

Spatial Intelligence For Senior High School Students

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Abstract: Spatial intelligence as the ability to see and observe space meticulously. Spatial intelligence is a very important part of improving the quality of individuals that will affect the potential progress of a region or country. Spatial intelligence can be developed by studying geography, which studies material objects and spatial phenomena. This research uses qualitative research methods. This study aims to analyze the levels of spatial intelligence of high school students in Medan City, North Sumatra Province, Indonesia. The results showed that the students' spatial intelligence was in the moderate category with a score of 47%. The analysis is detailed in 4 categories, with the blind map indicator regarding locations in Indonesia getting a score of 53.5%. Second, the Natural Resources Indicator, which contains the distribution of natural resource locations in Indonesia, scored 56.49 percent. Third, the icon or landmark indicator regarding icons or landmarks of districts or cities in Indonesia scored 63.9%, and finally, the human resources indicator (ethnicity and culture) scored 74.9%.

Keywords: *Students, Spatial Intelligence, Geography*

1. Introduction

Since birth, humans have been equipped with various potentials that need to be developed so that one day they can carry out their functions and roles as humans effectively and productively in carrying out their daily lives [1]. Howard Gardner says that every child has intelligence potential; one can stand out in one intelligence, in two intelligences, or in even more. This intelligence is known as multiple intelligences. This intelligence needs to be developed by everyone so that the ability to adapt to the world can be better directed [2]. One of them, namely, the aspect of intelligence possessed by children, is the aspect of spatial intelligence.

Children who have visual-spatial abilities can understand the concepts of color, direction, and space accurately, and children who are intelligent in this area have sensitivity to colors, lines, shapes, and buildings. Spatial intelligence is the ability to form, understand and present perspectives of the spatial world. Various actions and operations can be performed using these models [3]. Spatial intelligence is intelligence that prioritizes spatial thinking using various visual objects. When measuring spatial intelligence, it is useful when the information presented is wider than the five

senses can perceive.

Events presented in the form of images provide important indications about events that have occurred so that learners can estimate their influence on the future [4]. Spatial intelligence is a very important part of improving the quality of individuals who will affect the potential progress of a region or country. Improving this intelligence requires participation from various fields, especially the field of education, for example, through learning geography. The utilization of spatial intelligence makes the individual sensitive to the area where he lives and allows for proper planning, concluding, and evaluating [5].

A skill that students must acquire in geography classes is the ability to analyze and understand geospheric phenomena in the context of spatial concepts. Spatial concepts are forms of declarative knowledge that form the basis for developing spatial thinking [6]. Concepts such as location, dimension, continuity, pattern, spatial association, network, and proximity are examples of spatial concepts that are clearly recognized by researchers [7]. Develop the ability to understand geosphere phenomena in terms of spatial concepts through spatial reasoning, spatial reasoning, and

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geographic reasoning [8]. In the process of promoting national integration, spatial thinking plays an important role not only in determining appropriate regional modeling but also in solving national and regional problems in spatial contexts.

In addition, spatial thinking can also improve knowledge and attitudes about local conditions. Based on the explanation above, it shows the importance of spatial intelligence in students. The general purpose of this study is to analyze the spatial intelligence of high school students in Medan, to know the knowledge level of students on blind maps of Indonesia, and to know the knowledge level of students on the location of distribution of natural resources in Indonesia. is focused on knowledge of Indonesia, student knowledge of local icons and landmarks in Indonesia, and student knowledge of human resources in the form of ethnic groups and cultures distributed throughout Indonesia.

2. Materials and Methods

The method used in this study is descriptive-qualitative. Percentage is one of the data analysis techniques used. This percentage technique tries to find out the percentage of spatial intelligence competence from several items given to show a certain score. This score becomes the standard for the spatial intelligence of low, medium, and high students. While the data collection method uses the survey method. The selected population is the XI grade students of the State Senior High School in Medan City, which is located in North Sumatra Province. The sample taken amounted to 153 students. Based on this, researchers explored spatial intelligence using the following indicators [9]:

Table 1. Spatial intelligence indicator

| No | Indicator | Question Number |
|----|--------------------------------------|-----------------|
| 1 | Blind Map | 1-10 |
| 2 | Natural Resources | 11-20 |
| 3 | Icons Or Landmarks | 21-30 |
| 4 | Human Resources (Ethnic and Culture) | 31-40 |

3. Result and Discussion

3.1. Result

Based on the results, for both blind maps, natural resource indicators (symbols or landmarks) and human resource indicators (ethnicity and culture) were determined based on the results of answering the questions of 153 respondents. For more information, the indicators will be presented.

3.1.1. Blind Map Indicator

This indicator aims to determine students' spatial knowledge by detecting regions in Indonesia using only blind maps. The results show that 53.5% of her students can identify regions in Indonesia using only the provided blind maps. See Table 2 for details.

Table 2. Scores of respondents' answers to blind map indicators

| Indicator | Question Number | Percentage of Correct Answers (%) |
|-----------|-----------------|-----------------------------------|
| Blind Map | 1 | 49 |
| | 2 | 58 |
| | 3 | 55 |
| | 4 | 32 |
| | 5 | 50 |
| | 6 | 75 |
| | 7 | 64 |
| | 8 | 71 |
| | 9 | 33 |
| | 10 | 48 |
| Average | | 53.5 |

Based on Table 2 above, we can see that the question with the highest percentage of correct answers is question number 6, with a percentage of 75%. This question contains a map of the island of Kalimantan, with each region numbered. Respondents were asked to determine which was the city of Samarinda. The least popular question is his fourth, with a 32% share, on the location of South Sulawesi's capital.

3.1.2. Natural Resources Indicator

This indicator is used to measure students' understanding of natural resource potential and its location in Indonesia. Based on the 10-question test, 56.49% of the students were able to indicate the location of specific regional resources or potential natural resources. i.e., Table 3.

Table 3. Scores of respondents' answers to Natural Resources Indicator

| Indicator | Question Number | Percentage of Correct Answers (%) |
|-----------------------------|-----------------|-----------------------------------|
| Natural Resources Indicator | 11 | 77 |
| | 12 | 56 |
| | 13 | 49 |
| | 14 | 64 |
| | 15 | 71 |
| | 16 | 79 |
| | 17 | 55 |
| | 18 | 60 |
| | 19 | 46 |
| | 20 | 79 |
| Average | | 56.49 |

According to Table 3, the 79% correct question is his 16th, in the form "Why does Papua have the largest gold mine in Indonesia?" The lowest response is question number 19, at 46%.

3.1.3. Indicator Icon or Landmark

References to Indonesian icons and landmarks are unique and easily recognizable place markers. The results are shown in table 4.

Table 4. Scores of respondents' answers to Indicator Icon or Landmark

| Indicator | Question Number | Percentage of Correct Answers (%) |
|----------------------------|-----------------|-----------------------------------|
| Indicator Icon or Landmark | 21 | 70 |
| | 22 | 84 |
| | 23 | 66 |
| | 24 | 61 |
| | 25 | 43 |
| | 26 | 49 |
| | 27 | 64 |
| | 28 | 55 |
| | 29 | 66 |
| | 30 | 81 |
| | Average | 63.9 |

From the results of Table 4 above, it can be seen that the average correct answer rate is 63.9%. The most frequently answered question is 22nd, with a share of 84%. This question contains images of the Sulo and Boyo statues and asks the respondent to identify the area where the symbol or landmark is located. The question with the fewest correct answers is number 25, with a 43% share. This question contains an image of a time capsule monument of Papua, but many answered in Jakarta

3.1.4. Human Resources Indicators (Ethnicity and Culture)

Human resource indicators include ethnicity and culture. This indicator can show the socio-cultural spatial knowledge of high school students in Medan City. Based on our analysis, the average score for this indicator is 74.9%. This means that this metric has the highest score of about 57.96% compared to other metrics. See table 5.

Table 5. Scores of respondents' answers to Human Resources Indicators (Ethnicity and Culture)

| Indicator | Question Number | Percentage of Correct Answers (%) |
|--|-----------------|-----------------------------------|
| Human Resources Indicators (Ethnicity and Culture) | 31 | 89 |
| | 32 | 70 |
| | 33 | 91 |
| | 34 | 66 |
| | 35 | 58 |
| | 36 | 88 |
| | 37 | 83 |
| | 38 | 77 |
| | 39 | 74 |
| | 40 | 53 |
| | Average | 74.9 |

Table 5 shows that question number 40 scored the lowest percentage at 53% and question number 33 scored the highest percentage at 91%. This high proportion is influenced by common knowledge of the traditional Sigale Galle Dance Ceremony held in Samosir District, North Sumatra.

Based on the four indicators described, the spatial intelligence of high school students in Medan can be categorized as follows:

Table 6. Categories of Spatial Intelligence Levels

| No | Value Interval | Categories | Frequency | Percentage (%) |
|---------------|----------------|------------|-----------|----------------|
| 1 | 0 – 14 | Low | 12 | 8 |
| 2 | 15 – 27 | Medium | 72 | 47 |
| 3 | 28 – 40 | Tall | 69 | 45 |
| Amount | | | 153 | 100 |

Table 6 shows the results of the data analysis, showing the spatial intelligence ratings of the 153 respondents. 12 respondents have low spatial intelligence, 72 have medium, and 45 have high spatial intelligence. for more information. See Figure 7.

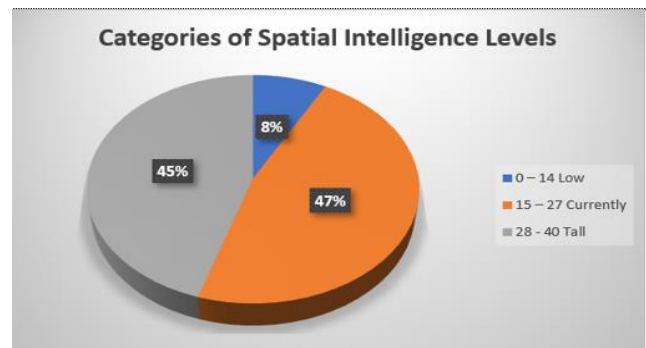


Figure 7. Categories of Spatial Intelligence Levels

These three class categories are determined by taking the difference between the highest score of 40 and the lowest score of 0 and dividing it by 3. The value 3 here is the required interval class to help classify the level of intelligence (high, medium, or low). Spatial intelligence is the ability to understand space. In this case, this skill makes geography easier to learn because geography itself is based on location and region. The spatial intelligence of Medan students is moderate at 47%.

3.2. Discussion

Based on research findings, intelligence is related to the objects and spaces we encounter in our daily lives [9]. Geographically, space is the environment around us, more precisely the geographical situation around us, visualizing the space that can be realized in the form of a map. Because maps can represent the actual condition of the Earth's surface. The details of the information depend on the scale. On large maps, the information displayed is very detailed. The smaller the map scale, the more general the

information.

Spatial intelligence is found in geography studies; through a spatial approach, geography sees problems with regional and location glasses [10]. This is related to the spatial approach of geography, which not only sees problems and phenomena in space but also the interactive activities of the components within it [11]. Spatial intelligence is important because it can prepare excellent geographers who are sensitive to the potential of the surrounding environment [12].

Spatial intelligence has evolved. Spatial intelligence is not limited to the ability to understand and reflect changes in the position of a two-dimensional and three-dimensional image or shape; the ability to solve problems is also part of spatial intelligence. When viewed from the point of view of geography, spatial intelligence can be interpreted as the ability to describe every event that is interconnected due to the influence of the surrounding environment [13].

The analytical results of this study show that students are very good at blindly mapping their knowledge of local places in Indonesia. Based on the 10 blind map category questions, they answered correctly on average 53.5% of the time. Respondents are most familiar with blind cards. Samarinda city has regional characteristics recognized as the capital of East Kalimantan and is the most populous city in the whole Kalimantan island, with 75% he ranks 6th. Spatial intelligence is the ability to see and observe space. This includes the ability to view objects from different angles. To improve spatial intelligence, it bridges the rise of spatial intelligence, such as geographic information system (GIS) map literacy and the ability to transform real-world environments into visual images. To use the Geographic Information System "GIS", is effective as a support, so learners should first deepen their understanding of spatial concepts [14]. However, it is a great pity that there are not many teachers who use remote sensing imagery as a learning medium in geography classes to form spatial perspectives and ways of thinking.

The analytical result of students' ability in natural resource knowledge related to natural resource distribution in Indonesia is very good. Based on 10 questions in this category, 56.49% of respondents answered her correctly. Respondents are most knowledgeable about natural resources concerning natural resource potential. For example, with a percentage of 16th 79%, Papua is the island's richest in precious minerals and is known all over the world. Spatial thinking considers finding meaning in the size, shape, direction, position, direction, or trajectory of an object, process, or phenomenon, or in the relative position of an object, process, or phenomenon in space [15].

The analysis shows that students' ability to acquire knowledge about icons and landmarks is very good in terms of icons and landmarks of Indonesian districts and cities. In this category, 63.9% of respondents answered a total of 10 questions correctly. Items with lower-than-average accuracy were questions 24, 25, 26, and 28. Respondents are most proficient with icons or landmarks of cities that are

well-known icons, such as in number 22, because in both numbers, respondents filled in the correct answers with a percentage of 84%. Spatial intelligence is the ability to see in detail the visual images contained in the habitats in which we find ourselves, and the ability to compare the similarities and differences in the characteristics or conditions of one space with another [16].

The analysis showed that the student's skills in personal knowledge of Indonesian ethnicity and cultural distribution are very good. An average of 74.9% of respondents correctly answered 10 questions about race and culture. There are questions with below-average accuracy on items number 32, 34, 35, 39, and number 40. Most respondents performed best in this category and were most knowledgeable about cultures, such as number 33 (91%). and human societies) and the ability to analyze spatial identity in terms of spatial patterns, spatial distributions, spatial relationships, and spatial differences to predict future impacts [17]. A geographer must possess spatial intelligence and be able to study earth phenomena, the natural environment, and social life. Geographers study how the physical environment (naturally) contributes to humans (human society) and how humans affect the physical environment.

Based on the conclusions of a survey conducted on 153 respondents, some questions represented up to 40 spatial intelligence questions, and he was at least 1 unanswered. The score is now 0. Results After completing the question, 12 respondents rated it low, 72 respondents rated it medium, and 69 respondents rated it high.

Spatial intelligence varies from person to person. These differences are influenced by several factors such as genetics, social and economic background, environment, physical condition, and emotional makeup [18]. The stronger the five factors, the higher the spatial intelligence. Students' high spatial intelligence is caused by a good room layout.

4. Conclusion

According to the study's findings, high school students in Medan City are characterized as having medium spatial intelligence (47%). The analysis' findings in four categories, namely: 1) the ability of students in the knowledge of blind maps regarding the locations of regions in Indonesia (53.5%); 2) the knowledge of natural resources regarding the distribution of the locations of natural resources in Indonesia (56.49%); 3) The students' capacity to identify symbols or landmarks in Indonesian districts or cities (63.9%); and 4) The students ability to identify human resources related to Indonesia's distribution of race and culture (74.9%).

Recommendation for enhancing spatial intelligence is for teachers to be knowledgeable about Geographic Information Systems (GIS). Spatial intelligence is significantly impacted by the use of a geographic information system (GIS) in the classroom. The impact is a result of the interaction between students spatial

intelligence and their experience utilizing Geospatial Information System (GIS) tools. As a technology that enables increasing spatial intelligence, the Geographic Information System (GIS) has a very real potential.

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