

COVID-19 MISINFORMATION: HOW DOES SCIENTIFIC INFORMATION LITERACY PREVENT IT?

Muhammad Retsa Rizaldi Mujayapura¹
Karim Suryadi²
Sardin³

^{1,2,3} Indonesian Education University, Bandung
Email: ¹retsa98@upi.edu
²karimsuryadi@upi.edu
³sardin@upi.edu

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Abstract

This article aims to examine the importance of information literacy and scientific literacy skills to prevent exposure to misinformation in the midst of the Covid-19 pandemic. Believing in misinformation encourages behaviour that is detrimental to individuals and groups due to anxiety, fear, uncertainty, and a lack of critical thinking skills. This study uses a qualitative approach with a systematic literature review (SLR) method. Through the SLR method, this article uses various sources of empirical research by collecting data and information to analyze elements in information

literacy and scientific literacy that can identify misinformation. Information literacy is considered to be more useful in preventing belief in misinformation compared to the concepts of digital literacy, media literacy, and news literacy. Information literacy skills with information verification, and supported by scientific literacy with intellectual virtue, can recognize misinformation about COVID-19 so that it can prevent individuals from believing in misinformation that can result in errors of action. Scientific information literacy needs practical intervention to the public, one of which is through the role of educational institutions.

Keywords: COVID-19 Misinformation, Information Literacy, Scientific Literacy

Abstrak

Artikel ini bertujuan untuk mengkaji pentingnya keterampilan literasi informasi dan literasi saintifik guna mencegah terpaan misinformasi di tengah pandemi Covid-19. Mempercayai misinformasi mendorong perilaku yang merugikan individu maupun kelompok karena kecemasan, ketakutan, ketidakpastian, dan kurangnya kemampuan berpikir kritis. Penelitian ini menggunakan pendekatan kualitatif dengan metode systematic literature review (SLR). Melalui metode SLR, artikel ini menggunakan berbagai sumber penelitian empiris dengan mengumpulkan data dan informasi untuk menganalisis unsur-unsur dalam literasi informasi dan literasi saintifik yang dapat mengenali misinformasi. Literasi informasi dinilai lebih bermanfaat

dalam mencegah mempercayai misinformasi dibandingkan dengan konsep literasi digital, literasi media, maupun literasi berita. Kemampuan literasi informasi dengan verifikasi informasi, serta ditunjang dengan literasi saintifik dengan kebajikan intelektual dapat mengenali misinformasi seputar COVID-19 sehingga dapat mencegah individu untuk mempercayai kesalahan informasi yang dapat berakibat pada kesalahan bertindak. Literasi informasi saintifik perlu diintervensi secara praktis kepada publik, salah satunya melalui peran institusi pendidikan.

Kata Kunci: *Misinformasi COVID-19, Literasi Informasi, Literasi Saintifik*

Introduction

Since March 2020, the Indonesian government has announced the first cases of coronavirus or COVID-19. Until this article was written, the disease that has been designated by the World Health Organization (WHO) as a pandemic is still a common enemy. Not only busy grappling with handling pandemics, the current era of information sharing also presents more difficult challenges in dealing with the COVID-19 pandemic. Information about COVID-19 is scattered on social media

in the form of news, social media broadcasts, and opinions of public officials or celebrities.

The high level of information exchange during this pandemic is adorned by information that does not match the real information. This condition known as misinformation is spread on social media and trusted by the public so that the real information is ignored. Regarding misinformation about COVID-19, research by Nasir, et al. (2020) convey a variety of misinformation that is believed by some of the Indonesian public. As many as 13.2% believe that COVID-19 cannot survive in Indonesia's climate, 27.7% believe that COVID-19 is a biological weapon that was deliberately created by another country, and 19.6% believe that the COVID-19 virus can be killed through gargling with salt water. Much of the misinformation surrounding COVID-19 takes the form of conspiracy theories. Shabsavari research (2020) noted the four main conspiracy theories circulating on social media, namely the issue of the virus being deliberately released from a laboratory in China, the issue of not being dangerous to COVID-19 and only engineering

by the global elite, the COVID-19 virus being spread through the 5G internet network, as well as the assumption of covert operations done by Bill Gates during the pandemic.

Believing that the misinformation surrounding COVID-19 has a significant social impact on handling the pandemic. Moreover, in the era of sharing information through sharing on social media, misinformation spreads to the public more quickly. Mistaken beliefs in the Covid-19 pandemic can pollute the information environment, spread confusion and spoil the true news (Carlson, 2018), reduce the effectiveness of public health campaigns (Georgiou et al., 2020), ignoring healthy behavior and encouraging wrong activities (Freckelton QC, 2020; Tasnim et al., 2020), thus creating an anti-science attitude and destroying trust in public institutions (Mancosu et al., 2017).

Believing the misinformation that has emerged around COVID-19 shows the public's concern about the pandemic conditions that have a major impact on the lives of every individual. Anxiety, fear, uncertainty, and

feelings of helplessness drive individuals to believe misinformation (Carlson, 2018; Cassese et al., 2020; Freckelton QC, 2020; Laato et al., 2020; Miller, 2020; van Prooijen, 2017). Outside the pandemic conditions that raise concerns, trusting misinformation is also supported by a lack of knowledge, analytical thinking (Bali & Musrifah, 2020), and laziness to verify the information received (Bronstein et al., 2019; Sallam et al., 2020).

The presence of misinformation that encourages people's attitudes to ignore this pandemic is a big concern. Requires an alternative discourse on information that the public already believes. The counter-discourse that can be done in dealing with conditions like this is through strong arguments with personal attractiveness, moral convictions (Bali & Ruzifah, 2021), depicting neutral voices and strengthening education (Montgomery, 2017; Rider & Peters, 2018).

Various studies have noted the importance of verification, information processing, and intellectual virtue in identifying information. The ability to verify and think critically in processing information is considered

useful in identifying information (Bali, 2017) which is referred to as information literacy (Chen et al., 2015; Jones-Jang et al., 2021; Khan & Idris, 2019). Meanwhile, intellectual virtue is also needed in processing the information received in order to promote scientific thinking (Rozi et al., 2020), where this is called scientific literacy (Dragoş & Mih, 2015; Sharon & Tsabari, 2020).

Therefore, this paper aims to conduct literature studies to obtain answers in preventing the bad effects of COVID-19 misinformation so that it can contribute to accelerating the handling of the COVID-19 pandemic or for preventing various misinformation in the future.

Method

This research focuses on the ability of scientific information literacy to prevent the belief in misinformation around COVID-19. To get answers to these problems, researchers will identify a variety of literature that shows the ability of scientific information literacy to prevent misinformation of COVID-19. Therefore, the research was conducted through a

qualitative approach with the Systematic Literature Review (SLR) method.

The SLR method is considered appropriate to answer this problem because misinformation is not something new, so it needs a literature review of the work that has been done by researchers who have conducted similar studies. This is basically an important element for increasing the knowledge that must be built on the existing work (Xiao & Watson, 2019). Thus, the source of the data obtained in this study is empirical research obtained from various books, indexed international journals, and proceedings related to information literacy, scientific literacy, and misinformation about COVID-19.

Data collection and analysis was followed by following the SLR procedure. There are 8 general steps in SLR collection and analysis, namely: (1) formulating the research problem; (2) developing and validating the review protocol; (3) searching the literature; (4) screening for inclusion; (5) assessing quality; (6) extracting data; (7) analyzing and synthesizing data; and (8) reporting the findings (Xiao & Watson, 2019). Data searches are carried

out digitally through Google Scholar and perform backward searches by digging references from articles that have been found previously. The suitability of literature is obtained from the use of keywords in search. After the articles are collected, the researcher then performs screen inclusion and assessing quality by assessing the relevance of the article to the problem to be studied from the research design and method, assessing the content of the article from the research abstract, and adjusting the unit of analysis. Furthermore, data analysis and synthesis were carried out prior to coding and categorizing the articles according to the subject matter and the study unit being carried out. Thus, analysis and synthesis are arranged systematically.

Results and Discussion

Misinformation and the Age of Information Sharing

Truth presents objective facts about events in the world. Truth has its own level to what extent truth is in an absolute level. Truth in the modern era is described in the general picture of modernism which is positivistic,

technocentric, and rationalistic (Bali & Hajriyah, 2020). Thus, modernity puts forward the roles of rational and objective scientific thought so that modern life excludes the role of religion and developing mythologies. This secular view becomes the scientific world view of truth.

Globalization opens up access to space for all citizens of the world to interact and exchange information, which creates an information society. Through the advancement of social media, all citizens of the world can become consumers, producers and distributors of information. As a result, currently available information is not only conveyed by credible media with guaranteed accuracy, not only published by journals by researchers whose validity and scientific validity has been tested, but also disrupted by information from various directions. Finally, the information obtained is increasingly diverse and not a little contradicting each other, resulting in information bias that leads to public opinion.

This condition is a real condition that we are currently in the post-truth era. The post-truth era, which signifies the defeat of objective truth by the exploitation of

emotions and narrow personal beliefs (Lumowa, 2019). Thus, in this case emotions and personal beliefs dominate the perceptions of public opinion, not the truth anymore. Truth in the post-truth era is defeated by irrelevance (McIntyre, 2018).

Social media facilitates the continued democratization of public space. This condition encourages the devaluation of the truth by paving the way for the emergence of radical post-truth movements such as lies, obscurantism, and extremism through political rhetoric by echoing empty discourses (Jatmiko, 2019). The echo chamber in social media directs public attention in an instrumental or behaviorist way by manipulating through fake news to convince the will of the discourse that is echoed (Sismondo, 2017). The elite are the beneficiaries in the discourse battle against the public by leading public opinion. Post-truth leads public opinion against lies by touching public feelings (Ulya, 2018). Thus, the truth at this time seems obscure and pseudo defeated by public assumptions that roam social media as a form of democratization of public space. Public sensitivity seems

to be used as a tool to lead discourse so that the contestation of empty discourses in the post-truth era cannot be separated from identity politics and religiosity.

Misinformation is defined as the spread of incorrect information whether factually or by scientific consensus. Misinformation is broadly defined as information that is not true, maybe accidentally, and is conceptualized as believing as something contrary to fact (Scheufele & Krause, 2019). COVID-19 misinformation is misinformation of science and health, where misinformation of science and health is information about certain phenomena that is not in accordance with the consensus of the epistemic of the scientific community (Swire-Thompson & Lazer, 2019). However, not all misinformation that is disseminated is always intended to be misleading (Lewandowsky et al., 2012).

Through various claims and narratives, misinformation spreads rapidly, causing uproar as various types of hoaxes circulate. Misinformation spreads further, wider, and deeper than real information (Swire-Thompson & Lazer, 2019). The characteristics of

misinformation include reconfigured information (misleading content, false context, and manipulated content), deliberately created (fabricated content and imposter content), as well as satirical or parody content. (Brennen et al., 2020). These characteristics categorize misinformation as a type of hoax according to Rahadi (Ulya, 2018) in the form of fake news, clickbait, confirmation bias, misinformation, satire, post-truth, and propaganda.

The popularity of misinformation is driven by the role of public figures and media narratives as sources and distributors of misinformation. Sources of misinformation include rumors and fiction, government and politicians, personal interests, and the media (Lewandowsky et al., 2012). Politicians, celebrities and other public figures play a big role in spreading misinformation (Brennen et al., 2020). Media broadcasts and social media accounts that have a large following drive the popularity of information, including misinformation, so it is important for individuals who have a big influence on social media to have responsibility for the information that is

disseminated (Swire-Thompson & Lazer, 2019). Misinformation in the post-truth era is designed as a force to divert attention from strategic actions and policies (Lewandowsky et al., 2017).

Apart from the role of the media, politicians, and public figures in the spread of misinformation, the culture of family communication also has its own role. In the field of cognition of the political system in adolescents in Indonesia, for example, the culture of family communication in the form of the ways in which adolescents select a variety of media, political talks that take place in the family, and the ways in which families influence information significantly influence about 40% of changes in adolescent cognitive responses about input function, convention process, output, and capabilities of the political system in Indonesia (Wahid et al., 2020). Thus, the family has a role in instilling an ideological framework and values in adolescents that are obtained from mass media information. In relation to this misinformation, the spread of misinformation will be wider with the role of one family member who believes in

the misinformation so that it is implanted in other family members.

Information Literacy and Scientific Literacy

Media and technology information skills are one of the demands of an increasingly dynamic 21st century society. These skills can be passed through critical thinking skills (Muali et al., 2018). Various information that is easily accessible at this time, accompanied by the rapid development of social media, provide a space for information exchange and discussion in the public through digital media. This condition is a breath of fresh air for the democratic climate of a country, especially the freedom of expression is guaranteed by law. However, the increasing democratic climate of a country does not guarantee the quality of information and dialectics. The quality of democracy depends on an informed citizenry (Mason et al., 2018).

The 2005 Alexandria Proclamation which was later adopted by UNESCO's Information for All Program (IFAP) (Catts and Lau, 2008) revealed the definition of

information literacy on a person's ability to recognize information needs, find and evaluate the quality of information, store and retrieve information, use information effectively and ethically, and use information to communicate knowledge. In connection with the distribution of health misinformation that has led to hoaxes.

Meanwhile, scientific literacy skills are needed by every citizen to be able to think rationally about science in relation to personal, social, economic, political and other problems encountered in people's lives (Hurd, 1998). Scientific literacy skills guide the use of data and evidence in evaluating the quality of information and arguments presented by scientists or the mass media (Dragoş & Mih, 2015). Pella, et al. (Laugksch, 2000) shows someone who is scientifically literate is those who have an understanding of the relationship between science and society, the ethics of scientists, the nature of science, the differences between science and technology, the basic concepts of science, and the relationship between science and the humanities.

Scientific literacy is divided into four categories, the first three categories were introduced by Shen and the fourth category added by Trefil (Dragoş & Mih, 2015) as follows: (1) Scientific and Cultural Literacy, understanding science with cultural education; (2) Citizenship Scientific Literacy, an understanding of the knowledge a person needs to make informed decisions relating to laws and public policies; (3) Scientific Literacy Practice, scientific knowledge needed to solve practical problems; and (4) Aesthetic Literacy and Consumer Science, an understanding of laws and scientific phenomena to give appreciation to life through the intellectual beauty of scientific ideas.

Individuals who are scientifically literate according to Hurd (Hurd, 1998) is an individual who has the following skills: (1) Distinguishing information from experts; (2) Distinguishing between theory and dogma, and data generated from myths from folk tales; (3) Understanding that science in a social context often has dimensions in political, ethical, and moral interpretations; (4) Experience how scientific research is conducted and

how to validate findings; (5) Using science in life and when making social decisions, forming judgments, solving problems, and taking action; (6) Distinguishing science from pseudo-science such as astrology, witchcraft, occultism, and suffering; (7) Acknowledging the cumulative nature of science as "the border without end"; (8) Recognizing scientific research as a producer of knowledge used by society; (9) Recognizing gaps, risks, limits and probabilities in making decisions involving scientific knowledge; (10) Knowing how to analyze and process information to produce knowledge that goes beyond facts; (11) Recognizing that the concepts of science, law, and theory are always growing and developing; (12) Knowing that individual and social science can have more than one correct answer; (13) Understanding the importance of research for self-interest as a product of a scientist's curiosity; (14) Recognizing that the current global economy is influenced by advances in science and technology; (15) Recognizing when cultural, ethical, and moral issues are involved in solving social science problems; (16) Distinguishing evidence from

propaganda, fact from fiction, nonsense, and knowledge from opinion; (17) Considering social science problems and individual citizenship requires a synthesis of knowledge from various fields; (18) Acknowledging that science is always developing; (19) Recognizing that scientific literacy is obtaining analyzing, synthesizing, coding, evaluating, and making use of achievements in science and technology to humans and the social environment; (20) Recognizing the mutually beneficial relationship between science and technology and between science, technology and human affairs; (21) Recognizing the reality of the way science serves human adaptive capacities; (22) Recognizing that social science problems are solved collaboratively; (23) Recognizing that the solutions of social science can lead to new problems in the future; and (24) Acknowledging that short-term and long-term solutions to a problem may not have the same answer.

Scientific Information Literacy as Covid-19 Misinformation Protection

Social media users are very likely to be trapped in the vortex of misinformation either through social media algorithm systems or biased information received in cyberspace. The dissemination of misinformation content is driven by social homogeneity resulting in the formation of a homogeneously polarized 'echo space' (Del Vicario et al., 2015). This polarized echo chamber encourages one to believe in fake news.

Regarding the echo chamber, identity and ideological references encourage someone to believe in fake news. People who consume news from the media tend to trust articles that are in line with their ideology (Allcott & Gentzkow, 2017). In America, supporters of Republicans and Democrats are more likely to trust the news about the values that suit their group and the values that eat away at other groups (Pereira & Van Bavel, 2019). As a result, Republican supporters believe more in conspiracy and fake news because party elites influence their views on the media (Uscinski et al., 2016). However,

another view states that belief in fake news is not driven by biased information, but is caused by laziness to think (Pennycook & Rand, 2019a). Not only ideological factors and media bias, laziness to think is the cause of someone to believe in misinformation.

Hoaxes that provide information by involving a person's emotional feelings cause less analytical thinking in response to information. Imaginary, dogmatic, and religious fundamentalist ideas believe more in fake news because of the less incentive to be open-minded and analyze (Bronstein et al., 2019). The ability to think critically and argue is neglected because the emotional response that causes the message is spread to other parties (Ilahi, 2019). Belief in fake news is driven by a tendency to take weak claims for granted (Pennycook & Rand, 2019b).

In addition, the lack of critical thinking skills in processing information is driven by social crises and individuals over their concerns about social conditions. Feelings of anxiety, paranoia, and feelings of helplessness expressed through conspiracy theories to attract individual attention (Green & Douglas, 2018; Uscinski,

Klofstad, & Atkinson, 2016). In addition, anxiety and insecurity caused by negative responses to the government have led to conspiracy assumptions (Georgiou et al., 2020; Madalina, 2015).

As a part of misinformation, conspiracy theories present alternative answers by making subjective and assumptive claims that are easy to accept and sound plausible. Conspiracy theories offer a way of negotiating the global divide between everyday and structural life (Johnson-Schlee, 2019). Those who believe in conspiracy theories view complex social phenomena deliberately designed collectively by powerful actors (Mancosu et al., 2017). The ease with which a person believes in conspiracies is also driven by individual anxiety and fear of world conditions. Feelings of anxiety, paranoia, and feelings of helplessness expressed through conspiracy theories to attract individual attention (Green & Douglas, 2018; Uscinski, Klofstad, & Atkinson, 2016). In addition, anxiety and insecurity caused by negative responses to the government have led to conspiracy assumptions (Georgiou et al., 2020; Madalina, 2015).

Seeing the factors that cause the condition to believe in misinformation, the ability to think critically and skeptically is needed in every information received. This ability can be obtained through literacy. According to Newman, et al. (Vraga et al., 2020), literacy skills are important as a way to use social media to process news and information. Various types of literacy can help improve the ability to use the internet properly, such as media literacy, news literacy, digital literacy, and information literacy. However, information literacy is considered more useful in helping identify fake news (Jones-Jang et al., 2021). Information literacy skills are more useful in using social media than basic internet skills (Khan & Idris, 2019).

The first step in dealing with fake news and the spread of misinformation is to identify misinformation (Khan & Idris, 2019). With a focus on the ability to navigate and find verifiable information online, information literacy significantly influences the identification of fake news than media literacy, news literacy, and digital literacy because the point of view of

navigating and finding information with efficiency is considered more relevant (Jones-Jang et al., 2021). Skills in identifying information needs, finding, using and evaluating information, and respecting copyright melam communicating information on information literacy are deemed necessary for every adult society (Catts and Lau, 2008).

In connection with the misinformation that has occurred around COVID-19, the talk around this pandemic is nothing more than talk about health issues. Brennen, et al. (2020) noted the proportion of types of misinformation claims around COVID-19 as follows:

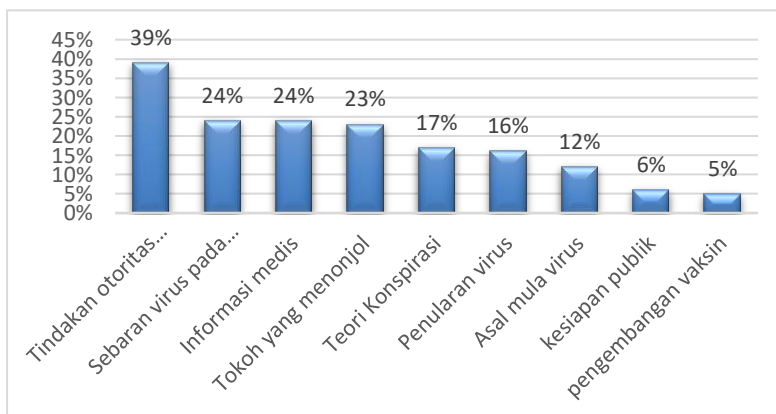


Figure 1. Proportion of Types of Misinformation Claims Around COVID-19 (Brennen et al., 2020)

Of the nine types, there are only two types of misinformation claims that are not related to scientific information. Meanwhile, the rest is information on the distribution of viruses, medical information, information from public figures, conspiracy theories, virus transmission, the origin of the virus, and vaccine development which contains scientific information. This condition shows that currently the public is receiving a lot of scientific information about the COVID-19 pandemic so it is important for recipients of information to understand information with a scientific mindset through scientific literacy. Scientific literacy can bring intellectual virtue to being open to information (Sharon & Tsabari, 2020).

Conclusion

The involvement of information literacy and scientific literacy is needed in recognizing misinformation around COVID-19. Information literacy is useful for first emphasizing attitudes towards information verification, while scientific literacy plays a role in providing intellectual virtues and forming an open and scientific

mindset. The two of them must integrate with each other considering the typical misinformation surrounding COVID-19 currently related to scientific health information. Behind the important role of individuals in dealing with misinformation through verification of information and intellectual virtues, information literacy and scientific literacy need to be intervened practically by the public, one of which is through the role of educational institutions.

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