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Utilization of InaRISK Data as GIS Based Media in Improving Students Spatial Intelligence

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ABSTRACT

Yadika Senior High School in Tanjungsari students have a low level of understanding when it comes to interpreting map information, particularly in lessons related to disaster preparedness. Hence, there is a requirement for media that can enhance spatial intelligence. This study aims to analyze the effectiveness of using Inarisk data as GIS-based media in improving spatial intelligence. The method used is a quasi-experimental with a non-equivalent control-group design. Data analysis tests used T-test and N-Gain. The results of this study obtained the value of t (56) = 2.982, p = 0.004. When described, the significance value is 0.004 < 0.05 and t count (2.982) > t table (2.048) which means there is a significant difference between the control class and with experimental class. Meanwhile, for the N-gain test for the control class, a value of 0.15 (low category) was obtained. While, for the experimental class it was 0.34 (medium category, which means that the experimental class is more effective than the control class. Based on these data, the use of Inarisk data as a GIS-based learning media in the experimental class has better effectiveness in increasing students' spatial intelligence.

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1. INTRODUCTION

Spatial intelligence is an ability to describe and present a phenomenon in a spatial concept. someone who has this ability will find it easier to describe everything that is seen (Somantri and Hamidah, 2024). Spatial intelligence can also be interpreted as an image perspective and visualization, the ability to understand and change the shape and behavior of various aspects of the visual world (Malekian et al., 2012; Nofirman, 2018).

Spatial intelligence makes it easier to determine locations, predict relationships between objects in space, understand an object in detail, imagine and manipulate images of objects in the mind. Spatial intelligence also helps students in making decisions. High spatial intelligence then affects the quality of decision making. Another way to understand spatial intelligence is as a set of skills for visually monitoring the world, making decisions based on initial observations, and generating visual experiences (Marlyono and Urfan, 2019; Nandi, 2016).

A person's spatial intelligence can be seen from his ability to capture and apply every form or event. Spatial intelligence in the context of geography can be developed. This intelligence can be improved and honed through the learning process. This intelligence can also be known through the ability of students to predict, associate, analyze, and draw conclusions about a spatial condition on the surface of the earth. (Purbadi, 2015; Artayasa et al., 2016; Yani et al., 2018).Spatial intelligence is the ability to analyze spatial identity in the form of spatial patterns, spatial distribution, spatial relations, and spatial differences to respond to natural phenomena, both physical and social, in the past, present, and predict the possible impacts in the future. (Hadi, 2012; Ernawati, 2016).

Spatial intelligence began to be noticed since there was an impulse from the development of information technology that supports this thinking. This intelligence is an integral component of science, especially geography. Spatial intelligence can be improved in learning geography, one of which is disaster mitigation material. Through the use of learning media that are appropriate with the theme and goals, spatial intelligence can be developed. Spatial intelligence is spatial reasoning intelligence that can be improved through maps, charts, illustrations, graphs, tables, artwork, crosswords, and other media (Ridwana et al, 2022). This becomes very important because spatial intelligence is a geographic identity in seeing every phenomenon and problem that is around, thus distinguishing it from other disciplines (McKenzie, 2005; Susetyo et al., 2017; Yani et al., 2018).

Spatial technology in the field of geography is very helpful for analyzing and visualizing appearance on the earth's surface. Geospatial technology as it is currently developing, namely Geographic Information Systems (GIS) provides an opportunity for everyone to be able to analyze and display geographic data with sophisticated uses (Nisnala et al., 2023). GIS can be used as a medium to facilitate understanding of disaster issues and disaster mitigation, because this system makes it easier for users to determine policies that need to be taken, especially those related to spatial issues (Geographical Association, n.d.; Wibowo et al., 2015).

GIS in education has two approaches. The main approach is GIS as a topic of discussion or material being taught, the second approach is GIS as a tool or media in learning. GIS acts as a tool that helps in analyzing spatial data concretely. the large use of GIS in secondary education is due to the benefits that can be drawn through teaching using these tools or media. This is because GIS can support problem-based learning and inquiry (Kerski et al., 2013; Jakab et al., 2017).

According to Zwartjes (2014) GIS has the advantage of making it easy to understand the world both in natural and man-made forms which are the essence of geography. In addition, learning to use GIS has a positive impact on developing spatial thinking and reasoning abilities.

GIS has an important role in educating future generations. Through the use of GIS in the

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field of education, especially in classroom learning, it can help students process spatial knowledge in all fields of geography (Al Fauzi et al, 2022). GIS which is used as a medium in classroom learning can make it easier for students to be more focused on increasing spatial intelligence or spatial thinking skills. GIS allows students to learn about their local environment in an unconventional way (Johansson and Pellikka, 2006; Artvinli and Martinha, 2014).

The use of GIS-based learning media is often limited by inadequate time, so that the competencies that need to be achieved are not obtained optimally (Somantri et al, 2021). Learning activities that used GIS is quite complex because it requires adequate equipment, few know how to optimize its use. To solve this problem, it is necessary to develop GIS-based learning media as an alternative media that is easier and more flexible to use (Favier and Schee, 2012; Witama et al., 2017). The advantage of GIS is the initial capital to understand every spatial phenomenon. These advantages can make it easier for students to recognize the environment in which they live (Alfi et al., 2024). When integrated into disaster mitigation learning, the material obtained is not only described in the abstract but can be understood and visualized. But in reality, everyone has unequal interests and abilities. Each individual has a different spatial intelligence, so that the contextual spatial intelligence possessed by each individual still needs to be improved (Gardner, 2003/1993; Yani et al., 2018).

Similarly to the participants in the study, the students at Yadika Senior High School in Tanjungsari. Based on preliminary observations, most of them continue to have difficulty understanding the information displayed on the map. Based on these problems, it will always be necessary to innovate in the development of GIS-based learning media that is expected to improve the spatial intelligence of students, one of which is by utilizing existing data sources in Inarisk.

2. METHODS

This research utilized a quasi-experimental approach employing the non-equivalent control-group design. Quasi experiment is a part of quantitative research that was developed based on the fact that it is difficult to control the appropriate variables Suryabrata (2015). According to Suryabrata (2015) variables in research are often expressed as factors that have a role in the events or symptoms to be studied. In this study there are two variables, namely variable X in the form of GIS-based media (utilizing data from Inarisk) and variable Y in the form of spatial intelligence.

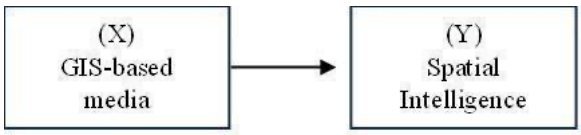

Figure 1. Relationship between Variables

Samples were taken using the saturation sampling technique which were students in class 11 social studies at Yadika Senior High School in Tanjungsari-Sumedang. The sample was divided into two classes, namely a control class of 29 people, who were given treatment by utilizing image media from remote sensing (google earth), and an experimental class of 29 people, with GIS-based learning media.

The instrument used to measure students' spatial intelligence is a multiple-choice test. According to Arikunto (2010) The test is defined as a number of questions or exercises that are given to individuals or groups to determine the level of knowledge, skills, abilities and

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talents. The test indicators used include predicting, associating, analyzing, and drawing conclusions.

Data analysis techniques using T-test and N-Gain. The T-test was carried out to determine the significance between before and after treatment, while the N-Gain test was carried out to find out how much effectiveness GIS-based media is used in disaster mitigation learning.

3. RESULTS AND DISCUSSION

3.1 GIS Based Media Design using Inarisk Data

Inarisk is a portal published by the National Disaster Management Agency to make it easier for the public to know the risks and dangers of disasters. Inarisk provides information on disaster threats, vulnerabilities (population, material, economic and environmental losses), capacity, disaster risk, and risk index monitoring (BNPB, n.d.; Pemerintah Kabupaten Banjar, 2020). The learning media in the form of a natural disaster map in Sumedang Regency was made based on data found on the Inarisk web. The following is the front view of the Inarisk website which will be used as a data source in making natural disaster maps:

Figure 2. Inarisk Web Homepage

In addition to being used directly, on the Inarisk GIS Service page, spatial data can be downloaded to be developed into various disaster maps with the help of ArcGIS or QGIS software. The maps made in the form of maps prone to landslides, floods, earthquakes, extreme weather, drought, and forest and land fires are published on the QGIS Cloud so that students can easily access them through the available links. Here is an example of a map of the distribution of natural disasters made and used as learning media:

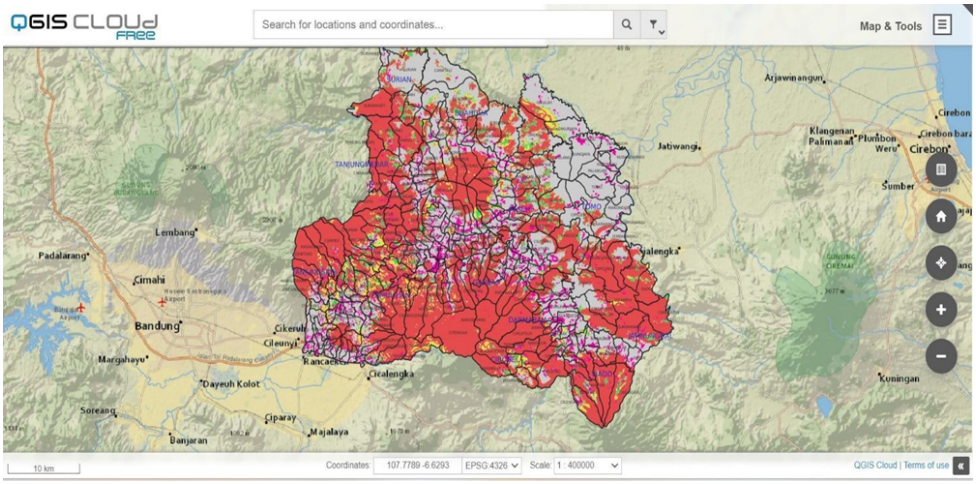

Figure 3. Map of Landslide-Prone Areas in Sumedang Regency

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3.2 Field Results

The research results represent the outcomes of research carried out in the field. The suitability of the hypothesis can be analyzed and answered based on the data obtained, and processed using a predetermined method. The first stage carried out on the samples taken was in the form of a pre-test by giving a test of spatial intelligence questions to students. The following table displays the outcomes of the pre test:

Table 1. Pre-test results

Descriptive Statistics				
	N	Minimum	Maximum	Mean
Control class pre test	29	12	76	48
Experimental class pre test	29	12	88	49
Valid N (listwise)	29			

Source: Data analysis (2022)

Table 1 displays the pre test outcomes which indicate that the control class and experimental class have the same average score. Based on the results obtained, it can be said that the spatial intelligence of students before treatment has a low average value.

The next step involves providing therapy to both the control group and the experimental group. Specifically for the experimental class, apart from in-class learning, students are also invited to cross-check directly in the field to prove that the information obtained from the map is following field conditions. Students are divided into 5 groups, each group tasked with matching information about different natural disasters.

Cross-check activities are carried out by students in areas that are indeed close to where they live. Therefore, matching the information on the map with the results in the field only proves the compatibility that has occurred in the areas that have been visited. The suitability categorization is divided into three categories, namely: (1) inappropriate/never happened, (2) quite appropriate/happened several times, and (3) appropriate/often occurs. For more details, the following table shows the results of field cross-checks conducted by students regarding the condition of areas that are considered prone to natural disasters:

Table 2. Percentage of conformity of information on media and field crosscheck

No	Area	Disaster	Information On The Map	Cross Check Result	Compatibility		
					1	2	3
1	Sawah Dadap Village	Landslide	High Category	In hilly areas, land use change occurred, and the landslides that occurred claimed many victims	-	-	3
2	Cikeruh Village	Flood	High and Medium Categories	Every year there is a flood	-	-	3

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3	Cihanjuang Village	Earthquake	High Category	Several times there were earthquakes	-	2	-
4	Jatisari Village	Extreme weather	High Category	Several times there were thunderstorms and lightning	-	2	-
5	Cipacing Village	Drought	High Category	Drought occurs every year	-	-	3
				Total Compatibility		13	
				% = Total Compatibility/Maximum suitability value x 100		87%	

Source: Data analysis (2022)

Based on **Table 2**, the results of conformity are 87%, with details of areas prone to landslides, floods and droughts that have a high level of vulnerability have suitability (3) or can be interpreted according to conditions in the field and frequent disasters, while for areas that are considered to have the level of vulnerability to earthquakes and high extreme weather has a value of (2) which is interpreted as quite appropriate or only occurs a few times. The third stage in the post test to determine the increase in students' spatial intelligence before and after trreatment. The post test results are as follows:

Table 3. Post test results

Descriptive Statistics

	N	Minimum	Maximum	Mean
Control class post test	29	12	88	58
Experimental class post test	29	41	94	72
Valid N (listwise)	29			

Source: Data analysis (2022)

Table 3 shows the results of the post-test with the mean value of the experimental class being 72, while the control class is 58. From these results it can be concluded that the post-test value of the experimental class is greater than the control class. For more details, it can be seen in **Figure 4** below:

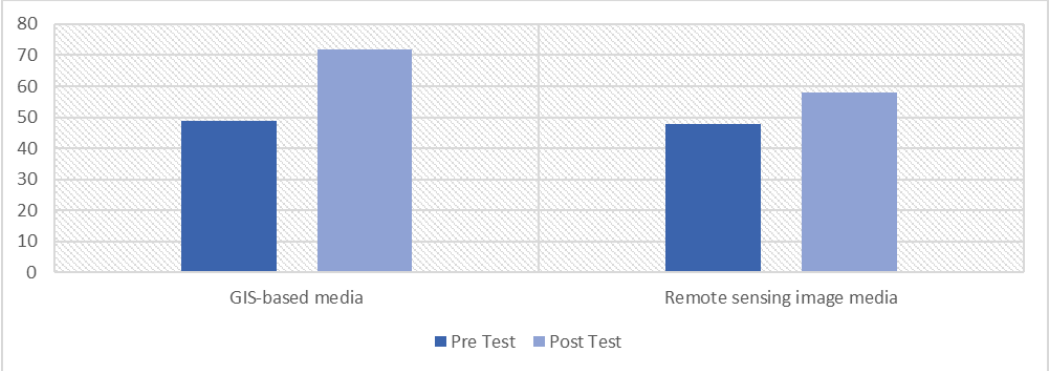

Figure 4. Comparison of pretest-posttest control and experimental classes

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The fourth step is to carry out the prerequisite normality test. In this study, using the Shapiro-Wilk normality test. If the trial results show results of more than 0.05, the data obtained can be said to be normally distributed. The following are the results of the data normality test:

Table 4. Shapiro-Wilk Normality Test Results

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Results	Pre-test control	0.120	29	.200*	0.965	29	0.432
	Post test control	0.123	29	.200*	0.948	29	0.163
	Experimental pre-test	0.128	29	.200*	0.961	29	0.339
	Experimental post test	0.121	29	.200*	0.930	29	0.057

Source: Data analysis (2022)

Based on **Table 4**, The Shapiro-Wilk normality test results showed that the pretest-post test results for the experimental group had significance values of 0.339 and 0.057 (0.06). As for the control class group, the significant values si (sig) of the pretest-post test results were 0.432 and 0.163. These results indicate that the collected data follows a normal distribution (> 0.05 confidence level). Once the normality test has been completed and confirmed as normally distributed, the next step is to conduct the homogeneity test. The homogeneity test findings are the following:

Table 5. Homogeneity Test Results

		Levene Statistic	df1	df2	Sig.
Results	Based on Mean	3.140	1	56	0.082
	Based on Median	2.879	1	56	0.095
	Based on Median and with adjusted df	2.879	1	55.841	0.095
	Based on trimmed mean	3.107	1	56	0.083

Source: Data analysis (2022)

Based on **Table 5** it can be seen that the value of Sig. of learning outcomes (Based on Mean) is 0.082. When compared with the value of α is greater (0.082> 0.05) or it can be interpreted that the data is homogeneous. In the last stage, independent t-test and N-Gain tests were carried out to determine the significance and effectiveness of the data obtained. The following is the data from the independent t-test and N-Gain test results:

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Table 6. Independent t-test results

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Test	Equal variances assumed	3.14 0.082	-2.982	56	0.004	-14.655	4.915	-24.500	-4.81
	Equal variances not assumed		-2.982	52.922	0.004	-14.655	4.915	-24.513	-4.797

Source: Data analysis (2022)

Table 7. The average value of the N-Gain test for the control and experimental classes Descriptives

Descriptives				
Class			**Statistic**	**Std. Error**
N_Gain	Control	Mean	0.1543	
		Minimum	-1.03	0.07705
		Maximum	0.76	
	Experimental	Mean	0,3366	
		Minimum	-1.00	0.08980
		Maximum	0.92	

Source: Data analysis (2022)

The importance of spatial intelligence in understanding various fields of science such as geography, makes this something that must be continuously developed, especially in classroom learning. The effectiveness of the learning media created can be seen from the results of achieving the significance value of the t-test and N-Gain. The independent t-test produced a significant number t (56) = 2.982, p = 0.004. When described, a significance value of 0.004 <0.05 and t count (2.982) > t table (2.048) which means there is a significant difference between treatment for control class and experimental class. N-gain test for the control class, a value of 0.15 (low category) was obtained, in contrast for the experimental

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class it was 0.34 (medium category). So the treatment in the experimental class can be said to be more effective than in the control class.

The results obtained are influenced by the media used in learning. This is in accordance with the purpose of using technology as a medium or means of delivery in learning (Jakab et al., 2017). In addition, GIS-based media which is made in the form of a distribution map of disaster-prone areas in the local area by utilizing data from Inarisk, can increase students' spatial intelligence. Therefore, spatial intelligence can be improved, one of which is by using maps (McKenzie, 2005; Yani et al., 2018). The results of this trial also prove in accordance with the opinion of Zwartjes (2014) which states that GIS has an advantage in understanding the world, both its manifestations in the form of natural and social conditions, and has a positive impact on developing the ability to think spatially. This also confirms that GIS which is able to analyze every geographical problem and phenomenon is a good and perfect medium to use.

Based on these results, the unequal level of spatial intelligence of students can be improved by utilizing Inarisk data as GIS-based learning media processed in the form of disaster-prone maps and tested in experimental classes. This is evidenced by the results of the t-test and N-Gain test, as well as the posttest results of spatial intelligence which are greater than the pretest results.

4. CONCLUSIONS

Based on the results of research that has been processed, analyzed, and discussed, it can be concluded that the results of learning by utilizing Inarisk data as GIS-based media have an influence on increasing the spatial intelligence of students, compared to using other equivalent media. With the level of effectiveness obtained in the medium classification. In addition, the implementation of crosschecks carried out directly by students also adds experience and helps students predict, associate, analyze and conclude every phenomenon that occurs in the field with an accuracy of 87%.

5. RECOMMENDATIONS

GIS has a positive influence on increasing spatial intelligence. But the N-Gain result of 0.34 in the moderate category should still be optimally improved. GIS-based learning media can continue to be developed as innovative media in various geography materials that are adapted to the conditions or characteristics of students and more diverse locations.

6. REFERENCES

Al Fauzi, R., Dewi, E. O., Rizara, A., Ridwana, R., & Yani, A. (2022). Perbandingan Arcgis Dengan Google My Maps dalam Membantu Pembelajaran Sistem Informasi Geografis. *Jurnal Pendidikan Geografi Undiksha*, 10(2), 186-196.

Alfi, M., Utami, A. D., Cholisa, K. N., Putri, Y. E., & Utami, G. R. (2024). Level of Student Preparedness in Disaster Alert Schools in Bengkulu City in Dealing with Potential Disaster Threats. *Jurnal Geografi Gea*, 24(1), 12-24.

Arikunto, S. (2010). Prosedur Penelitian: Suatu Pendekatan Praktik. Jakarta: Rineka Cipta.

Artayasa, I. P., Susilo, H., Lestari, U., and Indriwati, S. E. (2016). The Effectiveness of the Three Levels of Inquiry in Improving Teacher Training Students Science Process Skills. *Journal of Baltic Science Education*, 16(6), 908–918.

DOI: https://doi.org/10.17509/gea.v24i2.58842
p-ISSN 1412-0313 e- ISSN 2549-7529

Artvinli, E., and Martinha, C. (2014). *Dealing with GIS in Geography Curricula: Comparing Portugal and Turkey*. In R. de M. Gonzalez and K. Donert (Eds.), *Innovative Learning Geography in Europe: New Challenges for the 21st Century* (pp. 121–140). UK: Cambridge Scholars.

BNPB. (n.d.). *Panduan Penggunaan Inarisk how risky is your place?* Jakarta: Direktorat Sistem Penanggulangan Bencana.

Ernawati. (2016). Penginderaan Jauh & Kecerdasan Spasial. In Y. Suasti and Ahyuni (Eds.), *Prosiding Seminar Nasional Geografi* (pp. 97–104). Padang: Universitas Negeri Padang.

Favier, T. T., and Schee, J. A. van der. (2012). Exploring the Characteristics of an Optimal Design for Inquiry-Based Geography Education with Geographic Information Systems. *Computers and Education*, 58(1), 666–677. https://doi.org/10.1016/j.compedu.2011.09.007

Gardner, H. (2003). *Multiple Intelligences: Kecerdasan Majemuk Teori dalam Praktik* (A. Sindoro, Trans.). Batam: Interaksara. (Original work published 1993)

Geographical Association. (n.d.). Spatial thinking. The Geographical Association. Retrieved February 6, 2022, from https://www.geography.org.uk/Spatial-thinking

Hadi, B. S. (2012). Remote Sensing Implementation In Learning To Develop Student Spatial Thinking Skills. *In an International Seminar Utilization of Geospatial Information to Raise Environmental Awareness In Realizing The Nations Character* (pp. 1–11). Yogyakarta: Universitas Negeri Yogyakarta.

Jakab, I., Ševčík, M., and Grežo, H. (2017). Model of higher GIS education. *Electronic Journal of E-Learning*, 15(3), 220–234.

Johansson, T., and Pellikka, P. (2006). GISAS – Geographical Information Systems Applications for Schools. *AGILE Conference on Geographic Information Science*, 317–318.

Kerski, J. J., Demirci, A., and Milson, A. J. (2013). The Global Landscape of GIS in Secondary Education The Global Landscape of GIS in Secondary Education. *Journal of Geography*, 112, 232–247. https://doi.org/10.1080/00221341.2013.801506

Malekian, F., Pour, A. R. F., and Pour, B. S. (2012). Study the Effect of Supplemental Instructional Images on Students' Spatial Intelligence Degree. *Procedia - Social and Behavioral Sciences*, 46, 3301–3305. https://doi.org/10.1016/j.sbspro.2012.06.055

Marlyono, S. G., and Urfan, F. (2019). Optimalisasi kecerdasan spasial untuk meningkatkan kesiapsiagaan bencana. *Pros. SemNas Peningkatan Mutu Pendididkan*, 1(1), 441–449.

McKenzie, W. (2005). *Multiple Intelligences and Instructional Technology-second edition*. Washington DC: International society for Technology in Education (ISTE).

Nandi. (2016). Kecerdasan Spasial & Pembelajaran Geografi: Pemanfaatan Media Peta, Pengindraan Jauh & Sistem Informasi Geografis dalam Pembelajaran Geografi & IPS. In Y.

Suasti and Ahyuni (Eds.), *Prosiding Seminar Nasional Geografi 2016* (pp. 23–37). Padang: Universitas Negeri Padang.

Nisnala, W. E. F., Purwanto, P., & Taryana, D. (2023). Building Creativity in Students' Spatial Thinking Skills using ArcGIS Story Maps. *Jurnal Geografi Gea*, 23(1), 67-80.

Nofirman. (2018). Studi Kemampuan Spasial Geografi Siswa Kelas XII SMA Negeri 6 Kota Bengkulu. *Jurnal Georafflesia*, 3(2), 11–24.

Pemerintah Kabupaten Banjar. (2020). *Apa Itu Inarisk?* Pemerintah Kabupaten Banjar. https://home.banjarkab.go.id/apa-itu-inarisk/

Purbadi, Y. D. (2015). *Kesadaran & Kecerdasan Spasial*. Yogyakarta: Universitas Atma Jaya.

Ridwana, R., Nafisyah, V. A., Yani, A., Setiawan, I., Waluya, B., Mulyadi, A., & Rosyana, M. (2022). Pengembangan media digital untuk meningkatkan minat siswa dan kualitas pembelajaran Geografi di sekolah. *Transformasi: Jurnal Pengabdian Masyarakat*, 18(2), 268-286.

Somantri, L., & Hamidah, S. (2024). Effects of webGIS-based spatial intelligence training on Geography teacher's spatial skills. *Jurnal Pendidikan Geografi: Kajian, Teori, dan Praktek dalam Bidang Pendidikan dan Ilmu Geografi*, 28(1), 7.

Somantri, L., & Ridwana, D. R. (2021). Model Pembelajaran Penginderaan Jauh Di Sekolah Menengah Atas. *Jurnal Geografi, Edukasi Dan Lingkungan (JGEL)*, 5(2), 109-117.

Suryabrata, S. (2015). *Metode Penelitian*. Jakarta: Rajawali Press.

Susetyo, B. B., Sumarmi, and Astina, K. I. (2017). Pengaruh Pembelajaran Problem Based Learning Berbasis Outdoor Adventure Education Terhadap Kecerdasan Spasial. *Jurnal Pendidikan*, 2(12), 1669–1675.

Wibowo, K., Indra, K., and Jumadi, J. (2015). Sistem Informasi Geografis (SIG) Menentukan Lokasi Pertambangan Batu Bara di Provinsi Bengkulu Berbasis Website. *Jurnal Media Infotama*, 11(1), 51–60.

Witama, I. W., Astra Wesnawa, I. G., and Sriartha, I. P. (2017). Pemanfaatan Media Sistem Informasi Geografis (Sig) Untuk Meningkatkan Motivasi & Hasil Belajar Siswa Mata Pelajaran IPS. *Jurnal Pendidikan IPS Indonesia*, 1(1), 22–30. https://doi.org/10.23887/pips.v1i1.2814

Yani, A., Mulyadi, A., and Ruhimat, M. (2018). Contextualization of Spatial Intelligence: Correlation Between Spatial Intelligence, Spatial Ability, and Geography Skills. *Journal of Baltic Science Education*, 17(4), 564–575.

Zwartjes, L. (2014). The need for a learning line on spatial thinking using GIS in education. *Innovative Learning Geography in Europe: New Challenge for the 21st Century*, 39–62.

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