

THE PERSPECTIVE OF SOCIAL SCIENCE EDUCATION STUDENTS ON THE USE OF DIGITAL MAPS AND GEOGRAPHIC INFORMATION SYSTEMS (GIS) ARCGIS ONLINE IN THE REMOTE SENSING COURSE

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ABSTRACT

The development of digital technology has brought significant changes to the field of education, including in the teaching of geography through the Remote Sensing course. One of the widely used technologies is ArcGIS Online, a Geographic Information System (GIS) that enables users to manage, analyze, and visualize spatial data interactively. This study aims to explore the perceptions of Social Science Education students regarding the use of digital maps and ArcGIS Online in Remote Sensing learning. This research employed a quantitative descriptive method with data collected through a questionnaire distributed to 25 students from various universities. The results indicate that the majority of students have a positive perception of using ArcGIS Online in learning, with high average scores in understanding basic GIS concepts, creating digital maps, and the relevance of the material to the required skills. However, several challenges were identified, including device accessibility, internet connectivity, and understanding of certain ArcGIS Online features. These findings highlight the importance of integrating GIS technology into education and the need for improved technical support and more effective teaching strategies to optimize the benefits of spatial-based learning.

Keywords: *ArcGIS Online, Digital Maps, Remote Sensing, Social Science Education, Student Perception*

INTRODUCTION

Currently, the world of information is inseparable from technology. The rapid advancement of sophisticated technologies has enabled society to access information and communicate much more quickly compared to the past when obtaining information took a significant amount of time. Initially, technology was created to help humans access information and facilitate communication in everyday life. Today, technological developments are also being used as solutions to address problems in various fields, including education. One such technology that has been developed for geography subjects, particularly in the Remote Sensing course, is ArcGIS. This technology enables students to manage spatial data effectively.

With ArcGIS, users may dynamically and interactively access, analyze, and visualize spatial data. Multidimensional data can be imported, stored, analyzed, and shown using the computer program ArcGIS. Because of its superior visual and image processing capabilities, it is frequently used to handle data about earthquakes and thematic mapping, particularly when simulating seismic intensity fields¹.

There is also a previous study Wang, H. 2007 titled *Research and Development on the Frame of ArcGIS Server*, published in the *Journal of Zhengzhou Institute of Surveying and Mapping*. ArcGIS is a modern geoinformation system (GIS) tool that enhances military operations by accurately depicting operational situations through data integration and automation, allowing for timely updates and improved decision-making compared to other software like CorelDRAW². This study explains that ArcGIS Server is a versatile platform that enables the development of corporate GIS applications across various operating systems and programming environments. It provides essential functionalities for mapping, analysis, and geocoding while offering easy web application development tools. From this, we can understand the importance of using ArcGIS Online in a course.

There is also a research gap regarding the technical and non-technical challenges students face when utilizing ArcGIS Online in the Remote Sensing learning process. Few studies have thoroughly explored the obstacles experienced by students, such as internet connectivity issues, limited access to devices, or variations in digital literacy skills. Additionally, the impact of using ArcGIS Online on students' motivation and mastery of

¹ Wang et al., *n.d.*, "ArcGIS digunakan karena kemampuannya dalam pemrosesan visual dan simulasi medan intensitas gempa".

² Oleksenko, A., & Mirzoyan, M. ArcGIS sebagai alat sistem informasi geospasial modern untuk visualisasi operasional dan pengambilan keputusan. (2024).

Remote Sensing concepts within Social Science Education remains underexplored. Although there are indications that GIS usage can improve understanding, studies specifically assessing its effects on motivation and comprehension among Social Science Education students are still minimal

This theory describes an individual's belief in their capacity to complete a specific task. In the context of learning GIS and Digital Maps, students' self-efficacy beliefs will affect their confidence level in using this technology and how well they can apply it in Remote Sensing learning³. ArcGIS Online offers a more relevant and applicable learning experience in an educational context, especially in subjects involving spatial aspects such as Remote Sensing. The Remote Sensing course is an essential component of the geography curriculum, including in the Social Science Education (Pendidikan IPS) department. Remote sensing is the technique and science of obtaining data and information about the Earth's surface using tools that do not directly interact with the observed objects⁴.

Students studying remote sensing learn how to gather data about the Earth's surface without making direct contact, usually using satellite photos or aerial photography. Having the ability to use GIS technology is essential for more efficient analysis of such data. ArcGIS Online serves as a link between theory and practice when it comes to processing and analyzing spatial data. Despite the enormous educational potential of GIS, students' acceptance and utilization of this technology still vary. In particular, students in social science education programs might have less geospatial exposure than those in geography or geoinformatics programs. Thus, it's critical to comprehend how students studying social science education see the usage of ArcGIS Online and digital maps in the classroom, particularly in remote sensing.

These perceptions include the extent to which students feel supported in understanding the material, their level of comfort in using the technology, and how far ArcGIS Online can enhance their interest and participation in learning. Gaining such insight is important not only to evaluate the effectiveness of the learning process but also to provide input for designing future curricula and spatially based digital skills training.

³ Bandura, A., *Teori Pembelajaran Sosial*, dikutip untuk menjelaskan pengaruh efikasi diri dalam pembelajaran yang berbasis teknologi. (1977).

⁴ Farid, F. *Penginderaan jauh: Teknik dan ilmu untuk memperoleh data permukaan bumi tanpa kontak langsung* (2015).

This study aims to explore in depth how Social Science Education students perceive the use of digital maps and ArcGIS Online and its implications for learning Remote Sensing as part of contextual and relevant geospatial education in the digital age.

METHOD

This study employed quantitative descriptive research as its methodology. The findings of quantitative research are expressed as numerical data. The descriptive research method is used to research the current state of a group of people, an item, a state, an idea, or an event. Descriptive approaches produce a methodical, factual, and precise image or description of an existing phenomenon. In quantitative descriptive research, variables are described using numerical data derived from the real world.

Quantitative research involves methods based on numbers and statistics to collect, analyze, and explain data. It aims to enhance understanding of research types, procedures, and data measurement, contributing significantly to scientific knowledge and decision-making across various fields⁵.

Quantitative descriptive research uses numerical or statistical data to precisely and methodically characterize a variable or phenomenon. Quantitative approaches use words and numbers to describe events, gather information using various tools like surveys, interviews, and observations, and then statistically analyze that information. Questionnaires were distributed as data instruments in this investigation.

A questionnaire is a structured tool for gathering information through standardized questions, enabling statistical analysis and summarization of data on various topics like user experience and technology use⁶.

A questionnaire contains a list of written questions systematically arranged to collect information from respondents. It is used in various fields, such as research, surveys, and evaluations, to obtain quantitative and qualitative data.

⁵ Barella, dkk. *Penelitian Kuantitatif: Meningkatkan Pemahaman Ilmiah melalui Data dan Statistik*. (2024). [Rincian publikasi lebih lanjut tidak tersedia]

⁶ Questionnaires. "Penggunaan Kuesioner sebagai Alat untuk Mengumpulkan Data dalam Penelitian Pengguna Teknologi" (2019).

This study uses a data collection technique through a questionnaire. Furthermore, this questionnaire was distributed to respondents of 25 male and female social studies students at various universities. Generally, questionnaires are conducted to obtain clear information from experience and then used to solve a problem. This means that this study aims to receive information about the relationship between the Perspectives of social studies education students on using digital maps and GIS (Geographic Information Systems) ArcGIS Online in remote sensing courses. The population of this study is all male and female social studies students at various universities.

RESULTS AND DISCUSSION

Technology is essential to our rapid and straightforward access to and sharing information. Originally designed to benefit people, it now aids in resolving several issues, including those related to education. Students may efficiently handle spatial data with the help of ArcGIS, a technology utilized in geography classes like Remote Sensing. It helps with tasks like researching earthquakes and making themed maps by allowing users to access, analyze, and visualize spatial data.

With ArcGIS Online, ArcGIS Server supports the development of maps and applications, particularly for educational use. However, there is a scarcity of studies on the difficulties that learners face when using ArcGIS Online, such as connectivity issues, insufficient devices, and differing levels of digital proficiency. Furthermore, there is no insight into how ArcGIS influences students' enthusiasm and grasp of remote sensing concepts. ArcGIS Online offers valuable geography-related experiences, and students' assurance in GIS technology plays a significant role in their educational progress.

Geography students must take the Remote Sensing course, which teaches them how to use satellite imagery to collect data about the planet. GIS is essential for analyzing this data. Understanding how Social Science Education students interpret and use ArcGIS Online and digital maps is crucial for analyzing teaching techniques and enhancing future curricula. This study will explore these students' thoughts on integrating digital maps into their learning process.

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A quantitative descriptive study was carried out. This kind of research uses numerical data to describe the current state of a group, condition, or event. It seeks to present a concise and accurate picture of the situation based on actual data. The goal of quantitative research is to improve understanding in a variety of domains by gathering and evaluating numerical data.

This study used a questionnaire as the primary tool for collecting data. Questionnaires consist of structured questions that help gather information from respondents. The study involved 25 male and female social studies students from various universities, aiming to explore their perspectives on using digital maps and GIS (Geographic Information Systems) ArcGIS Online in remote sensing courses. The goal is to obtain clear information about this relationship and address a specific related problem.

At this stage, this report presents the results of data analysis from a questionnaire distributed to Social Science Education (Pendidikan IPS) students regarding the use of Digital Maps and Geographic Information Systems (GIS), particularly the use of ArcGIS Online in the Remote Sensing course. The collected data was analyzed using descriptive quantitative methods by converting qualitative responses into a numerical scale as follows:

Tabel 1. Category, Score Range

No	Range	Category
1	4	Always
2	3	Often
3	2	Sometimes
4	1	Rarely
5	0	Never

After conversion, the mean score was calculated for each question. From a total of 25 respondents and 25 questions, the following are the eight questions with the highest average

scores, representing the most prominent aspects of students' perceptions regarding the use of ArcGIS Online:

Tabel 2. Question, Avarage Score

No	Question	Avarage Score
1	In the Remote Sensing course, students are required to use ArcGIS Online?	3,36
2	How often do you understand the basic concepts of GIS, such as spatial data, attributes, layers, and map coordinates?	3.16
3	How often are you able to create digital maps using ArcGIS Online?	3.16
4	How often does the learning material align with the skills required to use ArcGIS Online?	3.12
5	How often do you find it easy to visualize data through digital maps?	3.08
6	How often do you explore the available features in ArcGIS Online to better understand them?	2.96
7	How often do you find it easy to access ArcGIS Online on your device?	2.92
8	How often does using GIS help you understand the socio-economic distribution in a region?	2.76

The results from these eight questions indicate that, in general, students frequently use and understand ArcGIS Online in the Remote Sensing learning process. However, there is some variation in accessibility and familiarity with its features. Furthermore, this data can be visualized in the form of a bar chart or radar diagram to better illustrate students' perceptions of different aspects of GIS use in the educational context.

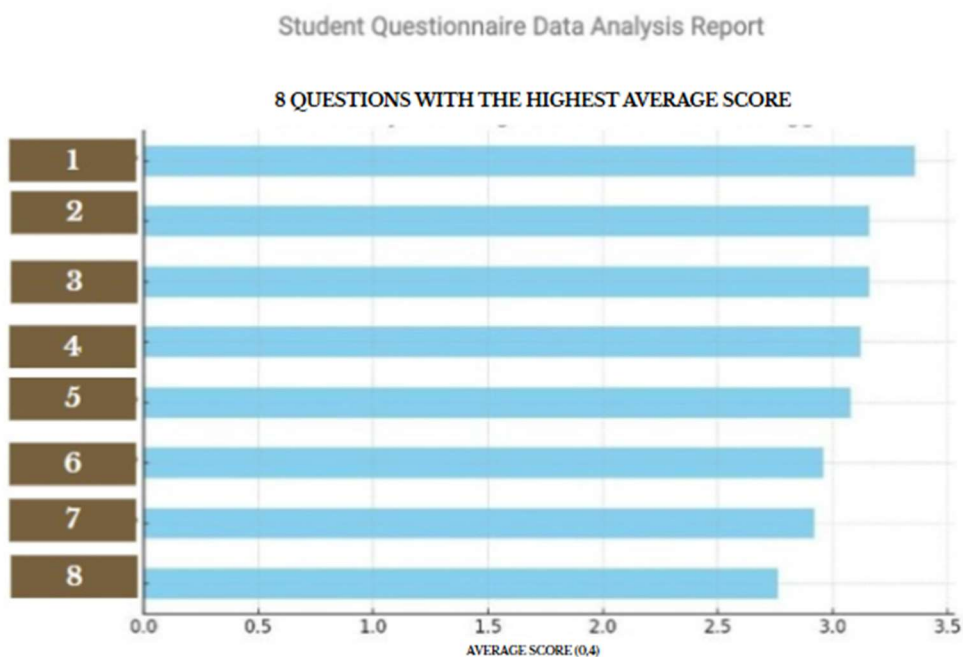


Diagram of Social Science Education Students Perceptions on the Use of ArcGIS Online in the Remote Sensing Course

The questionnaire results showed that most students used ArcGIS Online often and felt that this application supported their understanding of Remote Sensing material. This was indicated by the high average scores on questions about understanding basic concepts, ease of access, and feature exploration.

Created a web-based GIS program to map South Central Timor Regency's tourist attractions. According to the study, web-based GIS increases community involvement in tourism data management and facilitates better access to geographic information. This is consistent with the research's findings, which show that students regularly use and comprehend ArcGIS Online during the learning process for remote sensing⁷. To map healthcare services for people with disabilities, (Abdul 2020) created a mobile GIS application. The study highlights how crucial it is that technology be accessible to everyone, especially people with physical disabilities. Similar to this, even though students in this study use ArcGIS Online regularly, accessibility and feature use are hampered by problems like device availability and connectivity.

⁷ Driana. *Sistem Informasi Geografis Berbasis Web untuk Objek Wisata di Kabupaten Timor Tengah Selatan*. *Jurnal Teknologi dan Sistem Informasi*, 8(1), (2022). 10–17.

(Agung 2020) used the SUS approach to assess a WebGIS platform's usefulness for monitoring forest health. Although interface design and access speed need to be improved, the results show high usability. These results confirm the current study's observation that students have differing degrees of difficulty navigating and using ArcGIS Online's features, even when they use it often.

According to this study, including ArcGIS digital maps into instruction greatly boosts students' motivation, especially when it comes to comprehending abstract geographical ideas. This conclusion supports the findings of the current study, which indicate that students think GIS improves their comprehension of socioeconomic distributions ⁸.

To help students create digital maps, created instructional films on OpenStreetMap. According to the study, students' understanding of GIS applications is enhanced through media-based learning. Similarly, even though the students in this study utilize ArcGIS Online a lot, there is variation in their comprehension and application of its capabilities, which may be due to the teaching strategies used. visualized the distribution of public facilities in Umurboto Village using ArcGIS Online. The study emphasizes how important spatial data visualization is for geographic analysis and planning. This corroborates the recent findings that students in remote sensing courses found digital mapping useful for understanding the geographical distribution of socioeconomic elements⁹.

CONCLUSION

According to data analysis from surveys given to Social Studies Education students regarding the use of digital maps and geographic information systems (GIS), specifically ArcGIS Online, in remote sensing courses, the majority of students have a positive opinion of using ArcGIS Online for learning. This is shown by the high average results in several critical areas, such as making digital maps, understanding basic GIS concepts, and the material's relevance to the skills needed to utilize ArcGIS Online. In addition, students also feel that they use ArcGIS Online quite often in the learning process, although there are several challenges related to accessibility and understanding of certain features. ArcGIS Online helps students

⁸ Ainu dan Syafira, *Pengaruh Penggunaan Peta Digital ArcGIS sebagai Media Pembelajaran IPS terhadap Motivasi Belajar Siswa*, *PAKIS: Jurnal Pendidikan Islam* 11, no. 1 (2023): 22–30.

⁹ Agam. C. M, *Visualisasi Peta Fasilitas Umum Desa Umurboto dengan Menggunakan ArcGIS Online*, *Jurnal Geodesi Undip* 9, no. 2 (2020): 53–54.

understand Remote Sensing material, especially an area's spatial distribution and socio-economic data. These findings indicate the importance of integrating GIS technology in learning and being input to improve students' understanding of ArcGIS Online features and how to optimize them in an educational context. Therefore, improving accessibility and instructional methods could further strengthen the educational impact of GIS technology.

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