

Research Article

Mitigating Environmental Disasters Through Virtual Psychoeducation: The Urgency of Public Communication During COVID-19

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Abstract.

The COVID-19 pandemic, which rapidly spread across Indonesia and the world, caused widespread concern and disrupted nearly all aspects of life, not just public health. In response, the Indonesian government introduced several measures, including lockdowns, physical and social distancing, and work-from-home policies. President Joko Widodo eventually pushed for the expansion and enforcement of *Pembatasan Sosial Berskala Besar* (PSBB) which sparked debate due to their impact on daily routines and social interaction. Social distancing challenged traditional modes of communication and socialization. Effective social interaction plays a crucial role in maintaining community well-being, particularly during crises. Yet, public communication from the government during the pandemic was often seen as inconsistent and overly optimistic, leading to confusion and reduced trust. This study highlights the urgent need for more coherent and adaptive communication strategies, especially those aligned with the digital landscape of the Industry 4.0 era.

Keywords: environmental disasters, mitigating, public communication, virtual psychoeducation

1. Introduction

The environmental crisis has emerged as a significant threat to human life, particularly during the global COVID-19 pandemic. The combination of natural disasters and a global health crisis has created complex challenges in public communication and community education (1)–(8). Social restrictions limiting physical interaction have driven a shift in methods of information dissemination and education toward virtual platforms, including in the context of environmental disaster mitigation (9)–(11).

Virtual psychoeducation has emerged as an innovative solution to bridge the communication gap between governments and communities during dual emergencies. This

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approach not only facilitates widespread and efficient information dissemination but also provides the psychological support communities need to cope with the uncertainty and anxiety caused by environmental disasters during the pandemic.

The importance of effective public communication during the COVID-19 pandemic has become increasingly apparent, especially with the rising frequency of environmental disasters in various regions. Data indicate that a lack of community preparedness for disasters increases the risk of both material and non-material losses. Furthermore, limited understanding and preparedness for environmental disasters exacerbate their impacts.

Previous studies have demonstrated that psychoeducation effectively enhances community resilience to disasters. However, adapting this approach to a virtual format during the COVID-19 pandemic presents new challenges and dynamics that require further investigation. Understanding the effectiveness, barriers, and opportunities of virtual psychoeducation in the context of environmental disaster mitigation is crucial for developing improved public communication strategies in the future.

This article aims to evaluate the application of virtual psychoeducation as a tool for environmental disaster mitigation during the COVID-19 pandemic, highlighting the urgency and effectiveness of public communication in dual-crisis situations. This study seeks to provide a comprehensive understanding of the strategic role of virtual psychoeducation in enhancing community preparedness and resilience to environmental disasters in the new normal era.

2. Research Methodology

This study is a literature review research (12)–(17). A literature review involves all efforts undertaken by researchers to obtain and compile all written information relevant to the problem being studied. There are several characteristics essential for conducting an effective literature review, namely: a) analyzing methodologies and synthesizing high-quality literature, b) providing a strong foundation for selecting the research topic, c) offering a solid basis for choosing the research methodology, and d) demonstrating that the intended research contributes new information, advances knowledge, or enhances the knowledge base in the field of study.

3. Research Result and Discussion

3.1. Covid-19 Pandemic

The coronavirus is a group of viruses capable of causing diseases in animals or humans. Several types of coronaviruses are known to cause respiratory infections in humans, ranging from mild symptoms such as coughs and colds to more severe conditions, such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). This novel type of coronavirus was recently identified as the causative agent of Coronavirus Disease 2019 (COVID-19), which is highly transmissible and more lethal. Both the virus and the disease it causes were unknown prior to the outbreak in Wuhan, China, in December 2019. COVID-19 has since developed into a pandemic, affecting numerous countries and spreading globally.

The Indonesian government has been implementing measures to minimize the number of individuals infected by the coronavirus. Initially, the government was reluctant to disclose information about the virus entering Indonesia, aiming to avoid public panic and the spread of unverified rumors. On Thursday, March 19, 2020, as reported by DetikNews, the government spokesperson for COVID-19 response, Achmad Yuriyanto, announced that efforts were underway to conduct mass testing for the coronavirus and emphasized the need for PCR testing. Yuriyanto also officially reported on the progress of COVID-19 cases, stating that as of Thursday, March 19, 2020, research conducted by the World Health Organization (WHO) and virology experts worldwide had yet to reach a global standard for definitive treatment protocols for COVID-19.

In response to the evolving situation, the government introduced a policy as an initial measure in the form of social distancing recommendations [18]–[20]. The government fully understands that coronavirus transmission occurs through droplets—tiny mucus particles expelled from the respiratory tract of an infected person during coughing or sneezing. Therefore, the government has advised anyone experiencing coughing or influenza symptoms to wear masks to limit the spread of droplets. Social distancing measures, including maintaining physical distance between individuals, are also recommended to reduce the likelihood of transmission.

Coronavirus testing can be conducted using various methods, depending on their sensitivity. Molecular testing, such as PCR, and immunoglobulin testing are among the approaches used for initial screening, which can be implemented on a large scale. The

goal is to quickly identify individuals who test positive for the virus, enabling timely isolation measures to prevent further spread.

3.2. Lockdown as an Alternative Policy in Indonesia

The lockdown measures became a policy of the Governor of DKI Jakarta based on Regulation No. 5 of 2020 concerning the Temporary Suspension of Religious and Worship Activities in Places of Worship to Prevent the Spread of the Coronavirus Disease (COVID-19). In this decree, the government communicated the suspension of religious worship activities and other religious events that gather large numbers of people, which were held in mosques, churches, temples, pagodas, and other places of worship, including Friday prayers, services, Sunday masses, study groups, religious celebrations, and others. To address this, guidelines were prepared and distributed to worship organizers for conducting worship at home as a substitute for the suspended activities (21)–(23).

Regarding the lockdown policy, it has actually been regulated in Law No. 6 of 2018 on Health Quarantine. Quarantine refers to the restriction of activities or the separation of individuals exposed to contagious diseases as defined in the relevant legislation, even if they show no symptoms or are in the incubation period, or the separation of containers, vehicles, or goods suspected of being contaminated by pathogens or other sources of contamination to prevent the potential spread to people or goods nearby.

The government's efforts to anticipate the development of the coronavirus have caused considerable concern among the public. People are not only worried about contracting the virus but also about the regional government policies imposing lockdowns in certain areas. This obviously complicates people's activities and mobility, even though it is being implemented despite the significant risks in order to stop the virus's spread. The lockdown is essentially an extension of social distancing, applied to specific regions or territories. If a region is in lockdown, it means that entry and exit points for residents are closed. It is no surprise that in some news reports, the lockdown policy has become a topic of consideration for local officials, based on budget readiness and the social impacts that arise.

It is undoubtedly difficult to implement a lockdown policy for a global social community today because humans never stop moving and migrating from one place to another. Therefore, the success of implementing this policy requires the involvement of stakeholders in a democratic and participatory manner. Stakeholders and policymakers

must continuously engage in dialogue to analyze the consequences of implementing the policy. Policy implementation evaluation is necessary to assess accountability and improve the performance of public policies. Helmut Wollman's model outlines three main types of policy evaluation: ex-ante evaluation, ongoing evaluation, and ex-post evaluation. The lockdown must be adapted to the conditions and characteristics of the community in each area, considering social characteristics, preparedness of handling methods, logistical readiness, and many other factors.

3.3. The Erosion of Social Interaction Amid the COVID-19 Pandemic

Current Situation as of July 26, 2020 the number of confirmed COVID-19 cases in Indonesia has significantly increased, with 97,286 reported positive cases. Of these, 55,354 have recovered, and 4,714 have passed away. To curb the spread of the virus, the government implemented social distancing, which involves limiting social activities or specific activities within a certain area. The goal is to prevent the widespread transmission of COVID-19 and reduce the number of people affected. In addition to social distancing, the government has also asked people to reduce social interactions by staying at home and limiting the use of public transportation.

The impact of implementing social distancing or physical distancing is the fading of social interactions. Social interactions in Indonesia have traditionally been characterized by warmth, politeness, nobility, mutual cooperation, smiles, and helping each other. This is difficult to find today, even though it is a social asset not found in all countries. According to Lyda Judson Hanifan, this is a real asset in social life. Social interactions built on goodwill, fellowship, sympathy, and beneficial social relationships create mutual trust and cooperation. The fading of social interaction, according to Coleman, is caused by the loss of the medium for social interaction. Students no longer have opportunities to interact with peers or teachers. In mosques, people no longer gather for Friday prayers or congregational prayers. Family members can no longer share happiness during weddings due to restrictions. The "work from home" policy has severed social interactions among employees, and the closure of tourist sites has limited people from relaxing.

This situation would become even more challenging if a lockdown is enforced, as it would further diminish social interaction and eliminate social cohesion. According to Burt, social cohesion is a strength and social capital, not only as social power but also

as economic power. Social capital, according to Fukuyama, is a set of values or informal norms shared by members of a group, enabling cooperation among them. However, in such a situation, the presence of social distancing or physical distancing causes these values to fade. Over time, social distancing will deconstruct trust, mutual understanding, and shared values that bind and strengthen society. In such difficult times, according to Hasbullah, it is challenging for communities to cooperate due to the diminishing social interaction among members.

3.4. Implementation of Public Risk Communication Amid the COVID-19 Pandemic

Humans are social beings who need touch and interaction. Therefore, it is understandable that when vigilance and social distancing guidelines are extended in various places, many people seek opportunities to socialize with their loved ones. The purpose of socialization during a pandemic like this is to encourage the public to remain calm while staying alert to the spread of the coronavirus, ensuring that social concern does not diminish due to individualistic attitudes aimed at avoiding the virus, and to reinforce the idea that togetherness will unite society in collectively addressing the challenges posed by the coronavirus.

The People's Consultative Assembly of the Republic of Indonesia (MPR RI) has a socialization program for the Four Pillars of the MPR in accordance with its constitutional duties and authority. The Four Pillars' socialization consists of four foundations for community, national, and state life, which include the ideology, constitution, unity and integrity, and the spirit of diversity as social capital to build the strength of the Indonesian nation. The MPR continues to ground these pillars through the socialization of Pancasila, the 1945 Constitution, the Unitary State of the Republic of Indonesia (NKRI), and Bhineka Tunggal Ika.

The application of risk communication that combines speed and accuracy is crucial in preventing the spread of the coronavirus. The social and economic impacts of the dissemination of incorrect information can be more severe than the spread of the virus itself, so it is essential to manage the chaos and the information circulating in society to prevent it from becoming a new disaster. According to Arif, the government, research institutions, and relevant authorities must be able to communicate risks based on science to build public trust. The goal is to enable the public to be more prepared and reduce the impacts caused by the coronavirus (24), (25).

In crisis communication management, there are four stages: prodromal, acute, chronic, and resolution. The prodromal stage begins when signs of a crisis appear. The acute stage occurs when the crisis is announced, which is the shortest stage. The chronic stage lasts throughout the crisis. The resolution stage occurs when the crisis subsides. In all four stages, the five key elements of effective media communication must be met to ensure effective communication during the COVID-19 pandemic.

3.5. Online Technology as Pro-Environmental Psychoeducation during the Covid-19 Pandemic

The lack of opportunities for normal interaction has created a new gap in the need for and dependence on technology during the COVID-19 pandemic. Technological advancements offer numerous benefits for everyday human life, especially with the development of information technology, which plays a critical role in education, industry, healthcare, and various other businesses. The use of technology not only creates new experiences but also opens up opportunities for growth and fosters innovation.

Mass communication plays a crucial role during the COVID-19 pandemic, which has been declared a global pandemic by the World Health Organization (WHO). In Indonesia, expert predictions indicate that the pandemic is unlikely to end anytime soon. Therefore, an effective and efficient communication strategy is needed to provide the public with information regarding the handling of the pandemic.

In the past, communication was limited to voice and traditional communication tools. Now, with the use of online technology, people can interact face-to-face even when they are in different locations, times, and places. In the current situation, where the entire world is affected by the Coronavirus, online technology has significantly helped people communicate virtually using devices. This is especially important since the Coronavirus spreads easily through human interaction, particularly if a person is experiencing flu-like symptoms or a cough. To mitigate such risks, governments have implemented work-from-home policies while ensuring that essential tasks such as work and education continue (26), (27).

Amid the COVID-19 pandemic, communication is a critical step in conveying the necessary information to individuals and the public. Moreover, communication has become a vital tool in addressing the pandemic. With social distancing policies in place, mass communication has become a key method for delivering information to the public. Public communication has emerged as the best option for maintaining

social interaction during the pandemic. Public communication refers to the process of delivering messages and information to a large audience, which often involves media platforms such as print, electronic, or online media.

With the rapid development of information technology, particularly in the era of Industry 4.0, technological advancements, such as smartphones and social media, have significantly transformed people's lifestyles. According to McLuhan, "innovations in information or communication technology have a profound impact on society." Today, people utilize online media technology to search for information quickly and easily. The sophistication of online media allows activities to be reached globally through platforms like Instagram, Facebook, Twitter, and others.

The pandemic has also accelerated digital lifestyles, as people who once used online spaces primarily for entertainment now seek to find more productive uses for these technologies. Moreover, technology has become increasingly advanced, with various devices now supporting online activities. Initially, only a small portion of educational institutions implemented online learning, but now almost all institutions have adopted this method.

From the outset, many government agencies had already planned to implement fully online services. However, due to factors like regulations and costs, the implementation of these online services has been slow. With the COVID-19 pandemic, most organizations with office-based processes have been required to adopt work-from-home arrangements. This shift has compelled institutions to quickly adapt in providing services that do not require face-to-face interaction. These online services, once envisioned as part of the Industry 4.0 revolution, have become essential during the pandemic.

Historically, pandemics have had a significant impact on civilizations. Each pandemic has led to substantial changes, and this current crisis underscores the importance of research on pandemic management to prevent further escalation in the future. With the increasing global population and easier mobility, the potential for virus transmission could become more widespread.

During the COVID-19 pandemic, we are experiencing a historical shift where many jobs that were once conducted in person are now being carried out online. Traditional classroom learning is now shifting to virtual platforms such as Zoom, Google Classroom, and live Instagram sessions. The Industry 4.0 revolution, which has been advocated for a long time, has now been forcefully adapted to accommodate remote working (WFH) and virtual learning, encouraging innovation in fields such as creating virtual videos

and posters related to the pandemic. This marks a milestone in service development, particularly within government, education, and corporate sectors, which must operate with professionalism, integrity, and accountability.

Through online technology, the hope is that all activities related to work, learning, and teaching can continue. The benefits of online technology for supporting work include e-commerce platforms for online trading and e-banking for online banking, while for supporting teaching and learning, online learning platforms (e-learning) allow students and teachers to interact easily despite being in different locations. Virtual online technology is the primary solution for curbing the spread of the Coronavirus while ensuring that activities continue as usual, offering psycho-education to the public.

The COVID-19 pandemic has forced adjustments in various aspects, including working and learning from home. Although adapting to remote work and study was initially challenging, creative use of technology has increased productivity from home. The shift to “staying at home” is driving change by enabling activities that once required face-to-face meetings to occur digitally, ensuring that various affairs can be conducted effectively, efficiently, and transparently. Positive impacts and anticipatory actions, such as utilizing technology and public communication as psycho-education in various sectors, should now be implemented to minimize the spread of the Coronavirus in fields like education, environment, healthcare, and more:

1) Improvement of Air Quality

The COVID-19 pandemic led to people staying at home more frequently, which had a positive impact on the environment. The cessation of most industrial activities reduced air pollution levels, and satellite imagery revealed a significant decrease in global nitrogen dioxide (NO₂) levels. NO₂, a gas produced by car engines and commercial manufacturing plants, is a major contributor to poor air quality in many large cities.

2) Reduction in Emissions

Not only NO₂, but also carbon dioxide (CO₂) emissions decreased during the COVID-19 pandemic as economic activities, schools, and daily routines were suspended or subject to lockdowns, leading to a reduction in CO₂ emissions.

3) Clearer Waterways

With the lockdown in place, oceans experienced a reduction in noise pollution, which lowered stress levels in marine life such as whales and other sea animals, allowing for calmer migration patterns and a decrease in ocean waste.

4) Triggering the Acceleration of Educational Transformation

The implementation of online distance learning (ODL), which is technology-based, required educational institutions, teachers, students, and parents to be technologically literate. This accelerated the transformation of educational technology in Indonesia and aligned the use of technology in education with the Industry 4.0 era.

5) Emergence of Numerous Online Learning Applications

The COVID-19 pandemic accelerated the transformation of educational technology by prompting various platforms to launch a range of online learning applications to support ODL. These platforms proved to be even more helpful and beneficial for effective learning at home, such as e-Study, Google Classroom, Zoom, Ruangguru, and others.

6) Unleashing Creativity Without Boundaries

The COVID-19 pandemic sparked the emergence of new ideas. For instance, scientists, researchers, lecturers, and even students worked on experiments to discover a COVID-19 vaccine. An example of this is UNNES students who produced and distributed face masks and hand sanitizers to the local community. Furthermore, students from Rumah Bahasa UI, who volunteered in COVID-19 relief efforts, along with schoolchildren and university students, innovated various creations related to COVID-19, such as makeup, traditional dances, songs, posters about COVID-19 news, and communication media on COVID-19 management. These efforts greatly contributed to educating the broader Indonesian society.

7) Application of Knowledge Within the Family

With the closure of schools and universities, and the shift to home-based learning, students and university students had the opportunity to apply their knowledge within the family. This included small discussions, learning how to cook, or teaching acquired knowledge to family members. Applying knowledge directly can have a significant impact, not only on the one applying it but also on those receiving it. Additionally, this can strengthen family bonds and foster a positive mental attitude, such as performing prayers together, reciting the Qur'an as a family, sharing meals, and spending more time at home, which was previously not possible due to work or campus activities.

The anticipated actions that the community should take include adhering to all government policies such as social distancing, physical distancing, lockdowns, work from home, and large-scale social restrictions (PSBB). By following all government policies, filtering information correctly, and implementing proper health protocols, the spread of the coronavirus can be minimized. The community must also maintain the environment and their health, starting with themselves and extending to their surroundings, to

avoid germs and diseases. Engaging in positive activities at home, using technology wisely while maintaining the environment—such as not littering and avoiding excessive energy use, which significantly impacts global warming—is essential. Learning from communication practices through media that have been successful in other countries suggests that media communication during the COVID-19 pandemic should focus on one goal: preventing the widespread transmission of the coronavirus. It is necessary to implement specific policies in delivering the content to be communicated. The content that needs to be conveyed to the public is how to accurately perform early detection of COVID-19 symptoms.

4. Conclusion

The coronavirus outbreak, which spread simultaneously across various regions, covering a vast geographical area and often referred to as the COVID-19 pandemic, has caused widespread anxiety among the Indonesian population. The COVID-19 pandemic has not only affected public health but has also impacted nearly every sector of life. Since COVID-19 was declared a national disaster through Presidential Decree Number 12 of 2020 regarding the Declaration of the Non-Natural Disaster of COVID-19 Spread as a National Disaster, the government has gradually requested the public to reduce outdoor activities through policies such as physical distancing, regional quarantine, and Large-Scale Social Restrictions (PSBB), which were followed by the implementation of work and study from home. In addition, these policies sparked controversy, and the government's media communication regarding the COVID-19 pandemic received negative assessments. A major challenge in pandemic media communication has been the controversy surrounding patient privacy versus the public interest in preventing the further spread of the coronavirus.

Alignment is necessary to address these various provisions by considering the culture of Indonesian society in facing the COVID-19 pandemic. During the current COVID-19 pandemic, we are indirectly experiencing a historical shift, where previously routine activities and work, which were conventionally carried out, must now be done virtually. This shift, while beneficial, also has its impacts. Communicating and conducting activities based on virtual platforms in the context of the long-promoted Fourth Industrial Revolution has now seemingly forced the adjustment to selective work-from-home processes and home-based learning. This has provided an opportunity to explore broader, innovative virtual knowledge on COVID-19 handling, which greatly aids in

educating the entire Indonesian population as a pro-environment psychoeducation effort, helping to prevent panic and ensuring vigilance amidst the ongoing COVID-19 pandemic.

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References

- [1] Mulianingsih F, Suharini E, Handoyo E, Purnomo A. Optimalisasi Sekolah Tangguh Bencana Berbasis Kearifan Lokal Terintegrasi Mata Pelajaran IPS sebagai Upaya Mitigasi Bencana Banjir di Kota Semarang. *Pros. Semin. Nas. Pascasarj.* 2023;6(1):316–9.
- [2] Mulianingsih F, Suharini E, Handoyo E, Purnomo A. “The Future Perspective of School Flood Disaster Education in Semarang,” in *International Conference on Science, Education and Technology*, 2023;pp. 267–270.
- [3] Ferani Mulianingsih PH. Can Disaster Risk Education Reduce the Impact of Disasters in Schools? *J. Geogr. Sci. Educ.* 2022;4(2):19–23.
- [4] Mulianingsih F, Kintoko B, Setyawan FB, Prananto IW. “Literacy House: Is It Important in a Fisherman’s Village?” in *Proceedings of the 1st UPY International Conference on Education and Social Science (UPINCESS 2022)*. 2023;vol. 2, pp. 132–140.
- [5] Dewa HP, Nirwansyah AW, Dewi RS, Demirdag I. Vulnerability Analysis of School Buildings to Tsunami in the Cilacap Coastal Area. *Forum Geogr.* 2023;37(2):117–33.
- [6] A. W. Nirwansyah, “Peningkatan Kemampuan Spasial Kebencanaan Masyarakat Pesisir Melalui Kegiatan Pemetaan Partisipatif (Studi Kasus Petani Garam Di Cirebon, Jawa Barat),” *Proc. Ser. Soc. Sci. Humanit.* 2022;vol. 6, no. 2004, pp. 85–91,, <https://doi.org/10.30595/pssh.v6i.446..>
- [7] Mulianingsih AP, Purnomo A, Nirwansyah AW, Arviyanto ZI. Literasi Mitigasi Bencana dalam Pembelajaran IPS. *Edu Geogr.* 2024;12(2):110–5.
- [8] Ferani Mulianingsih S. Fajar, “Peran IPS dalam Pendidikan Mitigasi Bencana,” in *Perkumpulan Rumah Cemerlang Indonesia Tasikmalaya*, 2024;p. 77.

- [9] Neeraj S, Mannakkara S, Wilkinson S. Build back better concepts for resilient recovery: a case study of India's 2018 flood recovery. *Int J Disaster Resil Built Environ.* 2020;12(3):280–94.
- [10] Yap CS, Keling W, Abdullah SK. Use of social media for information seeking and sharing during floods in rural Sarawak. *Int. J. Emerg. Serv.* 2023;12(1):38–51.
- [11] Risqiyah UN, Mulianingsih F. Pengaruh media vlog (video blogging) mitigasi bencana covid 19 terhadap hasil belajar IPS SMP N 02 Randudongkal Pematang. *Sosiolum J. Pembelajaran IPS.* 2022;4(1):39–42.
- [12] Krishna RN, Spencer C, Ronan K, Alisic E. "Child participation in disaster resilience education: potential impact on child mental well-being," *Disaster Prev. Manag. Disaster Prev Manag.* 2022;31(2):134–43.
- [13] Osei-Kyei R, Ampratwum G, Komac U, Narbaev T; U. K. Robert Osei-Kyei. Godslove Ampratwum, "Critical analysis of the emerging flood disaster resilience assessment indicators," *Int J Disaster Resil Built Environ.* 2024;: <https://doi.org/10.1108/IJDRBE-02-2024-0029>.
- [14] Zhang H, Leung XY, Bai B. Cultural attractiveness index for sustainable cities: tourism Agenda 2030. *Tour Rev.* 2023;78(2):411–26.
- [15] Suprpto Y, Putri A I, Nurkholis A. I. Putri A, and A. Nurkholis, "Implementation of Character Education Values in Elementary School Age Students in Nurul Huda Islamic Boarding School," *Res. Innov. Soc. Sci. Educ. J.* 2024;2(1):41–6.
- [16] Mulyani S, Suprpto Y. Analisis Nilai Karakter Cinta Tanah Air dalam Pembelajaran Pendidikan Pancasila Kelas IV SDN Gununglarang 01. *J. Dialekta Jur. PGSD.* 2023;13(2):10315–29.
- [17] Deri Saputra FM. Andarweni Astuti, "Harmony and Culture: A Portrait of Religious Moderation Model in Sungai Penuh Subdistrict, Sungai Penuh City," in *PICEIDCS: Proceeding International Conference on Educating to Intercultural Dialogue in Catholic School*, 2024, no. 1, pp. 55–63.
- [18] Masood MM, Haque MM. From critical pedagogy to critical digital pedagogy: a prospective model for the EFL classrooms. *Saudi J. Lang. Stud.* 2021;1(1):67–80.
- [19] Sukkar A, Yahia MW, Mushtaha E, Maksoud A, Buhashima Abdalla S, Nasif O, et al. Applying active learning method to improve teaching outcomes in architectural engineering courses. *Open House Int.* 2024;49(1):205–20.
- [20] Sawalha IH. A contemporary perspective on the disaster management cycle. *Foresight.* 2020;22(4):469–82.

- [21] Singla A, Agrawal R. "iRelevancy: a framework to identify the relevancy of a social media message to a disaster," *Glob. Knowledge. Mem. Commun.* 2023;2021: <https://doi.org/10.1108/GKMC-07-2022-0156>.
- [22] L. Sun, Y. Tang, and W. Zuo, "Coronavirus pushes education online," *Nat. Mater.* 2020;vol. Jun;19(6), no. 687, <https://doi.org/10.1038/s41563-020-0678-8>.
- [23] Nandlall N, Hawke LD, Hayes E, Darnay K, Daley M, Relihan J, et al. Learning Through a Pandemic: Youth Experiences With Remote Learning During the COVID-19 Pandemic. *SAGE Open.* 2022 Sep;12(3):21582440221124122.
- [24] Goegan LD, Le L, Daniels LM. Online Learning is a Rollercoaster: Postsecondary Students With Learning Disabilities Navigate the COVID-19 Pandemic. *Learn Disabil Q.* 2022;: <https://doi.org/10.1177/07319487221090912>.
- [25] Heriyanto YY, Krismayani I. Distance learning information literacy: undergraduate students experience distance learning during the COVID-19 setting. *Inf Dev.* 2021;37(3):458–66.
- [26] A. Medical Association. Letters Presumed Asymptomatic Carrier Transmission of COVID. 2020;19: <https://doi.org/10.1001/jama.2020.2565>.
- [27] Ismiyanti Y, Prajanti SD, et al. "Social Capital on the Sustainability of Micro Small and Medium Enterprises for College Students," *Int. ...*, pp. 950–957;2022.