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Relationship Between Technology Literacy and Communication Skills with Environmental Literacy of Class X Students of SMAN 2 Malang

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ABSTRACT
The aim of this study is to determine the relationship between technology literacy and communication skills in environmental literacy of class X SMAN 2 Malang. The methods using survey research with a correlational design to determine the relationship. Research subjects selected using simple random sampling. The subjects are 34 class X students of SMAN 2 Malang in social sciences and language majors. The research instruments are questionnaires on technology literacy and communication skills, and environmental literacy questionnaires and tests. Data analysis includes prerequisite, correlation and regression tests. The results showed that the values of technology literacy, communication skills, and environmental literacy are classified in the high category. The correlation between technology literacy and environmental literacy is -0.007 classified as very low category, the correlation between communication skills and environmental literacy is -0.207 classified as very low category, the correlation between technology literacy and communication skills is -0.903 classified as very strong category, and the correlation between technology literacy and communication skills together with environmental literacy is 0.048 classified as very low category.

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1. INTRODUCTION

Indonesia is one of the countries that has an increase in population in recent times (Wargadinata, 2021). An increase in population affects environmental conditions as space inhabited by living things and is considered one of the factors causing environmental problems (Indraswari & Yuhap, 2017). Today, technology advances are directly proportional to the advances of science in schools. Technology advances require parties, especially in the education sector, to balance and follow technology advances (Rahadian, 2017). Therefore, it is necessary to carry out an action of literacy for students (Arnon *et al.*, 2015).

Environmental literacy must to training for students which can help students to understand and interpret the state of the environment around them so as to make them respond both cognitively and effectively to environmental conditions and preservation (Kusumaningrum, 2018; Yusliani & Yanti, 2020). There are four aspects of environmental literacy, including aspects of ecological knowledge with indicators of ecological knowledge, aspects of cognitive skills with indicators of identification of environmental issues, analysis of environmental issues, and environmental action plans, aspects of attitudes towards the environment with indicators an intention to act, sensitivity to the environment, and feelings towards the environment, as well as aspects of pro-environmental behaviour with indicators of real commitment to the environment (Mcbeth *et al.*, 2011).

In education, technology has an important influence on science (Maritsa *et al.*, 2021). Technology literacy is important to teach students because it is useful in the 21st century, to find and determine information from various sources, communicate via computers, and work on technology-based projects such as presentations and data analysis (Helaluddin, 2019; Huggins *et al.*, 2014; Latip, 2020). In addition, in their daily lives, students use technology to obtain material and do assignments in class (Wulandari, 2021). Technology literacy consists of 6 indicators, including the use of computers, digital and multimedia products, engineering, design, using and selecting, and law/legal (Greenstein, 2012).

The learning abilities that students must have according to 21st century skills are 4C competencies, one of them is communication skills (Ashim et al., 2019). Communication skills are trained to students aim to make it easier for students to interact with their peers and facilitate group activities in learning (Huda et al., 2019). In communication skills there are 6 indicators, namely oral communication, receptive communication (listening, reading, seeing), understanding intent, using communication strategies, communicating clearly for a purpose, and presentation skills (Greenstein, 2012).

The aims of this study are to: 1) determine the value and level of technology literacy, 2) determine the value and level of communication skills, 3) determine the value and level of environmental literacy, 4) determine the relationship between technology literacy and environmental literacy, 5) determine the relationship between communication skills with environmental literacy, 6) knowing the relationship between technology literacy and communication skills, 7) knowing the relationship between technology literacy and communication skills together with environmental literacy of class X students of SMAN 2 Malang.

2. RESEARCH METHOD

This research is included to survey research. Survey research is research which data collection methods are obtained from samples taken from the population through the use of questionnaires (Morissan, 2012). This study uses a correlational research design. Correlational design is a design to determine the relationship (Silalahi & Atif, 2015).

This research was conducted in April-May 2023 at SMAN 2 Malang located at Jln. Laksamana Martadinata No. 84 Sukoharjo, Kec. Klojen, City of Malang, East Java 65118. The subjects are 34 class X students of SMAN 2 Malang in social sciences and language majors. The technique of selecting the subjects that became the sample was chosen randomly using simple random sampling.

The instrument used in this research by questionnaire and observation. The instrument on the technology literacy variable was a questionnaire totalling 43 statements with a Likert Scale that was referred from the Greenstein scoring rubric and observation. The instrument on the communication skills variable was a questionnaire totalling 27 statements with a Likert Scale that was referred from the Greenstein scoring rubric and observation. Instruments for environmental literacy variables were measured using research instruments in the form of tests and questionnaires with a Likert Scale adapted from the Middle School Environmental Literacy Survey (MSELS) and observation. Environmental literacy instruments on aspects of ecological knowledge and cognitive skills in the form of multiple-choice questions totalling 30 questions. Aspects of environmental attitudes in the form of a Likert Scale questionnaire totalling 15 positive statements and 15 negative statements. Aspects of pro-environmental behaviour in the form of a Likert Scale questionnaire totalling 10 statements. The research instrument was then tested for validity and reliability by an expert validator, then continued with data analysis in the form of a prerequisite test, namely the normality test, homogeneity test, and linearity test. Further tests are in the form of regression and correlation tests.

Table 1. Variable Value Category

Value Range	Category
0-60	Low
61-80	Current
81-100	High

Source: (Siregar, 2017)

Table 2. Correlation Coefficient Value Criteria

Coefficient Intervals	Category
0.000-0.1	Very Weak
0.2-0.4	Weak
0.4-0.6	Current
0.6-0.8	Strong
0.8-1.00	Very Strong

Source: (Riduwan, 2003: 228)

3. RESULT AND DISCUSSION

Technology Literacy Students of Class X SMAN 2 Malang

Technology literacy is an important thing in learning in the 21st century (Warsihna, 2016). Ability and literacy in using computers are basic skills needed in learning (Latip, 2020). Technology literacy has six indicators. Indicators of computer use explain that students can operate computers and technology-based productivity tools that routinely apply them in activities. Digital and multimedia product indicators explain that students can use graphic images, videos, sounds, and multimedia features to reinforce learning. Technical indicators clarify that students are able to use technology and its applications proficiently. Design indicators demonstrate that students are able to design multimedia

objects and elements well. The using and selecting indicators explain that students are able to understand and choose the right technology for complex and authentic problems. The legal indicator explains that students are able to understand related laws such as the copyright of a reference (Greenstein, 2012).

The average value of each indicator of technology literacy based on the differences in Social Studies and Language majors are shown in Table 3.

Table 3. Average Value of Technology Literacy Indicators by Major

Major	Technology Literacy Indicator					
	Computer Use	Digital and multimedia products	Technically	Design	Using and selecting	Legal
IPS	92 (High)	90,25 (High)	88 (High)	90,1 (High)	87,7 (High)	87 (High)
Bahasa	95,5 (High)	95,6 (High)	90 (High)	91,5 (High)	91,7 (High)	90 (High)

In Table 3, the indicators for using computers in Social Sciences and Languages major are 92 and 95.5, respectively, classified as the high category. Indicators of digital and multimedia products in Social Sciences and Languages major are 90.25 and 95.6, repectively, classified the high category. Indicator of technical and Language major is 88 and 90 is in the high category. Design indicators for the Social Sciences and Languages major are 90.1 and 91.5, in turn, classified as the high category. The indicators for the using and selecting of Social Sciences and Language majors are 87.7 and 91.7 is in the high category. The legal indicators for Social Sciences and Languages are 87 and 90, in turn, classified as the high category. Based on the data in Table 3, it can be seen that the technology literacy indicator scores of class X students majoring in Social Sciences and Languages at SMAN 2 Malang are included in the high category.

The results of observations on practicing technology literacy can be seen in Figure 1.

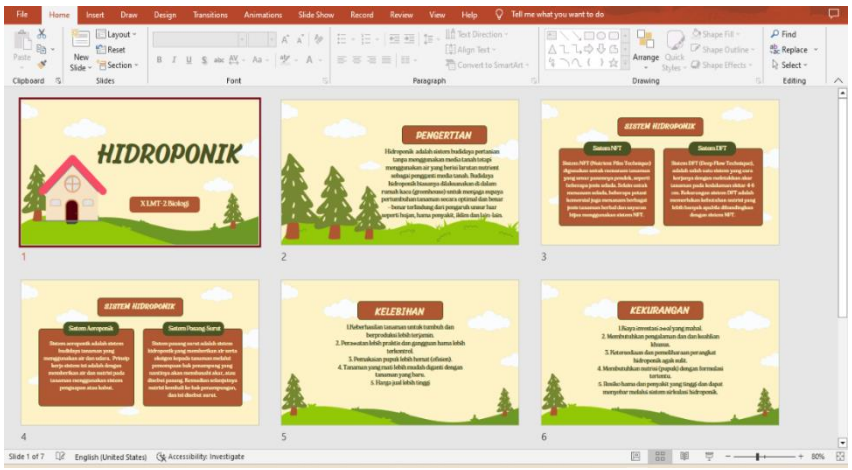


Figure 1. Products in PPt Format

In figure 1, it can be seen that students make the technology products in ppt format, so that, this can train students' technological literacy. Learning carried out by the teacher in the classroom has applied technology a lot, for example, the teacher gives freedom to students to find resources on the internet when completing assignments, the tasks assigned by technology-based teachers like making ppt, posters, to learning videos, and collecting assignments uploaded via electronic platforms. That statement is related with research conducted by (Pratama & Rahman, 2023) which states that technology helps students to have more and broader knowledge with the internet, where knowledge can be accessed free of charge. Technology is also a vehicle for effectively information by teachers to students (Wilson et al., 2020). With good technology literacy, students can associate computer use with the software, use computers proficiently, and solve tasks and problems with technology (Donnelly-Hermosillo et al., 2020).

Communication skills of Class X Students of SMAN 2 Malang

Communication skills are one of the 4C skills of the 21st century (Makiyah *et al.*, 2021). Communication skills are needed for fluency in learning activities (Lagur *et al.*, 2018). Moreover, if the learning process is seen

as a social reaction, good communication efforts are needed to create a learning atmosphere that increases positive relationships between teachers and students as well as students and their peers which in the end will be able to achieve learning goals (Safitri *et al.*, 2022).

Communication skills have six indicators. Indicators of oral communication explain that students can communicate clearly, precisely, and have strong intonation and articulation. Receptive communication indicators: listening, reading, and seeing explain that students are able to distinguish fact and opinion statements, understand and identify the meaning of a sentence. The indicator of understanding the meaning explains that students can clearly interpret the contents of sentences and can draw logical conclusions. The indicator using a communication strategy explains that students can communicate clearly, accurately, and reflectively to the other person. The indicator of communicating clearly for a purpose explains that students are able to understand information and the purpose of the information and the way out. Presentation skills indicators explain that students are able to be calm, adjust the tone and speed of the voice, and be aware of the audience (Greenstein, 2012).

The average value of each indicator of communication skills based on the differences in Social Studies and Language majors are shown in Table 4.

Table 4. Average Value of Communication skills Indicators by Major

Major	**Communication skills Indicator**					
	Oral Communication	Receptive Communication (Listen, Read, and See)	Understand the Meaning	Using a Communication Strategy	Communicating Clearly for a Purpose	Presentation Skills
IPS (Social)	91,1 (High)	90,3 (High)	88 (High)	92 (High)	89,7 (High)	88,8 (High)
Bahasa (Language)	95,8 (High)	95 (High)	91,25 (High)	98,75 (High)	93,75 (High)	90 (High)

In Table 4, the oral communication indicators for the Social Sciences and Languages majors are 91.1 and 95.8, repectively, as the high category. Receptive communication indicators (listening, reading, viewing) for Social Sciences and Language majors are 90.3 and 95, in turn, classified as the high category. The indicators of understanding the intent of the Social Sciences and Languages majors are 88 and 91.25, classified as the high category. The indicator uses a communication strategy of the Social Sciences and Languages are 92 and 98.75, in turn, classified as the high category. The indicator communicates clearly for a goal of the Social Sciences and Language majors are 89.7 and 93.75, respectively, classified as the high category. The indicators for presentation skills in Social Sciences and Languages are 88.8 and 90, in turn, classified as the high category. Based on Table 4, it can be seen that the communication skills indicator scores of class X students majoring in Social Sciences and Languages of SMAN 2 Malang are included in the high category.

The results of observations on practicing communication skills can be seen in Figure 2.

Figure 2. Implementation of Presentation activities by Students

In figure 2, it can be seen that students carry out presentation activities so that students' communication skills are trained. This is due to the learning activities in the classroom that are implemented by many students of SMAN 2 Malang City which support the success of communication skills in students. One example is the

implementation of learning activities with problem solving techniques. This agrees with research (Muhajir *et al.*, 2015) which states that communication skills can be improved through problem-solving activities and group work.

Environmental Literacy Student of Class X Students of SMAN 2 Malang

Environmental literacy is defined as a person's ability to understand the state of the surrounding environment so that the person responds to the environment (Kusumaningrum, 2018). Students who are environmentally literate will care about their surroundings, such as throwing garbage in trash cans, cleaning dirty classrooms, being sensitive to environmental issues, and being active in positive activities with environmental themes (Troy Frensley *et al.*, 2020). Environmental literacy has four aspects. The ecological knowledge aspect has indicators of ecological knowledge. The aspect of cognitive skills has indicators for identifying environmental issues, analyzing environmental issues, and planning environmental actions. The attitude towards the environment has indicators of intention to act, sensitivity to the environment, and feelings towards the environment. Aspects of pro-environmental behaviour have indicators of real commitment to the environment (Mcbeth *et al.*, 2011).

The average value of each environmental literacy indicator based on the differences in social studies and language majors is shown in Table 5.

Table 5. Average Value of Environmental Literacy Indicators by Major

Major	Environmental Literacy Aspects			
	Ecological Knowledge	Cognitive Skills	Environmental Attitude	Pro-environmental Behaviour
IPS	86,5 (High)	86 (High)	87,4 (High)	90,5 (High)
Bahasa	88,75 (High)	87,5 (High)	85,3 (High)	91 (High)

In Table 5, the ecological knowledge aspects of Social Sciences and Languages majors are 86.5 and 88.75, classified in the high category. Aspects of cognitive skills majoring in Social Sciences and Languages are 86 and 87.5, in turn, classified in the high category. Aspect of environmental attitude of social studies and language majors are 87.4 and 85.3, respectively, classified as the high category. Aspects of pro-environmental behaviour of Social Sciences and Languages majors are 90.5 and 9i, in turn, classified the high category.

Relationship between Technology Literacy, Communication Skills, and Environmental Literacy

Technology literacy, collaboration skills, and environmental literacy are part of what is needed in the 21st century to help improving material understanding and develop superior personal characteristics. The results of the analysis of differences in the average values of technology literacy, communication skills, and environmental literacy can be seen in Figure 3.

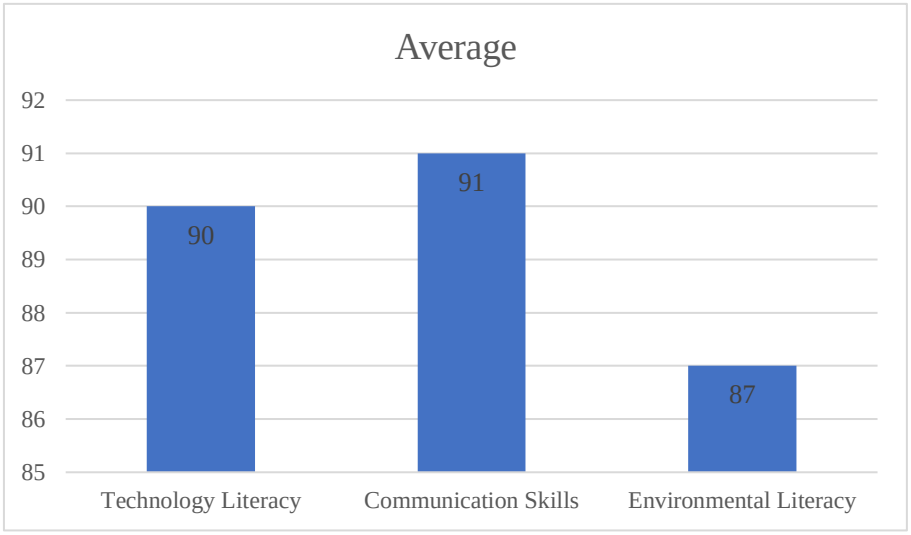


Figure 3. Graph of Differences in Average Values of Technology Literacy, Collaboration Skills, and Environmental Literacy

In the Figure 3, the average of technology literacy, communication skills, and environmental literacy successively is 90, 91, and 87.

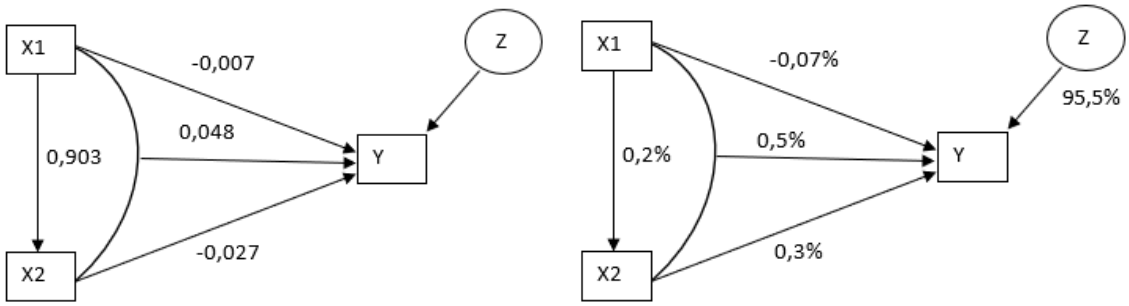
Table 6. Value of Linkages of Technology Literacy, Communication Skills, and Environmental Literacy

Connection	Significance Level	Correlation Coefficient	Effective Contribution	Relative Contribution
X_1Y	0.483	-0.007	-0.07%	-0.33%
X_2Y	0.439	-0.027	0.3%	1.5%
X_1X_2	0.000	0.903	0,2%	1,17%
X_1X_2Y	0.000	0.048	0,5%	2,34%

Based on Table 6, shows that the significance value of the X1Y data is greater than 0.05, which is 0.483, so there is no relationship between X1 and Y. The significance value of the X2Y data is greater than 0.05, which is 0.439, so there is no relationship between X2 and Y. The significance value of X1X2 data is less than 0.05, which is 0.00 so there is a relationship between X1 and X2. The significance value of the X1X2Y data is less than 0.05, which is 0.000 so there is a relationship between X1, X2, and Y. The correlation value and contribution value between X1, X2 and Y can be seen in Figure 4.

(a) (b)

Figure 4. Correlation Values (a) and Relative Contributions (b) Between X1, X2, and Y



Information:
X1 : Technology Literacy
X2 : Communication skills
Y : Environmental Literacy
Z : Another Factor

Based on Figure 4, it can be seen that the correlation coefficient value of X1 to Y is -0.007 which is included in the very low category with an effective contribution value of 0.07%. The correlation coefficient value of X2 to Y is -0.027 included in the very low category with an effective contribution value of 0.3%. The correlation coefficient value of X1 to X2 is 0.903 which is included in the very strong category with an effective contribution value of 0.2%. The correlation coefficient values of X1 and X2 to Y together are 0.048 which is included in the very low category with an effective contribution value of 0.3%. 95.5% is an effective contribution from other factors.

Based on the results of technology literacy, students majoring in language tend to have better technology literacy scores than students majoring in social studies. This is due to the gap in learning achievement between the two majors. According to (Silondae, 2019) states that the factors that influence the achievement gap come from within the student (internal) and from outside the student (external), one of which is the difference in learning motivation between students majoring in Social Sciences and Languages. Lack of learning motivation can cause students to have deficiencies in technology literacy because students tend to be passive (Malini, 2017). This is in accordance with what happened at SMAN 2 Malang, where the learning motivation of students majoring in Languages tends to be higher than that of students majoring in Social Sciences.

The indicators of communication skills of students majoring in language are higher than those majoring in social studies. One of the factors that makes students majoring in languages have a higher score of communication skills than students majoring in social studies is that students majoring in languages are more qualified in communication activities and socializing with other people. Learning materials related to communication received by students majoring in language tend to be more numerous, some examples such as discussions in class, drama assignments, and problem-understanding activities followed by searching for information related to the problems given, so that their communication skills are better trained (Hamia et al., 2021).

The environmental literacy indicator scores for class X students majoring in social studies and language at SMAN 2 Malang is in the high category. This is because SMAN 2 Malang is included in the Adiwiyata School, so education related to the environment has been given by teachers to students. According to (Haske & Wulan, 2015) understanding related to environmental education must be integrated with understanding related to

ecological systems, the concept of conservation, causation by the relationship between attitudes and human behavior towards the environment, as well as fostering responsible behaviour and awareness of the environment among students.

Based on the results of the relationship between variables, the value of environmental literacy categorized as the lowest. The low environmental literacy compared to the other two variables is because environmental literacy instilled in schools is only guided by textbooks or aspects of knowledge. Research (Rokhmah & Fauziah, 2021) states that students lack skills and competence in learning, namely students lack the opportunity to socialize directly with environmental problems around them. So far, learning has mostly been done in the classroom and has only been based on textbooks, and some additional information from teachers regarding environmental issues and problems. Research by (Nasution, 2016) also states that in learning, it is better not only to emphasize aspects of knowledge to be improved, but also thinking, affective and behavioural abilities are also the main benchmarks for the success and effectiveness of environmental education programs in school.

4. CONCLUSION

Based on the research results, the conclusions obtained are: 1) the technology literacy value of class X students of SMAN 2 Malang City has an average of 90 which is included in the high category; 2) the value of the communication skills of class X students of SMAN 2 Malang City has an average of 91 included in the high category; 3) the environmental literacy value of class X students of SMAN 2 Malang City has an average of 87 included in the high category; 4) there is a relationship between technology literacy and environmental literacy with a correlation coefficient of -0.007 which is in the very low category; 5) there is a relationship between communication skills and environmental literacy with a correlation coefficient value of -0.027 which is in the very low category; 6) there is a relationship between technology literacy and communication skills with a correlation coefficient value of 0.903, including in the very strong category; 7) there is a correlation between technology literacy and communication skills together with environmental literacy with a correlation coefficient value of 0.048 which is in the very low category.

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