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Implementation of Spatial Data-Based Learning in Planning Studio Subjects

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ABSTRACT
The Urban and Regional Planning Study Department studies and plans spatial conditions for future needs. The scope of knowledge starts from the scale of neighborhoods, and cities to the entire region. Implementing spatial-based or spatial data-based learning is decisive in producing outcomes from planning studio courses, which are core courses in the PWK study program. This study aims to examine the effectiveness of implementing spatial data-based learning in increasing student interest and understanding in understanding data management in the learning process of planning studio subjects. Data collection techniques are through observation, interviews, and questionnaires. The results obtained show that students` ability to understand data increases when non-spatial data is converted into spatial data or perform spatial analysis on data that is not spatially based. Data presentation techniques integrated with digital maps are easier to understand than data presented in tabular form.

Keywords: *Data, Spatial, Planning Studio, Learning Implementation.*

1. INTRODUCTION

The course "Studio Pendataan" (Planning Studio 2) in the Regional and Urban Planning Program, Faculty of Engineering at Gorontalo State University, is a mandatory course offered in the second semester of the first year. Through the concept of project-based learning, students produce a significant project assignment in the form of presenting spatial data derived from non-spatial/aspatial data obtained from primary and secondary sources. The learning objective is to enhance students' abilities in presenting and presenting data in spatial form.

The presentation of spatial data can provide knowledge both online and offline, including practical exercises for students, enhancing their skills in implementing data, such as the development of village profiles [1]. The influence of Geographic Information System (GIS) learning through spatial data analysis also affects students' spatial thinking abilities [2].

Furthermore, project-based learning utilizing Google Earth data significantly influences students' work capabilities and spatial thinking skills [3]. This is in line with the findings of [4], which state that increased exposure to maps and spatial thinking activities can enhance students' spatial thinking skills.

Based on these considerations, this research is conducted with the aim of assessing the effectiveness of implementing spatial data-based learning in increasing students' interest and understanding in comprehending data management in the Planning Studio course.

2. METHODS

The method employed in this research involves the analysis of both secondary and primary data to generate spatial data outputs. The research process utilizes the Quantum GIS application as a tool for spatial analysis. The stages of spatial analysis are carried out by students in the Planning Studio course, followed by the completion of questionnaires to gauge the level of understanding among students regarding the spatial data analysis process.

Research findings are derived from two classes in the Planning Studio 2 course. Subsequently, the researcher analyzes the obtained data based on the questionnaire results. The data used in this study include both secondary and primary data, which are then classified into spatial and non-spatial data.

3. RESULTS AND DISCUSSION

The results of the evaluation of spatial data-based learning indicate an improvement in students' abilities to understand data when conducting spatial analysis. The data used for this evaluation include secondary data obtained from data publication agencies such as the Central Statistics Agency (Badan Pusat Statistik) and primary data collected directly in the field.

The assessment of students' abilities in conducting spatial data analysis is carried out in several stages, namely the initial stage of the lecture, the data input stage, the data analysis stage, and the data presentation stage.

3.1. Initial Stage

Based on the research results, the majority of students admit to having difficulty understanding the available data. This is reflected in the questionnaire findings, where 65 percent of students state that they find it challenging to comprehend the data, 30 percent express an average level of understanding, and only 5 percent claim to find it easy. The comparison of students' comprehension levels at the beginning of the lecture can be seen in Figure 1..

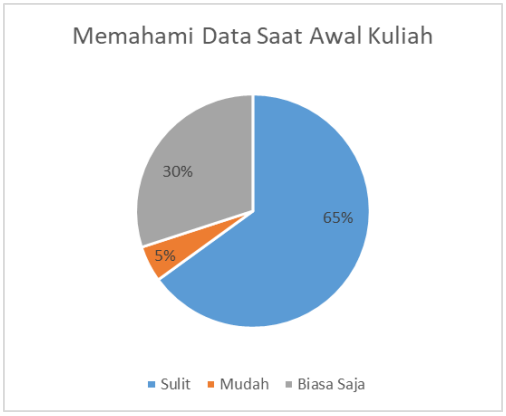

Figure 1. Students' understanding level at the beginning of the lecture

Furthermore, the results obtained through the questionnaire to determine the stages most understood by students/respondents indicate that 58 percent of students find the process of data classification easier, 26 percent find the data input process more accessible, and 16 percent find the data analysis process more straightforward. This suggests that the stage of classifying data, distinguishing between spatial and non-spatial data, is considered easier by the majority of respondents.

3.2. Data Input Stage

Another activity carried out in the Planning Studio 2 course is the data input stage. In this stage, participants input data in tabular form on Microsoft Excel worksheets and input data on vector maps in SHP format using the Quantum GIS application. Evaluation results for this stage indicate that the most preferred and easily executed data input method by students is on vector maps. The data input process on vector maps is more engaging because it provides a spatial display that can be directly visualized, not just presenting numerical figures.

A total of 94 percent of respondents prefer inputting data on maps, while 6 percent choose tabular data input. This indicates that spatial-based data input is more easily understood and more appealing for respondents. The selected data input preference of the respondents is illustrated in the graph in Figure 2.

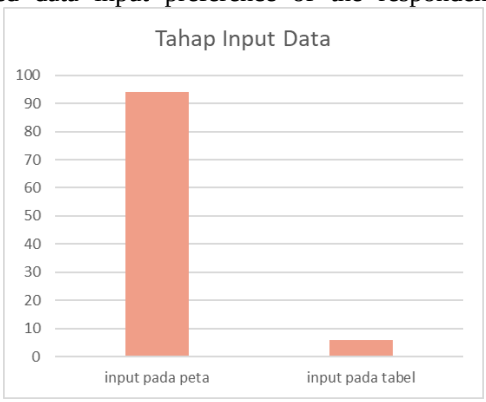

Figure 2. Comparison of the most interesting data input

3.3. Data Analysis Stage

The activity conducted in this stage involves categorizing the existing data into spatial and non-spatial data categories. Spatial data is information that has spatial characteristics, either in the form of dimensions (length or area) or coordinate points such as administrative boundaries, area size, slope classes, and others. Non-spatial data, on the other hand, lacks spatial information, such as population figures, happiness levels,

health conditions, and public satisfaction with urban planning. The graph in Figure 3 illustrates this process.

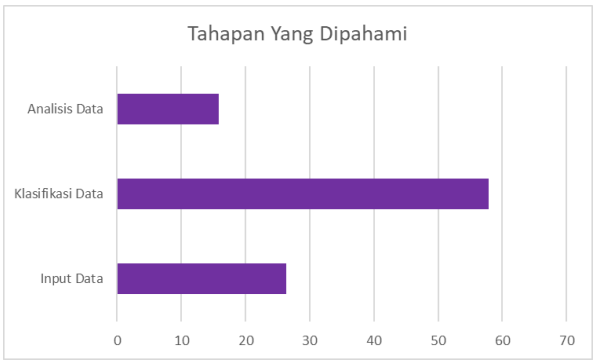

Figure 3. Stages most understood in the spatial data analysis process

Through the data analysis activity, it was also found that among all respondents, 56 percent of them stated that spatial data is the most easily understood. Meanwhile, the remaining 44 percent claimed that non-spatial data is more easily understood. This is closely related to the type of data collected by each respondent. Some non-spatial data is considered difficult to understand, especially when it pertains to public satisfaction levels. On the other hand, respondents who find spatial data challenging are typically dealing with data related to area delineation based on coordinates or spatial data related to distances. A comparison of respondents' understanding of spatial and non-spatial data can be seen in Figure 4 below.

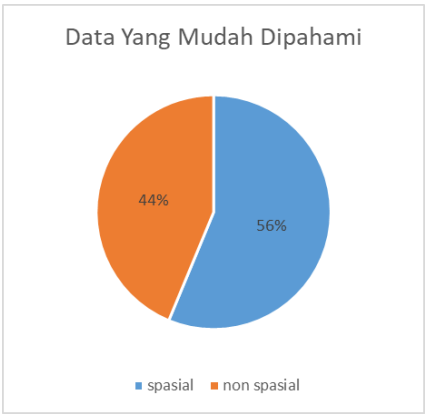

Figure 4. Stages most understood in the spatial data analysis process

The questionnaire data in this study also indicates that spatial data-based analysis is considered more interesting compared to data processing through statistical analysis in the Planning Statistics course. This condition is closely related to the data input process on maps, which is preferred by students over inputting data into tables, a common practice in the data analysis process in the Planning Statistics course.

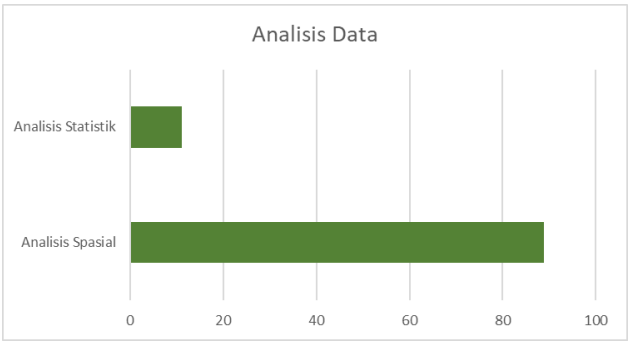

Figure 5. Comparison of the chosen data analysis

If we compare the data analysis process conducted in the Planning Statistics course with the data analysis in the Planning Studio course, as shown in Figure 5, it can be observed that 89 percent of students prefer spatial analysis, while only 11 percent choose statistical analysis.

3.4. Data Presentation Stage

The data presentation stage is the final stage in the learning process of the Planning Studio 2 course (Studio Pendataan). In this stage, students present data in the form of data layouts, graphs, and tables. The research results indicate that respondents find non-spatial data easier to present in spatial form when it comes from secondary sources, such as technical institution websites or publications from the Central Statistics Agency, compared to non-spatial data obtained from field surveys.

This is because secondary data has already been processed by other institutions/entities, making it easier to input and present spatially. On the other hand, primary data requires analysis before being presented spatially. Ninety-four percent of respondents state that presenting secondary data is easier, while 6 percent find it easier to present primary data (see Figure 6).

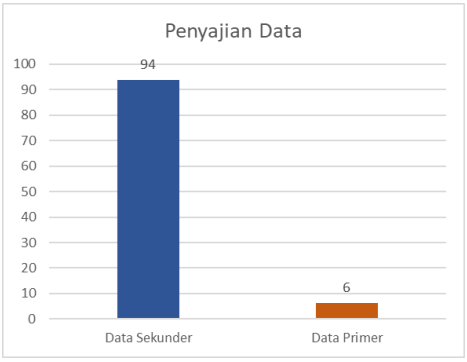

Figure 6. Ease of presenting non-spatial data in spatial form

In addition to the type of data that is easy to present, respondents also favored a particular method of data presentation during the data presentation stage. Among the three data presentation methods used, 50 percent chose the method of presentation in the form of maps, and the other 50 percent preferred presentation in the form of graphs. The method of presenting data in the form of tables was not chosen by the respondents. For further clarity, please refer to the following figure.

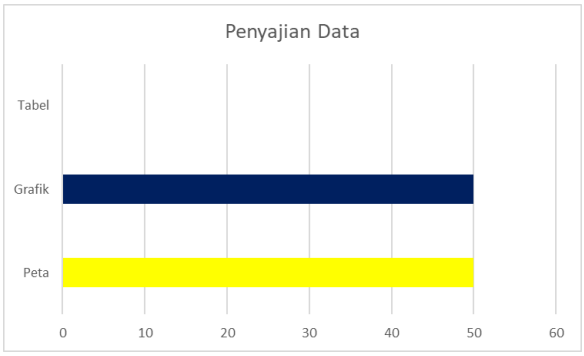

Figure 7. Data presentation methods that are more easily understood

The method of presenting non-spatial data as spatial data is an output or project produced from this course. Based on the presented research results, the implementation of spatial data analysis-based learning assists students in understanding data that is typically presented only in tabular form. Spatial analysis methods in the data processing stage of the Planning Studio learning process help students gain insights into the distribution of societal conditions and physical conditions of the area. This is consistent with previous studies [5], [3], [4] which found that the implementation of Geographic Information Systems as a form of spatial analysis contributes positively to the development of spatial thinking skills.

The method of presenting data in the form of maps based on existing non-spatial data can be seen in the following figure.

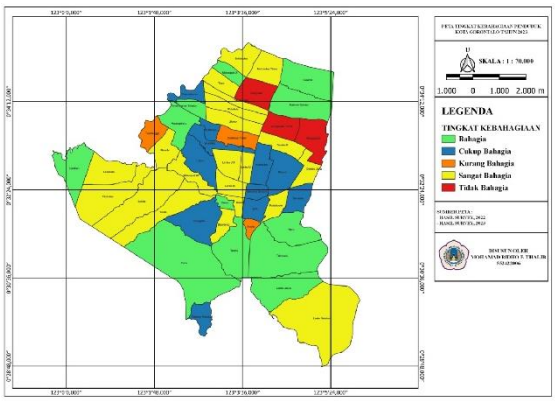

Figure 8. Map of the happiness level of the community in Gorontalo City

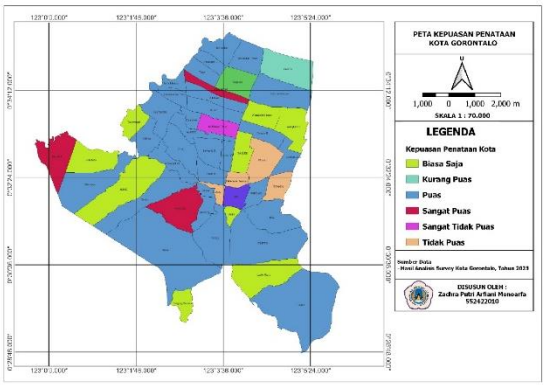

Figure 9. Map of the satisfaction level of the community with urban planning

The method of spatial data analysis that produces outputs displayed in the form of maps provides convenience for students in understanding non-spatial data, which was previously presented in tabular form.

4. CONCLUSION

Based on the conducted research, it is evident that first-year students in the Regional and Urban Planning Program are more inclined to engage in spatial data analysis compared to statistical data analysis or tabular data processing using Microsoft Excel. Furthermore, students find it easier to comprehend data presentation in the form of maps rather than in tabular form. Non-spatial data such as population figures, happiness levels, and community satisfaction with urban planning is more easily understood when presented spatially, resulting in outputs in the form of maps.

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