

# Spatial analysis for detect gender influence on score test English language and mathematics subjects junior high school in Pekanbaru

Sri Murhayati, Hartono, Hertina, Rado Yendra, Ari Pani Desvina, Ahmad Fudholi

**Abstract:** *This paper focus on investigate the influence of gender on score test of English Language and Mathematics subjects Junior High School on Pekanbaru region. The study specifically sought to determine gender differences in students academic performances in English Language and Mathematics based on comparison spatial analysis between gender and subjects. From the mapping number of junior high school male and female students and the average of scores English and mathematic on Pekanbaru region, indicate that there were some region on Pekanbaru, namely west, north and small area in south the number of gender has influence a score test Mathematic subject. On other hand females are less mathematically capable than male. This result contrast with east region area on Pekanbaru region, the different of number of gender not influence the score test mathematics. While, almost all area of the north and a few small areas in south region, which were found that the general views are that boys and girls are suited differently to particular academic subjects. Research findings revealed that girls perform better than boys in English Language score tests, on other hand, the different of number of gender has influence the score test English Language. The difference result can be found in east region, the number of gender has not influence the ability understanding in English Languages Subject.*

**Index Terms:** *Influence of gender on subject, comparison spatial analysis, mapping of number of gender, test score some subject.*

## I. INTRODUCTION

Several researchers worldwide have discussed some subject that separates students based on gender. Based on related previous studies, the researchers sought to investigate the influence of sex and gender with special to Language and Mathematics. From that theory, show that female students memory is significantly better than that of male students in foreign language learning. Contrast with mathematics, girls have lower expectations for themselves in mathematics than boys, and that girls believe they do not have mathematical ability.

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The literature in gender studies suggests that society as whole believes that females are less mathematically capable than men. Traditionally, girls lower performance in mathematics was explained as relating to both internal and external contextual factors—for example, lower perceived support for learning mathematics [1-5]. Some of the research on performance in mathematics has highlighted a traditional gender gap in favour of boys [6-9]. Aremu [10] reported that boys are better than girls in Mathematics and other science subjects. There have been a few published works on the detect gender influence on education using spatial analysis. Some studies have considered educational indices in order to analyze spatial patterns in regions, such as using the outcomes of math tests with the purpose of measuring the educational performance of students [11]. Geography may reveal important differences in a region's welfare and may play an important role in explaining educational development across the country [12]. Different objectives and approaches have been highlighted in detecting gender impact on some subjects Junior High School in in previous studies. To the best of our knowledge, no study has been conducted in Pekanbaru region to analyze gender impact on English and Mathematic using spatial analysis. Realizing its importance to the society, a spatial distribution of gender and some subjects Junior High School, namely English language and Mathematic is used to analyze impact of gender on some subjects in Pekanbaru region. Spatial analysis is a technique for mapping a problem in a particular area by using a limited amounts of data, and it is followed by the information of the location of the north latitude and east longitude of a region. Spatial analysis has studied and reviewed for health and environmental application in Malaysia [13-21]. However, the objectives of this study is to detect the impact of gender on some subjects junior high school based on spatial data of number of male and female students and test score English Language and Mathematics and map its spatial distribution.

## II. STUDY AREA AND DATA

Pekanbaru city is the capital of Riau and is located 00 32' 0.6180'' N and 1010 26' 50.6508'' E. Pekanbaru has a tropical rainforest climate, as with many cities with an equatorial climate, the temperature only varies a little throughout the year. The geographical coordinates and the some locations of the 40 selected junior high school are provided in Table 1 and Fig. 1 respectively. Here, SMP is defined as junior high school on Pekanbaru region, EL is English Language, and M is Mathematics.

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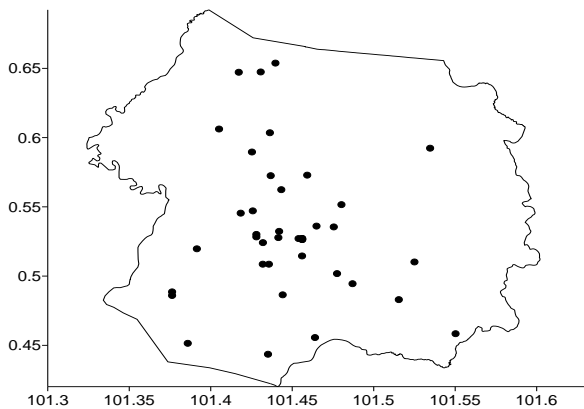
Additionally, number of male and female students for some junior high school in Pekanbaru region are provided in Table 2.

**Table 1. Geographical coordinates and the data of test score for some of the 40 Junior High School in Pekanbaru region**

SMP	Male students	Female Students
SMP22	483	430
SMP35	326	314
SMP33	203	214
SMP36	247	198
SMP13	550	546
SMP12	413	451
SMP18	327	361
SMP2	234	240
SMP20	523	594
SMP23	511	547

**Table 2. Number of male and female students for some junior high school in Pekanbaru region**

SMP	LAT	LONG	EL	M
SMP22	0.5018	101.4775	51.38	41.98
SMP35	0.455618	101.464	52.65	45.15
SMP33	0.5197	101.3915	41.46	39.04
SMP36	0.545451	101.4184	40.64	38.75
SMP13	0.51454	101.456	61.31	57.35
SMP12	0.5301	101.428	46.85	42.15
SMP18	0.5283	101.428	55.82	62.65
SMP2	0.532306	101.44197	49.55	48.83
SMP20	0.486	101.3763	58.75	57.45
SMP23	0.4886	101.3763	52.67	50.84



**Fig 1. The geographical coordinates and locations of the 40 selected junior high school in Pekanbaru region**

### III. METHOD

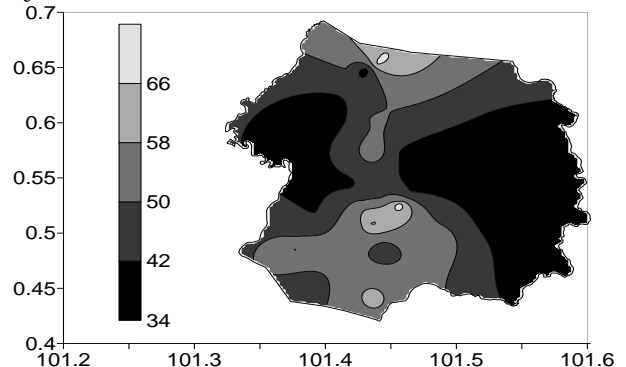
Spatial analysis is analysis of data in which the location or coordinates (latitude and longitude), and distance between objects that can be found from knowing the coordinates. Spatial analysis includes techniques for visualizing or mapping data, determining if data exhibit spatial autocorrelation, and modeling spatial relationships [22]. 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.

The effects of gender influence are also potentially indirect as, for example, number of male and female students are highly related to ability student to understand for some subjects on junior high school. As a matter of fact, most spatial gender and 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 test score English Language and Mathematic subject on junior high school. Additionally the mapping of number of male and female students junior high school in Pekanbaru region also will be produce. Several publications provide detail information on the Kriging method [23, 24].

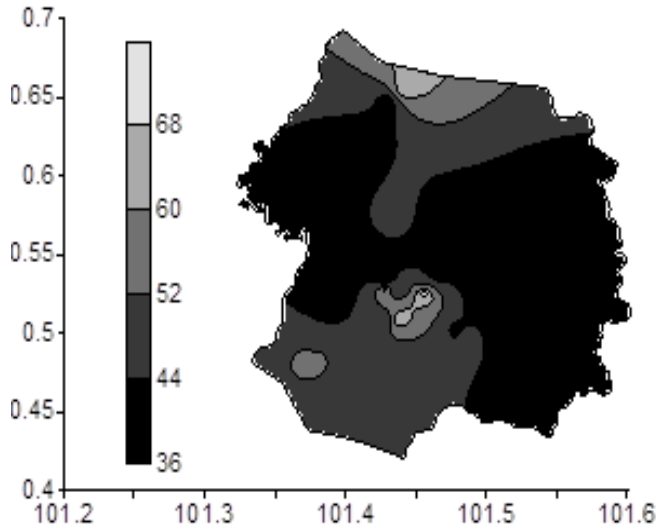
### IV. RESULT

Based on Kriging method, some of maps will be produced. Figure 2 can be seen that almost all area of the west and east region has a lower of mean score test of english language than other areas in Pekanbaru was recorded between 34 and 42. Contrast with south and north region, that are have higher score test in Pekanbaru was recorded between 42 and 66 and a few small areas in south and north region, which were found to have the largest score test for english language, with score over 68. In term of Mathematic score test, it can be concluded that almost all west and east areas in Pekanbaru experienced the same score between 36 and 44, as shown in Figure 3. While the most of larger the score was recorded along south and north region with value between 44 and 68. However, a few and isolated areas in the south region, which were found to have the largest score of Mathematic with value over 68. From these results it appears that the students junior high school on Pekanbaru region have the same ability in understanding of the subjects English Language and Mathematic, especially in the west and east. While a few small areas in south region have the best students on this subjects.



**Fig 2. The geographical coordinates and locations of the 40 selected junior high school in Pekanbaru region**



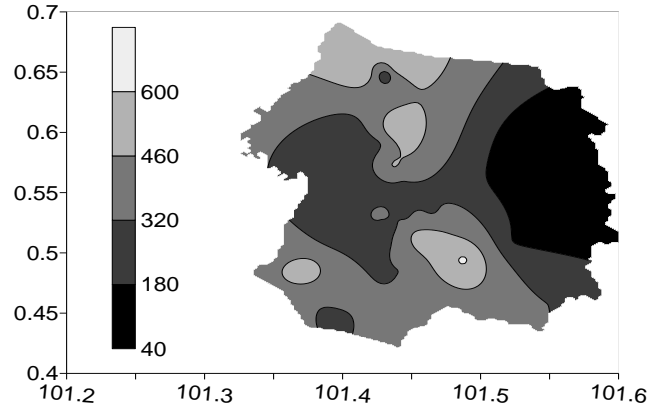


**Fig 3. Map of score test subject Mathematic Junior High School in Pekanbaru region**

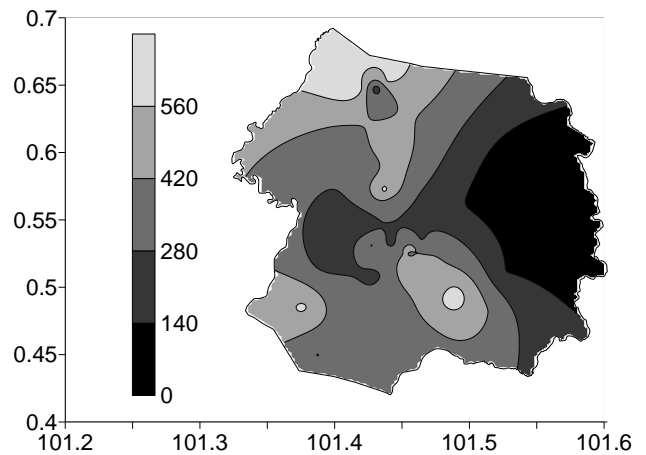
The spatial distribution of number of male students junior high school in Pekanbaru region is displayed in Figure 4. Almost all areas in east Pekanbaru region is recorded the lowest number of male students with value < 180. Few places on south region recorded the largest with value more than 600. However almost all areas on south and north also received higher number of male students with value between 460 and 600. In contrast, almost all areas in west Pekanbaru region seen decrease with value between 180 and 320.

In term of number of female students junior high school, it can be concluded that the largest was observed few areas on south and north with value > 560, while the lowest was found in east region with value < 180, as shown in Figure 5. Only a few places in the north, west, and south Pekanbaru region, recorded with value between 420 and 560.

From Figure 4 and 5 can be seen that the spatial distribution of number of male students junior high school more than female on west areas in Pekanbaru region. While on the same areas in Pekanbaru region, particularly the score test of mathematical subjects decreasing significant. From these results can be found that a gender has influence the score test mathematics, on other hand females are less mathematically capable than male. This result contrast with east region areas on Pekanbaru region, the different of number of gender not influence the score test mathematics. The similar result can be seen that on almost all area of the north region and A few small areas in south region, the general views are that boys and girls are suited differently to particular academic subjects. Research findings revealed that boys perform better than girls in Mathematics score tests. There are differences result in some area on Pekanbaru region, particularly west region experiences higher number of male students and from fig 3 can be seen that in similar area has a lower score test Mathematics subjects. On the other hand, the western part is likely to experience higher number of male students will be caused lower score test Mathematics subjects.



**Fig 4. Map of number of male students Junior High School in Pekanbaru region**



**Fig 5. Map of number of female students Junior High School in Pekanbaru region**

Figure 5 can be seen that almost all area of the north region has a higher number of female students than other areas in Pekanbaru. A few small areas in south region, which were found to have the largest. The spatial distribution of score test English Language is displayed in Fig. 2, From Figure 2 and 5 can be found that the general views are that boys and girls are suited differently to particular academic subjects. Research findings revealed that girls perform better than boys in English Language score tests, on other hand, the different of number of gender has influence the score test English Language. The difference result can be found in east region, the number of gender has not influence the ability understanding in English Languages Subject.

## V. CONCLUSION

Through comparison spatial analysis between number of gender and score test of some subjects (Mathematic and English Language) junior high school on Pekanbaru region, it can be known that there is difference characteristic male and female students junior high school in learning Mathematic and English language subjects on Pekanbaru region. Study results also indicated that almost area on Pekanbaru region the girls tended to perform slightly better than boys in Language while boys tended to perform slightly better than girls in Mathematics.

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To date, he has managed to supervise eight Ph.D (six as main supervisors and two as co-supervisor), one Master's student by research mode and one Master's student by coursework mode. He was also an examiner (five Ph.D and one M.Sc). His current research focus is renewable energy, particularly solar energy technology, micropower systems, solar drying systems and advanced solar thermal systems (solar-assisted drying, solar heat pumps, PVT systems). He has published more than 120 peer-reviewed papers, of which 30 papers are in the ISI index (25 Q1, impact factor more than 4) and more than 80 papers are in the Scopus index. He has published more than 80 papers in international conferences. He has a total citations of 1206 and a h-index of 17 in Scopus (Author ID: 57195432490). He has a total citations of 1684 and a h-index of 21 in Google Scholar. He has been appointed as reviewer of high-impact (Q1) journals. He has also been appointed as editor of journals. He has received several international awards. He has also been invited as speaker in the Workshop of Scientific Journal Writing: Writing Scientific Papers Steps Towards Successful Publish in High Impact (Q1) Journals. He owns one patent and two copyrights.