

# Investigating Capabilities of Science and Information Literacy: A Critical Insight into Prevention Awareness of Corona Virus Disease (COVID-19)

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## ABSTRACT

Science literacy and information literacy is one form of learning outcomes. For this reason, this study aims to look at the effect of these two variables on one's baseness to follow the government's recommendations in order to prevent COVID-19. This research uses a quantitative approach with a survey method. Respondents involved in this study amounted to 80 people consisting of men and women with an age range between 20-50 years scattered in several cities and provinces in Indonesia. The data collection instrument consisted of 30 questions to identify and score the three variables. Data analysis was performed using a two-variable multiple linear regression test with the help of SPSS 25 software. Based on the data and discussion it was concluded that the ability of scientific literacy and information literacy affects self-awareness in the prevention of COVID-19 by 79.7%. The remaining 18.3% is influenced by other factors, such as health literacy. Because it can be said that the level of scientific literacy and information literacy has a strong enough influence on individual self-awareness in following the government's recommendations for the prevention of COVID-19. Because science literacy and information literacy are part of learning outcomes, the government needs to train teachers and other education personnel so that they have good scientific literacy and information literacy abilities, so that in the future they can teach both variables to students through the learning process.

**Keywords:** Science Capabilities, Information Literacy, Prevention Awareness, Corona Virus Disease (COVID-19)

## INTRODUCTION

At the end of 2019 and entering 2020, the world was shocked by the emergence of new diseases caused by a type of virus that became a pandemic. The disease virus is then known as Corona so that it is then known as corona virus diseases 2019 or COVID-19 or 2019-nCoV and becomes a pandemic [1][2]. It is also mentioned that COVID-19 appeared in December 2019 and spread rapidly in several countries [3][4]. The corona virus has actually been known since the 1960s and infects 10% -20% of adults [5][6]. At present the disease has infected around 64 countries in the world [7].

At the beginning of its appearance, COVID-19 was found in Wuhan City, Hubei Province, China which was originally thought to have originated from marine animals and some land animals, because some sufferers worked or visited the area [8]. From that region, it was subsequently declared spread to various countries, so that in January 2020 WHO declared an international emergency based on the level of reporting of cases in various countries [6][7]. This disease becomes something very terrible because it has

the ability to spread very quickly. COVID-19 is capable of being transmitted from person to person [2][5]. Even in Italy which is reported daily in Italy between March 1 and March 11 2020, consistently between 9% and 11% of active infected patients [4][5].

COVID-19 besides infecting humans also infects animals [2][7]. In humans, this disease attacks the respiratory system and cardiovascular, even to death. The general clinical symptoms of people who have been infected will experience a fever that is not productive (dry cough) and breathing problems. In addition, it is also mentioned that the most common symptoms at the beginning of COVID-19 disease are fever, coughing, and fatigue, while other symptoms include phlegm production, headaches, hemoptysis, diarrhea, dyspnoea, and lymphopenia, syndrome acute respiratory disorders, acute heart injuries. Some recent research states that people over the age of 60 are at higher risk than children for COVID-19 [7]. This is reinforced that COVID-19 is more likely to attack parents and children. This disease is considered one of the most terrible diseases. This is because the incubation period of the

COVID-19 virus is relatively very fast ie, around 5.2 days and can cause death ranging from 6 to 41 days with a median of 14 days [4][5].

Based on the news from the mass media and case reports that occurred, then several heads of state or regional heads made the policies by taking steps to prevent the spread of COVID-19 massively. Some of these policies are to conduct social distancing and physical distancing which in essence is to avoid the crowd of people. In addition, there is a suggestion that citizens use soap when washing hands, spray the area with a disinfectant, isolate those who have been infected, and so on [5].

The implementation of policies by the government towards citizens has succeeded in suppressing the growth rate of cases (infected humans), for example in China, the policy of reducing the spread of COVID-19 has been successful up to 90% [6]. In addition, the Italian Government implemented extraordinary measures to limit transmission of the virus including limiting movement in several areas to minimize the possibility of uninfected people making contact with infected people [7].

In Indonesia itself when large-scale social restrictions (PSBB) and work from home are implemented, this applies in Jakarta and several other cities in Indonesia to prevent the spread of COVID-19 [6]. The government's call to implement large-scale social restrictions (PSBB) and work from home was warmly welcomed by the majority of the community by continuing to work from home and maintaining social distance, even they were not willing to carry out worship in congregation (prayer) because they followed the advice of the government and the Indonesian Ulema Council [5] In addition, calls for washing hands and wearing protective masks were also part of the community. Even on his awareness found the case of two people (students) in Makassar isolating themselves from their families and communities for fear of being spreaders of COVID-19 after a vacation from their campus, as well as a lockdown policy discourse to limit the spread of COVID-19 [6].

However, the efforts carried out by the head of state and regional government have not been fully successful. This can be seen from several indications, including; the number of infected people continues to grow, people with special policy areas such as; social distancing, still active as usual. In addition, there are some people who are forced (without self-awareness) to follow government regulations, so that the implementation of the policy seems to be implemented. Some people even even attacked the government by spreading hoaxes through

social media and so on. In addition, COVID-19 positive cases of death were also found, but the family ignored the call of the authorities to stay away from patients, consequently they were categorized as people with supervision (ODP).

Referring to the description above, it can be understood that there are two groups of people in following government recommendations and policies in order to reduce the spread of COVID-19, namely those who follow and those who do not want to follow or follow forcefully. Why this happened? What distinguishes these two groups? Referring to the description above it appears that the causes, symptoms, treatment and prevention of COVID-19 are closely related to science. Even the policies or rules applied by the head of state are also related to science. Therefore the question arises whether scientific literacy and information literacy affect a person's awareness of involvement in the prevention of COVID-19?

## LITERATURE REVIEW

### Towards Scientific Literacy

Based on the definition of scientific literacy, the ability to understand natural phenomena or events that are around in everyday life, scientific literacy is knowledge related to various scientific concepts and processes needed in order to draw personal conclusions, participate in personal benefit or productivity [9][10][11]. The definition of scientific literacy is ability in utilizing scientific knowledge, identifying problems and making data-based conclusions related to natural phenomena or events through real activities [[12][13][14]. In addition, scientific literacy can also be defined as a person's capacity in order to utilize scientific knowledge and skills in terms of identifying various questions and making conclusions based on facts and data on changes that occur as a result of human activity [15][16][17].

Based on the definition of scientific literacy above, it is clear that the COVID-19 phenomenon is one of the scientific phenomena that has spread globally. Various research data have also emerged from experts (researchers). Then why are there still groups of people who tend not to follow the government's recommendations or policies? One of the reasons a person is less concerned and responsive to various developments and problems in the surrounding environment, for example related to natural phenomena or events (including COVID-19) is due to the low level of scientific literacy [18][19][20]. Thus someone is said to be literate about science if they are able to use science, skills and values of science to interact with technology and the social environment including

developments in economic aspects [21][22][23]. Likewise it was with good scientific literacy skills, a person will have a high sense of responsibility, both towards himself and the environment and try to participate in finding and finding various solutions based on known scientific knowledge [24][25][26]. Therefore, do those who do not follow government recommendations and policies are not literate about science? Is there a relationship between scientific literacy and self-awareness to participate in COVID-19 prevention?

The ability of scientific literacy consists of three indicators namely: 1) identifying scientific issues, namely the ability in terms of: a) identifying various issues that can be scientifically researched, b) recognizing and finding various keywords from scientific issues, c) recognize the characteristics of scientific activities; 2) explain scientific phenomena, namely the ability in terms of: a) applying scientific knowledge in existing situations, b) making interpretations and making predictions from a scientific event, c) identifying an explanation or scientific prediction; 3) utilizing scientific evidence, namely the ability in terms of: a) using scientific data to make a conclusion, b) identifying various kinds of evidence and arguments from the conclusions obtained, and c) reflecting on the social implications of a scientific conclusion. If this ability is linked to the phenomenon of COVID-19 then those who are literate about science will be easier to recognize these issues, predict their scientific impact and actively participate in preventing the spread of COVID-19 by following government recommendations and policies.

#### **About Corona virus disease (Covid-19)**

Diseases caused by COVID-19 in addition to being a scientific phenomenon, are also known and understood by someone because of the ability of information literacy. According to information literacy is an ability to think at a high level that is useful in efforts to develop academic abilities and personality [27][28][29]. According to (Wahyuni, 2016) information literacy is a person's ability to know and recognize, assess and use appropriate and effective information, both in the form of electronic, printed and information from various places, organizations and media. Therefore information literacy is one of the most important capabilities. With information literacy capabilities, one can ward off false or untrue news or information or hoaxes [30][31][32].

Based on the definition of information literacy as described above, it is clear that this ability is very important and can influence someone in making

decisions. With a good level of information literacy, someone will be able to recognize and analyze the information, whether the information is true or not and how to apply it. Therefore, individuals with a good level of information literacy, can respond to a variety of correct information related to COVID-19, for example; the cause of the disease, the symptoms experienced by the infected person, the extent of the spread and the procedure of anticipating the spread, then they will make decisions for themselves (even for their families), what they must do and how. In other words, individuals with a good level of information literacy, who have a good awareness, are also involved in this COVID-19 case. Referring to the description above, it can be understood that theoretically individuals who are literate in science and information well will have a tendency and self-awareness to participate actively in the prevention of COVID-19. This awareness arises because he understands the issues that exist as a scientific phenomenon and is related to human life and they obtain information from the mass media.

#### **Understanding of Self-Awareness**

The extent of self-awareness refers to the ability to know and understand his feelings and thoughts about something and use it in decision making [33][34][35]. It is the ability in terms of understanding and accepting and utilizing all of his abilities for a better life in the future [36][37][38]. Self-awareness can also be defined as a person's intelligence in terms of placing himself in certain conditions and situations and his ability to realize what must be done [39][40]. Based on the definition, it can be understood that self-awareness is something that is very important, including one form of intelligence thinking, behaving and acting possessed by humans. Self-awareness includes affective abilities that are supported by cognitive and psychomotor abilities [41][42][43]. The cognitive domain is related to the ability to understand the situation between himself and his environment, while the psychomotor domain is related to the process of making decisions and taking action as a form of self-awareness. Self-awareness is one of the most important aspects of psychology in a person to understand his behavior and social impact [44][45][46].

As explained above that self-awareness is a very important thing and plays a big role in one's life. Self-targeting is an individual's internal capability, but it has an external impact, namely in his social behavior, for example in respecting social relations and compliance in obeying regulations. This is also supported that people who have self-

awareness will be more disciplined and obey the rules [47][48]. Selfishness played a role in controlling and directing all potential (including emotions) to establish social relations in the community [49][50]. Therefore, related to COVID-19, people with good self-awareness will tend to more easily understand social phenomena due to the impact of COVID-19 and are able to put them in the situation appropriately. They will have a good awareness to follow and implement various policies and regulations implemented by the government without any compulsion [51][52]. Related to the description above, namely about the COVID-19 phenomena, scientific literacy, information literacy and self-awareness can be understood as they are thought to be interrelated. Therefore, this study aims to look at how the influence between the ability of scientific literacy, information literacy and self-awareness in following the government's recommendations to prevent the spread of COVID-19. Thus, research is a very important thing as a basis for developing COVID-19 disease prevention programs and the like in the future.

#### METHODOLOGY

This research uses a quantitative approach with a survey method. Survey data were obtained through telephone and whatsapp (WA) networks so that researchers and respondents did not meet each other. As for the sample, there are 80 people aged between 20-50 years old, spread in several cities and provinces in Indonesia. Respondents include F1 (friend / researcher relation) and F2 (person recommended by F1). Thus the respondents in the study were a

combination of people who were known and unknown. The instrument used in the study is in the form of 30 items made in such a way that can be answered with 'yes' or 'no'. This is because the respondents in this study did not distinguish the level of education. All questions were focused on looking at the ability of scientific literacy and information literacy as well as respondent's self-awareness regarding COVID-19 prevention. Each 'yes' answer will get a score of 1 and each 'no' answer will get a score of 0. Therefore, each respondent will get a maximum score of 30 and a minimum score of 0. As mentioned above, this study aims to examine the effect of the scientific literacy variable (X1) and information literacy (X2) on self-awareness (Y) in actively participating in COVID-19 disease prevention. Thus the data analysis was performed using a two-variable multiple linear regression test followed by the T test to see whether the two variables (X1 and X2) partially or jointly influence the Y variable. As for seeing whether the two variables simultaneously affect the variables self-awareness (Y) then the F. test is performed

#### RESULTS AND ANALYSIS

##### Results

Based on data obtained from respondents using instruments that have been developed, data analysis is then performed. The first data analysis is done by classifying the ability level of each respondent based on the score scale obtained, namely in the category of 'high', 'medium' and 'low'. Based on this classification, the data obtained as in Table 1 below:

**Table 1: Science Literacy, Information Literacy and Self Awareness in COVID-19 Prevention**

Aspect	Score	Total	Mean Score	Percentage (%)	Category
Science Literacy	8-10	6	4,5	7,5	High
	4-7	38		47,5	Medium
	0-3	36		45	Low
	Total	80		100	
Information Literacy	8-10	16	5,2	29	High
	4-7	37		46,25	Medium
	0-3	27		33,75	Low
	Total	80		100	
Self-awareness of prevention from COVID-19	8-10	26	5,0	32,5	High
	4-7	23		28,75	Medium
	0-3	31		38,75	Low
	Total	80		100	

Based on Table 1 above, it can be seen that the average score of scientific literacy obtained by the respondent is 4.5. This score indicates that in general the respondent's scientific literacy ability

is in the medium category. This fact is also strengthened by the level of scientific literacy ability which is dominated by the middle category

group at 47.5%, followed by the low ability (45%), and the group with high ability at 7.5%.

As for the information literacy variable, the average score of the variable was 5.2, (higher than the scientific literacy ability), which is the medium category. This fact is also strengthened by the category percentage data, namely the high level achieved by the moderate category as much as 46.25%. Then followed by the low category group that is 33.75% and the group with the high category by 29%.

In addition, based on Table 1 it is also seen that in general self-awareness in following the government's recommendations in the prevention of COVID-19 is in the medium category. This is indicated by the average score of self-esteem in speech and preventing COVID-19 is 5.0 (moderate). However, if seen in Table 1 above it

can be seen that the group with the low category occupies the highest percentage of 38.75% and followed by the high category of 32.5%. The group with moderate level of awareness was 28.75%.

**Correlation of ability of scientific literacy, information literacy on self-awareness in the prevention of COVID-19**

Based on the scores obtained by respondents during the survey, which involved 80 people with different educational and socioeconomic backgrounds. Furthermore the score is analyzed to determine the correlation between variables. As for the results of data analysis with the help of SPSS 25 software, the output model summary is shown in table 2 below:

**Table 2. Model Summary, Correlations between variables**

Model	R	R Square	Adjusted Square	Std. Error of the Estimate
1	.893 <sup>a</sup>	.797	.792	1.159

a. Predictors: (Constant), Information Literacy (X2), Science Literacy (X1)

Based on the test summary model above, it appears that the R square value of 0.797. It shows that the ability of scientific literacy and information literacy affects self-awareness in the prevention of COVID-19 by 79.7%. The remaining 18.3% is influenced by other factors.

Because it can be said that the level of scientific literacy and information literacy has a strong enough influence on individual self-awareness in following the government's recommendations for the prevention of COVID-19.

**Table 3. ANOVA Test Results (Test F) between variables**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	406.570	2	203.285	151.412	.000 <sup>b</sup>
	Residual	103.380	77	1.343		
	Total	509.950	79			

a. Dependent Variable: Awareness COVID-19  
b. Predictors: (Constant), Information Literacy (X2), Science Literacy (X1)

Based on the ANOVA output table above, it can be seen that the sig values are obtained. in the F test is 0,000, which means <0.05. This means that both the scientific literacy and information literacy variables significantly influence the individual's self-awareness in following the government's recommendations for the prevention of COVID-19. In addition, if it is based

on the value of Fcount and Ftable, then the value of Fcount = 151.421, while the Ftable for N = 80 is 3.11. Thus Fcount > Ftable, the hypothesis is accepted, namely that the ability of scientific literacy and information literacy significantly together affect individual self-awareness in following government recommendations for the prevention of COVID-19.

**Table 4. Coefficients Test Results (T Test) between variables**

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	.052	.352		.149	.882
	Science Literacy (X1)	.975	.068	.839	14.387	.000
	Information Literacy (X2)	.113	.064	.103	1.766	.081
<b>a. Dependent Variable: Awareness COVID-19</b>						

Based on the results of the T test above, it appears that, obtained sig. for the effect of scientific literacy on awareness of COVID-19 prevention is 0,000. The value is  $<0.05$ , it means that the ability of scientific literacy affects one's consciousness to actively participate in preventing COVID-19. The value of sig, for information literacy on awareness of COVID-19 prevention is  $0.081 > 0.05$ , which means that information literacy has no effect on awareness in COVID-19 prevention.

Based on the results of data analysis, it can be seen that in general literacy, information literacy and respondent awareness in participating in preventing the spread of COVID-19 are still in the medium category with an average score of 4.5, 5.2 and 5.0. With an average score it means that the ability and awareness of respondents still need to be improved. In addition, based on the average score as well, it is natural that the appeal and advice of the government in the prevention of COVID-19 has not been fully understood and followed by the community.

Based on the opinion that self-awareness is a person's ability to identify process, store information about them and make decisions for them [53][54][55]. One's self-awareness can be seen from attitudes: attention, alertness / awareness, architecture, remembering knowledge and knowledge of oneself [56][57][58]. In essence, self-awareness is the ability of an individual to control and position himself in a situation of helper. Therefore, in the current situation of the spread of COVID-19 disease, a person who has self-awareness will be able to put himself in a safe situation.

From the data in Table 1 obtained information that the average score of self-awareness, especially related to the prevention of the spread of COVID-19 disease is in the moderate category. That means that in general (the respondent) has attention, and awareness of prevention of the disease is still relatively poor. In this situation, of course, they indirectly endanger themselves to be exposed to the COVID-19 virus, because they are not able to position themselves in a safe situation with full awareness. The people with high self-awareness will tend to be more disciplined. Therefore those who appear to lack discipline in the COVID-19 prevention process are also suspected to have relatively low levels of self-awareness.

Self-awareness does not stand alone; there are several factors that influence it. Referring to the correlation test results as Table 1 above (model summary test), it shows that the ability of scientific literacy and information literacy affects self-awareness in the prevention of COVID-19 by 79.7%. Because it can be said that the level of scientific literacy and information literacy has a strong enough influence on individual self-awareness in following the government's recommendations for the prevention of COVID-19. This finding shows that awareness (personal decision) in following government recommendations related to COVID-19 prevention is influenced by his ability or knowledge about scientific phenomena (issues) related to the environment and his ability to analyze information [59][60][61]. This guidance refers to the low ability of scientific literacy as one of the reasons for someone to be less concerned with the situation and problems that occur in their environment, in this case the phenomenon of COVID-19. In addition, the findings in this study are also strengthened by research that scientific literacy affects one's exceptions to the environment [62][63][64].

Referring to the definition of scientific literacy, that is one's ability in terms of knowing and understanding and using various scientific concepts and processes and making it a basis for decision making based on scientific evidence, to participate and produce through human activities [65][66][67] as well as the ability to solve problems in various contexts [68][69][70]. Therefore, in the context of education, scientific literacy is a form of learning outcomes that involves three domains, namely cognitive, affective (attitude) and psychomotor (ability to act). In other words, scientific literacy is the main goal in the education process, mainly science education [71][72]. Therefore, efforts to increase scientific literacy must obtain a large portion by science teachers, especially in Indonesia so that the awareness of every individual in responding to various environmental problems including COVID-19 is increasing [73][74].

In the process of education (learning) increasing the ability of scientific literacy can be done in various ways. Some of these ways, for example through learning that is integrated with real problems in daily life, for example science, technology and society [75][76], through learning

based on local excellence [77][78], through the use of models certain learning models, for example scientific learning [79][80], project based learning [81][82], using the Peer Assisted Learning learning model [81][82], applying discovery learning [83][84], through development of teaching materials and or learning tools [85][86], development of scientific literacy assessment instruments [87][88], the development of learning media based on scientific literacy [89][90], using web-based learning [91][92], developing learning models [93][94], using science literacy oriented student worksheets [95][96]. In addition, the learning process in order to increase scientific literacy can also be done by learning outside the classroom [97][98]. Thus the teacher as the main motor has a very important role in increasing scientific literacy for citizens.

Awareness in COVID-19 prevention as a type of deadly infectious disease in early 2020 is also influenced by information literacy, namely the ability to: find, use and evaluate information and make decisions between these information effectively [99][100]. That means that awareness in the prevention of COVID-19 is influenced by the amount of information a person receives, the origin of information (from being prepared), analyzing the correctness of information (true or false information) and the ability to use it [101][102]. Therefore, people who are still lacking awareness in the prevention of COVID-19 are suspected to be due to the weak capacity of information literacy. This finding is reinforced by previous research that there is an influence between information literacy on community preparedness in facing disasters [103][104].

In this digital era, where most of the information can be accessed through virtual, then in the context of education, information literacy capabilities can be associated with digital literacy or computer devices [105][106]. Thus the increase in information literacy can also be associated with an increase in digital literacy. Increasing digital-information literacy can be done in several ways, namely; developing information literacy guidelines [107][108], integrating information literacy directly in the learning process [109][110], through various training or special education activities [111][112]. As well as increasing the level of public education in general, by increasing the level of education it can also increase information literacy [113][114]. Thus it can be understood that educational institutions have a strategic role in improving the ability of information literacy including in terms of controlling false / hoax news [115][116].

One of the interesting things from this study is that scientific literacy and information literacy

together in influencing respondent awareness in their exceptions prevent the spread of COVID-19 disease as the data in Table 3. However, in table 4 (T test) it is seen that the second influence these variables are different, scientific literacy is more influential than information literacy. This shows that the decision to care about COVID-19 prevention is more determined by scientific literacy than information literacy [117][118]. This also shows that the respondents did not really believe the information they received because there were too many hoax and hoak rumors circulating including information about the disease through various mass media, thus affecting their awareness in COVID 19 prevention.

As the data in table 2 shows that 79.7% of the basic prevention of the spread of COVID-19 is influenced by scientific literacy and information literacy. The remaining 18.3% is influenced by other factors, for example health literacy [119][120]. A person's health literacy has an impact on one's decision making in maintaining his health [121][122]. Because COVID-19 disease is closely related to health, health literacy, of course, is one of the factors associated with awareness of the prevention of the disease. The people who are literate in health will have the skills to stay healthy and be able to maintain a better quality of life [123][124]. Thus, individuals who lack health literacy will tend to ignore or not care about their own health, as those who ignore the government's recommendations in terms of COVID-19 prevention.

Based on the results of this research, it is necessary to increase public awareness in general to be more concerned with scientific issues in the environment through increased scientific literacy and information literacy. With the increase in public awareness of the existing scientific phenomena including COVID-19, various government recommendations for the prevention of dangerous diseases can be more effective and efficient. For this reason, teachers as the main motor in the education and learning process must take these roles and responsibilities wisely [125][126]. The government needs to train teachers and other education staff so that they have good scientific literacy and information literacy abilities, so that in the future they can teach these two variables to students as agents of change and new generation for the nation, because teachers determine the student learning outcomes [126][127]. On the other hand, the government also needs to design an education curriculum based on managing natural disasters including infectious diseases, so that when a country experiences a disaster, citizens are ready

and can work together with the government to overcome it.

## CONCLUSION

Based on the discussion as described above, at the end of this study it can be concluded that the ability of scientific literacy and information literacy affects self-awareness in the prevention of COVID-19 by 79.7%. The remaining 18.3% is influenced by other factors, such as health literacy. Because it can be said that the level of scientific literacy and information literacy has a strong enough influence on individual self-awareness in following the government's recommendations for the prevention of COVID-19. Because scientific literacy and information literacy are part of learning outcomes, the government needs to train teachers and other education personnel so that they have good scientific literacy and information literacy abilities, so that in the future they can teach both variables to students as agents of change and new generation for nation, because the teacher really determines student learning outcomes.

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## Authors' Statement

The author hereby states, that during the writing and publication of the results of this study, the author does not have a conflict of interest, so the results of the study can be used as a reference and further research.

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