a matter of fact, most spatial education data have been analyzed without spatial models. The present study will obviously focus on the methods of analysis that actually utilize the spatial nature of the data. Although spatial models require spatial data, spatial data need necessarily be analyzed and visualized with the use of surfer. Surfer are software tools for digital cartography that help to process, organize, analyze, and visualize geographically referenced information with spatial models. There are many methods available for mapping in spatial analysis. Some of the common methods used are inverse distance, minimum curvature and Kriging. On this research kriging method will be used to produce mapping of NEM for three types of schools on Pekanbaru area. Several publications provide detail information on the Kriging method [10, 11].

IV. RESULT

This section will discuss the result of spatial analysis of the NEM for three types of the schools on this research. The data of the NEM and descriptive statistics for the academic years (2017/2018) was being shown in figure 4 and Table 4 respectively. NEM characteristics are critically important for the evaluation the ability of student in understanding mathematics subject. This evaluation is usually achieved by the values given in Table 4. While mean of the NEM varied from 38.33 to 45.32, maximum NEM varied from 73.29 to 81.44. Variance describing the amount of variability or dispersion around NEM data, almost same for three types of the schools. The values obtained indicates that there are not significant difference for ability of students on three types of school in understand of mathematics subject. However public schools have a higher average NEM value, but based on a variation value, spatial analysis is needed to ensure certain areas that have good and bad NEM values in the Pekanbaru region.
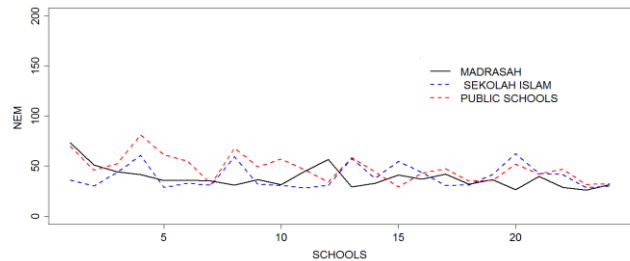

Fig 4. The NEM data for three types of the schools

Table 4. Descriptive statistics of NEM for three types schools

	Mean	Min.	Max.	Median	Variance
Madrasah	38.33	25.97	73.29	36.24	111.22
Sekolah Islam	38.38	24.85	62.68	36.02	110.98
Public Schools	45.32	29.10	81.44	44.48	161.93

Based on Kriging method, some of maps will be produced. The resulting map is able to provide a complete information in analyzing events in a region. The map, in generally, describing certain values, such as the smallest, medium, and highest event values in an area can be determined accurately. The three mappings carried out in this study were conducted by using the SURFER version 8 software, where the mapping for NEM Madrasah, Sekolah Islam and Public School can be given as Figure 4, 5 and 6 respectively. The resulting map means that the red color indicates the low or small value of NEM, the yellow color indicate the medium value and the green color indicate the high value of the NEM. Figure 4 can be seen that almost all area of the west region has a lower of NEM for Madrasah than other areas in Pekanbaru was recorded between 24 and 45. Contrast with south region, that ares have higher NEM in Pekanbaru was recorded between 45 and 66 and a few small areas in north region, which were found to have the largest NEM for Madrasah school, with value over 66.
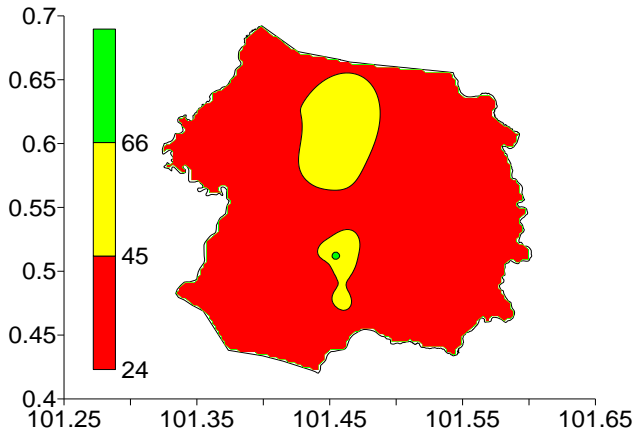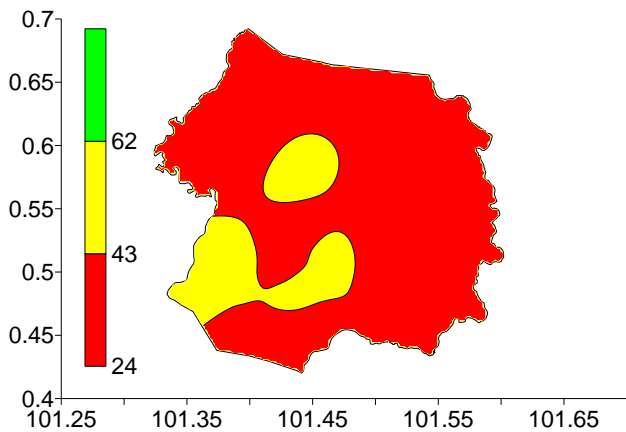
Fig 4. Mapping of NEM Madrasah on Pekanbaru region

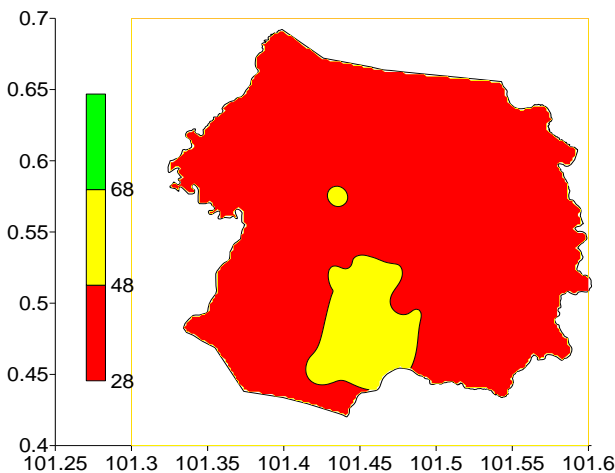**Fig 5. Mapping of NEM Sekolah Islam on Pekanbaru region**

Fig 6. Mapping of NEM Public Schools on Pekanbaru region

In term of NEM for SEKOLAH ISLAM, it can be concluded that almost all east and north areas in Pekanbaru experienced the same value between 24 and 43, as shown in Figure 5. However, a few and isolated areas in the west region, which were found to have the largest NEM with value between 43 and 62. From these results it appears that the students based on Islamic School namely Madrasah and Sekolah Islam on Pekanbaru region have the same ability in understanding of the subjects Mathematic, especially in the east and a few area on the west. While a few small areas in north region have the best students on this subjects for Madrasah.

The spatial distribution of NEM students public school (junior high school) in Pekanbaru region is displayed in Figure 6. Almost all areas in west, east, and north Pekanbaru region is recorded the lowest NEM with value < 48. Few places on south region recorded the largest with value between 48 and 68. Isolated areas in the west region, which were found to have the largest NEM with value between 48 and 68.

In term of comparison NEM between public school and the school based on Islam (Madrasah and Sekolah Islam), it can be concluded that the largest was observed few isolated areas on the south with value > 66 for Madrasah student. While on the small areas in south Pekanbaru region, received higher NEM for studebts in publics school. The difference result can be found in west region, the NEM for Sekolah Islam has higest value in Pekanbaru region.

V. CONCLUSION

Through the comparison of maps produced, it can be seen clearly that there is difference characteristic among students in Madrasah, Sekolah Islam and Publics Schools in ability to understanding of mathematics subjects on Pekanbaru region. Study results also indicated that students of Madrasah has the highest a NEM on the small ares in north and isolated areas on the south Pekanbaru region. While students of Sekolah Islam have the higest NEM on few ares in west Pekanbaru region. However students of the Public schools have the best ability in understanding mathematics subjects, especially in a few area on the south Pekanbaru region.

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