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The Relationship Between Reading Literacy and Spatial Intelligence and Students' Geography Learning Outcomes

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ABSTRACT

Education plays a vital role in preparing the younger generation to face globalization, where reading literacy and spatial intelligence are essential for achieving optimal learning outcomes. Reading literacy, which involves understanding and interpreting written texts, is expected to enhance spatial intelligence—the ability to comprehend and process spatial and visual information. This study aims to examine the relationship between reading literacy and spatial intelligence on students' learning outcomes at MAN 1 Banda Aceh. Using a quantitative correlational approach, the research involved 76 students of class XI IPS as the population and sample through total sampling. Data were collected using questionnaires and multiple-choice tests and analyzed using multiple correlation techniques. The regression equation obtained was $Y = 49.33 + 0.12X_1 + 0.15X_2$, indicating that both reading literacy and spatial intelligence positively influence learning outcomes. The correlation coefficient between the two variables and learning outcomes was 0.48, categorized as sufficient. Reading literacy and learning outcomes showed a weak correlation ($r = 0.23$), while spatial intelligence and learning outcomes had a sufficient correlation ($r = 0.47$). However, the F-test results showed F_count (1.1) < F_table (3.1) at a 5% significance level, indicating no significant relationship between reading literacy, spatial intelligence, and learning outcomes among MAN 1 Banda Aceh students.

INTRODUCTION

Education is part Which very important in life Humans, with education, humans can live according to their purpose and function. Education is effort coaching, formation, direction, intelligence and training provided to students, both formally and informally (Pristiwanti et al., 2022). Through educational activities, individuals can equip themselves with knowledge and skills, so that they are able to live their lives in accordance with their goals and functions (Nurhayati & Kemas, 2022). Currently, a country is said to be developed or not if the education system in it is running well and developing rapidly in line with the times, Because education is point reject embodiment generation young For ready to compete in the era of globalization and the demands of the times. Educational success in a nation or country capable of creating quality human resources (HR) (Novalita, 2017). Therefore, serious efforts are needed from various parties to achieve educational success.

Educational success can be said if a person has knowledge and there has been a process of changing the attitudes and behavior of a person or group of people in an effort to mature humans (Habe & Kasful, 2022), educational success is also assessed based on student learning outcomes, where students have the ability to use their knowledge in creating a work (Sustainable, 2020). Literacy identical with competence base in matter read, write and count, draft literacy now No just competence base However Already become factor supporters For think critical somebody (Pratiwi & Asyarotin, 2019:68). Therefore, reading literacy activities can improve intelligence spatial student, Wrong the only one in eye lesson Geography.

Spatial intelligence is the ability to understand and visualize spatial, dimensional, or geometric perspectives, including sensitivity to lines and colors. Spatial intelligence can be defined as a person's capacity to recognize and depict objects or patterns perceived by the brain (Nurdyanto & Nanik, 2017). Somebody Which own intelligence spatial capable maintain, take, produce And change picture visual Which structured with well into his imagination realistically (Hibatullah et al., 2020). This form of intelligence is generally skilled at producing mental imagination and creating graphic representations, as well as being able to think in three dimensions and recreate visual world (Jayantika et al., 2013). Spatial intelligence enables students to think and communicate spatially so they can take the right decision in finish all form problem spatial in earth with full responsibility (Novarlia, 2013:7). Spatial intelligence can support someone in solving problems, because visualizing a problem pattern makes it easier for someone to find alternative solutions in solving problems, one of which is problems in the scope of geography.

Spatial intelligence is an ability used by geographers to analyze spatial relationships. on earth (Oktavianto et al., 2017). As stated in previous research, "spatial intelligence in geography is very important, because someone who has spatial intelligence is able to explore the environment, improve spatial thinking skills so that they understand environmental conditions, recognize the potential of natural resources physically, recognize the potential of population resources and recognize the potential threats, vulnerabilities and risks of disasters" (Nofirman, 2018). The results of the literature study also mention that there is connection Which significant between intelligence spatial with knowledge geography, Where ability think spatial identical with understanding of space, so that someone is able to process data, analyze and manage data into a map (Nisa et al., 2021).

Spatial understanding is not only knowing the location or distribution of a phenomenon but also being able to analyze the causes and impacts that may arise. from One certain phenomena towards the field life that others and provide alternative solution to the problem (Metoyer & Bednarz, 2017). Thus, through reading literacy, spatial intelligence can be improved, where spatial intelligence is an important asset in improving the learning outcomes of students. Based on study previously concerning literacy read And spatial intelligence in his research stated that, "there is an influence of spatial ability literacy to ability solution problem student with mark Sig. 0.000 < 0.05 And coefficient determinant (R^2) as big as 0.777 or 77.7% with very strong relationship" (Nasution et al., 2023:820). Reading literacy supports someone to easily understand, use, evaluate, and reflect on various types of information, thereby increasing students' knowledge, understanding, and level of analysis.

Based on explanation in on from a number of results study, literacy Reading and spatial intelligence play a significant role in student learning outcomes. Learning activities using reading literacy methods can improve students' spatial intelligence, thereby improving their learning outcomes. Class XI IPS students at MAN 1 Banda Aceh received reading literacy-based learning conducted by teachers and participated in a national assessment that measured reading literacy. learning outcomes students. Researchers tried conducted initial observations on geography teachers and students of Class XI IPS MAN 1 Banda Aceh. The teacher explained that learning geography material is very suitable using the reading literacy model to improve students' spatial intelligence, especially in geography material. Which learn symptom natural And social. Besides That, results observation beginning also illustrates that the spatial intelligence possessed by Class XI IPS students at MAN 1 Banda Aceh is 70%. Based on this reason, it is necessary to study further in this study entitled " The Relationship Between Reading Literacy and Spatial Intelligence and Students' Geography Learning Outcomes".

METHOD

This study employed a quantitative correlational approach to examine the relationship between reading literacy and spatial intelligence on students' learning outcomes at MAN 1 Banda Aceh. The correlational method was used to identify whether there is a significant relationship between the two independent variables reading literacy and spatial intelligence and the dependent variable, namely students' learning outcomes.

The population of this study consisted of 76 students from class XI IPS 1 and XI IPS 2 at MAN 1 Banda Aceh. Since the total number of students was manageable, a total sampling technique was used, meaning all students participated as research respondents.

The research instruments included a questionnaire to measure students' reading literacy and spatial intelligence, and a multiple-choice test to assess their learning outcomes in geography. Before data collection, the instruments were tested for validity and reliability to ensure accuracy and consistency.

The collected data were analyzed using descriptive and inferential statistics. Descriptive analysis was used to describe the general trends of each variable, while inferential analysis was used to test hypotheses. The main statistical technique applied was multiple correlation and regression analysis, aimed at determining the direction and strength of the relationship between reading literacy, spatial intelligence, and learning outcomes.

All data analyses were carried out using SPSS 23, ensuring the reliability of statistical results. The significance level used in hypothesis testing was set at 5% ($\alpha = 0.05$), which means that results with a probability value below 0.05 were considered statistically significant.

RESEARCH RESULTS AND DISCUSSION

StudyThis is study correlation causal or connection consists of Of the 3 variables, 2 are independent variables and 1 is dependent variable, namely reading literacy X_1 and intelligence spatial X_2 with results Study (Y). Objective study This aim to know more carry on about connection between literacy read And intelligence spatial with results Study student MAN 1 Banda Aceh. Recapitulation results analysis data is shown in table 4.21

Table 1. Results of Correlation and Regression Analysis

No	Correlated Variables	Results	Interpretation
1	Multiple regression between reading literacy (X_1) and spatial intelligence (X_2) on learning outcomes (Y)	$Y = 49.33 + 0.12X_1 + 0.15X_2$	Both independent variables show a positive influence on the dependent variable.
2	Reading literacy (X_1) and learning outcomes (Y)	$r = 0.23$	Weak correlation
3	Spatial intelligence (X_2) and learning outcomes (Y)	$r = 0.47$	Moderate correlation
4	Reading literacy (X_1) and spatial intelligence (X_2)	$r = 0.31$	Weak correlation
5	Reading literacy (X_1) and spatial intelligence (X_2) together with learning outcomes (Y)	$r = 0.47$	Moderate overall correlation
6	Contribution of reading literacy (X_1) and spatial intelligence (X_2) to learning outcomes (Y)	$R^2 = 22\%$	About 22% of the variance in learning outcomes is explained by the two variables; 78% is influenced by other factors.
7	Significance test of reading literacy	F_h (1.1) <	H_0 accepted (no significant relation

No	Correlated Variables	Results	Interpretation
	(X_1) and spatial intelligence (X_2) with learning outcomes (Y)	F_t (3.1)	

Source: Results Study, 2024 .

Based on the results of the data analysis, it is known that the relationship between reading literacy and intelligence spatial to results Study obtained equality regression double Y = 49.33 + 0.12X $_1$ + 0.15X $_2$. Based on the equation, it is known that both independent variables (reading literacy and spatial intelligence) have a positive influence on the dependent variable (learning outcomes). If the independent variables (reading literacy and spatial intelligence) increase, the dependent variable (learning outcomes) will also increase. This can also be proven by the results of the multiple correlation data analysis which obtained a coefficient value of 0.48 and a determination coefficient of 23%. Furthermore, from the results of the F test, the $_{calculated}$ F value was obtained. = 1.15 .

Variables literacy read (X $_1$) with results Study own correlation as large as r $_{X1Y}$ = 0.23 , which means it has a positive correlation and is in the weak category. The relationship between the spatial intelligence variable ($_{X2}$) and learning outcomes (Y) is rX1Y = 0.47 which means it has a positive influence and is in the sufficient category. Furthermore, the relationship between reading literacy (X1) and spatial intelligence (X2) has a weak relationship , namely $_{rX1X2}$ = 0.31. Finally, the relationship between reading literacy (X $_1$) and spatial intelligence (X $_2$) with learning outcomes (Y) is r $_{X1X2Y}$ = 0.48 is in the sufficient category.

The coefficient of determination obtained was 23%. This means that learning outcomes are influenced by reading literacy (X1) and spatial intelligence ($_{X2}$) , while the remaining 77% is influenced by other factors examined in this study. Furthermore, based on the results of the F test, the $_{calculated\ F}$ is = 1.15 the value is then compared with the F $_{table}$ with a significance level of 5%, namely F $_{count}$ (1,1) < F $_{table}$ (3.1) then accept H $_0$ meaning there is no significant relationship between literacy read And intelligence spatial with results Study students of MAN 1 Banda Aceh .

Reading Literacy (X $_1$) with learning outcomes (Y) has a correlation of r $_{X1Y}$ = 0.47 Which means own influence positive And category Enough. The results of this study are in accordance with previous research conducted by Sundewi et al. (2019) about "Connection Culture Literacy (Read-Write) with data that collected Then analyzed with analysis descriptive And analysis one predictor regression. The results of this study indicate that the literacy culture of grade XI students SENIOR HIGH SCHOOL Country 7 including to in category very tall with mark average culture literacy 82.78. There is connection positive And significant between culture Literacy with Indonesian language learning outcomes of class XI students Senior High School 7 Denpasar. This means that increasing reading literacy will improve Indonesian language learning outcomes, and conversely, if reading literacy declines, Indonesian language learning outcomes will also decline.

The research results are consistent with Fahlevi's (2022) statement that reading literacy often has a significant relationship with overall learning outcomes. Good reading literacy can improve conceptual understanding, information absorption, and analytical skills, all of which support better learning outcomes. Spatial intelligence refers to the ability to understand and remember information about space and the relationships between objects. This certainly plays a role in learning, especially in subjects that require understanding visual And spatial like mathematics And knowledge knowledge (Uno et al., 2023).

Reading is a thinking activity to understand the content of the text being read (Dalman, 2014). Understanding a reading means discovering new information and knowledge. A person can add information and improve their knowledge if... He often read. Movement school literacy with reading habit five twelve minute every day before Study functioning For improve students' understanding of a reading. If students are proficient in understanding a reading And capable control knowledge with Good, objective from movement school literacy is achieved. There are many benefits to be gained from reading activities. Therefore, students should engage in reading activities based on need, not because something coercion. If student read on base need, so He will get all the information they want. However, on the other hand, if students read under duress, the information they obtain will not be optimal. Often read can increase

schemata We become more Good. In matter this, insight and reading experience will also increase. Unfortunately, not everyone enjoys reading, especially in our country, Indonesia. The reading problem in this country remains a classic problem that still needs to be resolved together. All subjects certainly require reading activities. Because by reading, we obtain the desired information (Sudarsana, 2010). One example is Indonesian language lessons, which are predominantly reading activities. In this regard, literacy activities are essential to foster students' interest in reading. With students' high interest in reading, it is hoped that this will influence their Indonesian language learning outcomes.

Research results by H a jumandini (2021) regarding "The Effectiveness of the School Literacy Movement Program during the Covid-19 Pandemic in Increasing Interest in Reading" Student Class X SENIOR HIGH SCHOOL Country 68 Jakarta Center". Interest read is source of motivation somebody For analyze, remember, And evaluate What Which has been read. Traditionally, literacy is seen as the ability to read and write. study state interest read student based on study seen Good with supporting factors is reading non-textbooks. The results of the correlation between the effectiveness of the School Literacy Movement Program and reading interest showed a Pearson correlation value of 0.848. The significance value was 0.000 < 0.05. So the relationship between Effectiveness Program Movement Literacy School with Interest Read correlated very strongly, and H1 is accepted, so there is a relationship between the Effectiveness of the School Literacy Movement Program and Reading Interest.

On the spatial intelligence variable with learning outcomes r_{X2Y} = 0.47 which has correlation positive And category Which Enough. Results study This in line with research Which has done by Nofirman (2018) about "Studies "Geographic Spatial Ability of Class XII Students of SMA Negeri 6 Kota Bengkulu" The results of the study show that spatial ability is very important in solving various problems. problem And phenomena in knowledge geography. Ability The spatial ability of class XII students at SMAN 6 Bengkulu City is in the sufficient group with the largest number of 43.55%. The potential spatial ability of class XII students at SMA 6 Bengkulu City is in the sufficient group with the largest number of 38.71%.

One of the important skills and a characteristic of geography studies is spatial thinking ability (Flynn, 2018). Spatial thinking ability according to... Golledge And Stimson (1997) in study (Aliman et al., (2020) Spatial thinking is a person's ability to process information related to space and develop it through input, analysis, and output processes. According to (Maryono and Urfan, 2020 *), spatial thinking skills* are the ability to understand, process, and think in visual forms. A person with this skill is able to translate images in their mind into two- or three-dimensional forms. As a collection of cognitive skills, *spatial thinking skills* consist of three main elements: the concept of space, instruments that describe space, and the process of spatial reasoning. Spatial thinking does not only Ability For learn about location, but Also involving about observation, analytical skills to understand geospheric phenomena, distribution, patterns, and spatial relationships between different objects (Ahyuni, 2016), so that they can overcome various problems that occur on the face of this earth. Therefore, spatial thinking skills are very important and must be possessed (Webster, 2015) and developed by students (Anwar. S, 2016).

In study (Abelda et al., 2023) about "Connection Between Motivation to learn With Ability think Spatial Student in Learning Geography at SMAN 1 Pariaman". The learning motivation of grade XI students at SMAN 1 Pariaman is in the sufficient category with an average value of 2.50. The spatial thinking ability of grade XI students at SMAN 1 Pariaman is in the sufficient category with an average value of 2.50. of 52.50. There is a positive and significant relationship between learning motivation and the spatial thinking ability of students of grade XI.F SMAN 1 Pariaman. This is indicated by the r value of xy greater than T table (0.525>0.176). This means that the higher a student's learning motivation, the higher their spatial thinking skills. student the. With thus has proven truth hypothesis alternative (Ha) "There is a significant positive relationship between learning motivation and thinking ability student spatial Phase F Class XI on eye geography lessons in high school State 1 Pariaman" .

Furthermore, the correlation level between reading literacy and spatial intelligence is $r_{XIX2.}$ = 0.31 which shows a positive correlation with the correlation of the relationship weak. Then level correlation literacy read And intelligence spatial on learning outcomes r_{XIX2Y} = 0.47, which indicates a positive correlation with a sufficient relationship. This research is in accordance with previous research. by Sari (2020) about "Connection Literacy Read Write And Interest Reading with Indonesian Language Learning

Outcomes" The research data were then analyzed using statistical techniques, namely *product moment* , simple regression and regression. double. Results analysis connection literacy read write with results Study Indonesian language shows rhitung = 0.087 > rtable = 0.05, meaning there is a significant and positive relationship between reading and writing literacy and Indonesian language learning outcomes.

Based on previous research concerning reading literacy and spatial intelligence, his research stated that, "there is an influence of literacy skills on students' problem-solving abilities with a Sig. value of 0.000 < 0.05 and a determinant coefficient (R2) of 0.777 or 77.7% with a close relationship the relationship that very strong" (Nasution et al., 2023:820). Literacy Reading supports someone to easily understand, use, evaluate, reflect various types of information, so that it can improve students' knowledge, understanding and level of analysis.

The results of Binasdevi's research (2021) show that there is a relationship between learning motivation and critical thinking skills with a significance of T Statistics 14.519 > 1.983. from T table whereas mark p-value 0,000 < 0.05. Results the shows that there is a significant positive relationship between learning motivation and thinking ability. critical. It means the more Good motivation Study student the so will good thinking skills critical. The formation of learning motivation most strong is an indicator of the existence of a conducive learning environment. This means that there is environment Study Which conducive is indicator Which most dominant in shaping students' learning motivation. Thus, the existence of a learning environment that conducive is values dominant in former motivation Study which has a strong relationship with improving students' critical thinking skills.

In research conducted by Anggraeni and Sumarni (2022), they found differences in students' spatial thinking skills between conventional and *guided inquiry* - based *geoliteracy* (GIGL) models. In classes using the GIGL model, students demonstrated better spatial thinking skills compared to classes using the conventional model. Model The GIGL learning model used directs students to conduct scientific investigations into existing phenomena, as it places greater emphasis on contextual learning. Other research that examines the GIGL model shows that the model provides influence on various ability, especially cognitive, problem-solving skills and fostering environmentally conscious character. It can be concluded that the GIGL learning model can improve various students' thinking skills.

According to Muraida & Sundari (2017), the learning model that can develop students' *spatial literacy* is the social multiliteracy learning model. A comparison between the social multiliteracy model and the STAD cooperative model shows that the social multiliteracy learning model provides better results. Based on the results of this study, the development of students' *spatial literacy* can be developed through the social multiliteracy learning model. Indicators of spatial thinking in the social multiliteracy learning process are proposed by Gersmehl (Hadi, 2013), including: show location something location *(location)* , estimate characteristics a place *(condition),* comparing phenomena in one place with phenomena in another place *(comparison),* explaining that the location of a place can influence places nearby.

CONCLUSION

Based on the results of the data analysis, it is known that the relationship between reading literacy and intelligence spatial to results Study obtained equality regression double $Y = 49.33 + 0.12X_1 + 0.15X_2$. Based on this equation, it is known that both independent variables have a positive influence on the dependent variable. The correlation coefficient literacy read with results Study as big as, coefficient correlation spatial intelligence And results Study, coefficient correlation literacy read And intelligence spatial, and the correlation coefficient of reading literacy and spatial intelligence with learning outcomes is 0.48 (sufficient). The coefficient of determination (R^2) = 23%, the remaining 77% is influenced by other variables not examined in this study. The results of the significance test show that the $_{calculated}F$ (1,1) < F_{table} (3.1) then accept H_0 This means that there is no significant relationship between reading literacy and spatial intelligence with the learning outcomes of students at MAN 1 Banda Aceh.

The suggestions that we wish to convey in this research are as follows: 1) In general simultaneous literacy read And intelligence spatial own a positive and insignificant relationship with learning outcomes,

therefore it is hoped that prospective researchers who are interested in conducting research on learning outcomes can conduct research advanced related literacy reading And intelligence spatial or adding different objects to get better results in the future in order to improve the quality of education. 2) Schools are expected to be able to build good relationships with people old so that able to apply reading literacy and spatial intelligence to improve student learning outcomes . 3) To student, expected so that capable apply literacy read well and also improve good spatial intelligence so as to obtain maximum learning results .

BIBLIOGRAPHY

Abelda, D., & Anwar, S. (2023). The relationship between learning motivation and students' spatial thinking skills in geography learning at SMAN 1 Kota Pariaman. *Innovative: Journal of Social Science Research, 3*(3), 10078–10089.

Ahyuni. (2016). Development of spatial thinking teaching materials for prospective geography teachers. In *Proceedings of the National Geography Seminar: Spatial Intelligence in Learning and Development Planning* (pp. 163–175).

Aliman, M., Mutia, T., Halek, D. H., Hasanah, R., & Muhammad, H. H. (2020). Instrument development test ability think spatial for senior high school students. *Geodica: Journal of Geography Science and Education Review, 4*(1), 1–10.

Anggreni, D. P., & Sumarmi, S. (2022). The effectiveness of the geoliteracy-based guided inquiry learning model (GIGL) on spatial thinking skills in geography lessons. *J-PIPS (Journal of Social Science Education), 8*(2), 114–125.

Anwar, S. (2016). Development of spatial intelligence instruments as a measuring tool for students' initial abilities: Application of evaluation instruments in geography learning. *Paper Knowledge, Toward a Media History of Documents*, 12–26.

Binasdevi, M. (2021). The relationship between school literacy activities and learning motivation through the mediation of critical thinking skills with elementary school students' mathematics learning achievement. *Mubtadi: Journal of Elementary Education, 3*(1), 70–82.

Dalman. (2014). *Reading skills*. PT Raja Grafindo Persada.

Fahlevi, R. (2022). The use of the discovery learning model to improve student learning outcomes and motivation in structure and function material of plant tissue in Public High School 1 Teunom Aceh Jaya. (Doctoral dissertation, UIN Ar-Raniry Faculty of Tarbiyah and Teacher Training).

Flynn, K. C. (2018). Improving spatial thinking through experiential-based learning across international higher education settings. *International Journal of Geospatial and Environmental Research, 5*(3), 4.

Habe, M. J., & Kasful, A. U. (2022). Determination of educational success: Systems thinking, external potential, and learning process (literature review of educational management). *Journal of Educational Management and Social Sciences, 3*(5), 491–503.

Hadi, S. B. (2013). Integrating spatial thinking competencies in geography learning through the utilization of geospatial technology.

Hajumandini, D. (2021). The effectiveness of the school literacy movement program during the

COVID-19 pandemic in increasing reading interest of grade X students of SMA Negeri 68 Central Jakarta. (Doctoral dissertation, YARSI University).

Hibatullah, I. N., Susanto, & Lioni, A. M. (2020). Profile of students' spatial ability reviewed from Florence Littauer's personality types. *Fibonacci: Journal of Mathematics and Mathematics Education, 6*(2), 115–124.

Jayantika, I. G. A. N. T., Ardana, I. M., & Sudiarta, I. G. P. (2013). The contribution of numerical aptitude, spatial intelligence, and logical-mathematical intelligence to mathematics learning achievement of elementary school students in Buleleng Regency. *Postgraduate Journal of Ganesha University of Education, Mathematics Study Program, 2*, 1–12.

Lestari, L. D. (2020). The importance of educating children's learning outcomes through play. *Journal of Child Education, 9*(2), 100–108.

Maryono, S. G., & Urfan, F. (2020). Optimizing spatial intelligence to improve disaster preparedness. In *National Seminar on Improving the Quality of Education* (Vol. 1, No. 1, pp. 440–448).

Metoyer, S., & Bednarz, R. (2017). Spatial thinking assists geographic thinking: Evidence from a study exploring the effects of geospatial technology. *Journal of Geography, 116*(1), 20–33.

Muraida, N. L., & Sundari, N. (2017). Influence of social multiliteracy models on students' spatial thinking skills in social studies. *Jurnal Khasanah Sekolah Dasar, 5*(1), 24–34.

Nasution, H. M. S., Syahputra, E., & Mulyono. (2023). The influence of critical thinking, literacy, spatial, and mathematical communication skills on mathematical problem-solving skills of 8th-grade junior high school students in Medan. *Jurnal Cendekia: Journal of Mathematics Education, 7*(1), 820–830.

Nisa, K., Hadi, S., Satti, W., & Joseph, S. (2021). The EarthComm learning model on geography subjects: Its influence on high school students' spatial thinking skills. *Scientific Journal of Teacher Professional Education, 4*(3), 500–510.

Nofirman. (2018). Study of geography spatial ability of grade XII students of SMA Negeri 6 Bengkulu City. *Georafflesia Journal, 3*(2), 11–24.

Novalita, R. (2017). Comparison of education systems in Belgium and Indonesia. *Journal of Applied Knowledge Geography and Geography Education, 3*(4), 1–10.

Novarlia, I. (2013). Geographic literacy-based learning model in an effort to build students' spatial intelligence (Studies on junior high schools in Sumedang Regency) [Doctoral dissertation, Indonesian University of Education]. Bandung.

Nurdyanto, V. D., & Nanik, E. (2017). The influence of spatial intelligence on psychomotor learning outcomes of CAD drawing in grade XI students of TGB SMKN 1 Nganjuk. *Journal of Building Engineering Education Studies, 1*(1), 13–22.

Nurhayati, N., & Kemas, I. R. (2022). Determination of Islamic education management: Education system, education management, and education personnel. *Journal of Educational Management and Social Sciences, 3*(1), 451–464.

Oktavianto, D. A. (2017). The influence of Google-assisted project-based learning Earth on

spatial thinking skills. *Jurnal Teknodik, 21*(1), 1–15.

Pratiwi, A., & Asyarotin, E. N. K. (2019). Implementation of literacy culture and citizenship as a solution to disinformation among the millennial generation in Indonesia. *Journal of Information & Library Studies, 7*(1), 68.

Pristiwanti, D., Bai, B., Sholeh, H., & Ratna, S. D. (2022). Understanding education. *Journal of Education and Counseling, 4*(2), 7911–7915.

Sari, P. A. P. (2020). The relationship between reading and writing literacy and interest in reading with Indonesian learning outcomes. *Journal for Lesson and Learning Studies, 3*(1), 141–152.

Sudarsana, U. (2010). *Coaching interest in reading* (2nd ed.). Universitas Terbuka.

Uno, H. B., & Umar, M. K. (2023). *Managing intelligence in learning: A concept of intelligence-based learning*. Bumi Aksara.

Webster, M. L. (2015). *GIS in AP human geography: A means of developing students' spatial thinking?* (Unpublished doctoral dissertation). University of North Texas.