

SOCIALIZATION OF CBRN-E THREAT AND ITS ANTICIPATION TOWARD STUDENTS OF A PARTICULAR SENIOR HIGH SCHOOL IN BOGOR REGENCY

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ABSTRAK

Kesadaran bela negara sudah sepatutnya disadari secara luas dan khususnya diterapkan oleh generasi muda Indonesia saat ini. Gagasan tersebut hendaknya disampaikan secara strategis kepada siswa-siswa SMA untuk mempersiapkan sumber daya manusia berkualitas yang mendukung pertahanan negara, khususnya dalam mengantisipasi ancaman Bahan Kimia, Biologi, Radiologi, Nuklir, dan Bahan Peledak (CBRN-E). Namun informasi mengenai pemahaman CBRN-E pada tingkat siswa SMA di Indonesia masih terbatas. Pengabdian masyarakat ini bertujuan untuk memberikan profil khusus pemahaman siswa SMA setempat terhadap ancaman CBRN-E sebagai wawasan program selanjutnya dalam mengantisipasi ancaman CBRN-E. Selain melakukan sosialisasi kepada siswa SMA di salah satu SMA tertentu di Kabupaten Bogor, kami menganalisis secara singkat pemahaman awal mereka terhadap isu-isu terkait pertahanan dan topik terkait kimia melalui pre-test kuesioner yang dirancang. Hasil studi pendahuluan ini menunjukkan bahwa pengetahuan mereka tentang ancaman CBRN-E harus diperkuat. Menariknya, sebagian besar peserta mempunyai persepsi positif mengenai preferensi karir mereka untuk mendukung sektor pertahanan negara, misalnya minat mereka untuk berkontribusi di bidang kimia untuk memperkuat pertahanan negara. Temuan ini menyiratkan mendorong pemangku kepentingan pendidikan untuk berkolaborasi secara strategis dengan lembaga pertahanan negara untuk mengintegrasikan materi pembelajaran terkait CBRN-E ke dalam kurikulum yang ada.

Kata kunci : CBRN-E, kesadaran bela negara, kimia pertahanan, pembelajaran kimia inovatif

ABSTRACT

National defense awareness ought to be widely recognized and particularly applied by the current youth generation in Indonesia. The idea should be strategically delivered to high school students to prepare qualified human resources that support national defense, especially in anticipating Chemical, Biological, Radiological, Nuclear, and Explosives (CBRN-E) threats. However, information regarding the understanding of CBRN-E at the level of Indonesian high school students is still limited. This community service aims to provide a particular profile of a typical local high school student's understanding of CBRN-E threats as an insight into the subsequent program to anticipate CBRN-E threats. In addition to performing socialization toward high-school students in a particular high school in Bogor Regency, we briefly analyze their initial understanding of the defense-related issues and related chemistry topics through a pre-test of a designed questionnaire. The results of this preliminary study show that their knowledge of CBRN-E threats should be fairly strengthened. Interestingly, most participants have a positive perception regarding their career preference for supporting the national defense sector, e.g., by their interest in contributing to the chemistry field for strengthening national defense. This finding implies encouraging education stakeholders to collaborate strategically with national defense institutions to integrate learning materials related to CBRN-E into the existing curriculum.

Keywords : CBRN-E, chemistry for defense, innovative chemistry learning, national defense awareness

INTRODUCTION

The utilization of some hazardous chemical warfare agents has been firmly prohibited since the deadly features had been shown during the World War II era. In addition to the popular disasters of the atomic bomb explosion in two cities at the end of World War II, other types of Chemical, Biological, Radiological, Nuclear, and Explosives (CBRN-E) threats were suspected to be introduced in that era. For example, several organophosphates are responsible for some neuropsychological negative effects (Muñoz-Quezada et al., 2016) and neuro-related disorders of children (Hertz-Picciotto et al., 2018). Based on the current trend of conflicts between several countries, Indonesia ought to have enough numbers of trained human resources to anticipate both the direct and indirect effects of CBRN-E threats.

CBRN-E threats could be mildly anticipated in several conditions in the current era. These threats could appear, or be modified, in diverse versions of daily-use products. For example, the trading of organophosphate-based pesticide products in some virtual commercial platforms (Stiawan et al., 2023) as well as the utilization for general uses, such as agricultural activities. Regarding the handling of hazardous pesticides by agricultural workers, an effort to reduce the negative effects of these typical threats has been initiated through safety induction of handling hazardous agrochemical agents toward several agricultural workers (Xaviera et al., 2024). This approach is essential for agricultural workers since frequent pesticide exposure could negatively impact their physiological condition. For instance, several workers in the shallot area in Enrekang Regency, who had been exposed to pesticides, displayed relatively low haemoglobin (Sunaidi & Meinari Dwi Rantisari, 2023) and cholinesterase levels (Rahmi et al., 2024). Particularly, in addition to the mitigation approach, socialization of safety handling could be sharpened by applying exposure assessments to profile the risk level of activities (Komalasari et al., 2023).

Regarding the national defense aspect, this country should also persuade the current generation to possess an awareness and initiative to strengthen their nation since many of them are featured by the proper ability to quickly adapt to a relatively new circumstance, especially in the virtual world. In common perspectives, some military or defense-related principles seem strict and tough to be directly adopted by general society. Whereas, some defense-related principles might be adopted in generally milder circumstances. For instance, command-oriented leadership is considered promising to be applied to answer particular challenges during long-distance meetings or teaching activities (Fahri et al., 2024). This condition could provide them with excellent critical thinking skills, a valuable aspect of national resilience. However, the information regarding CBRN-E understanding at the high school level in Indonesia is still limited. For example, in a particular study regarding teachers' opinions on learning materials of nuclear utilization, the interview results implied that the nuclear topic should be more developed to provide updated information on the utilization and safety aspects of nuclear (Mariati, 2013).

Socialization to deliver information regarding CBRN-E threats toward high school students is one of the simple approaches to ensure that our upcoming generation will be well-prepared for unpredicted and undesired CBRN-E threats. Before this work, we assumed that perhaps many Indonesian high students had a particular interest in the CBRN-E topic since many of them were active on some popular social media with bursts of updated information including related disasters or the development of defense technology of developed countries. Consequently, a novel insight related to CBRN-E knowledge was expected to be added to local high school student's understanding after bridging their initial acquaintance of CBRN-E-related information and the prospective feature of chemistry as a fundamental field to strengthen our national defense in CBRN-E. Accordingly, this activity aimed to profile the students' basic understanding of CBRN-E threats and to obtain information regarding their future interest in

being professionally involved in the strengthening of national defense through science application.

METHOD

The subject was a group of tertiary-level senior high school students in a particular area at Bogor Regency (initial: PP1B), Indonesia. We decided to select the tertiary-level students as participants by considering their maturity and pedagogical level as they were being prepared to enter a higher level of education in the universities with more concern for career preferences. Meanwhile, there was barely any specific consideration of selecting a particular regular school or area. Yet, the area could be adjusted by the representation that the participants were living in an area close to the capital city of Indonesia with appropriate information and technology access.

During the observation, conducted on February 2023, the participants were asked to complete the questionnaire to recognize their basic understanding of CBRN-E threats and their career preferences related to science and defense activities. The questionnaire was designed by relevant experts, i.e., academics under the science-based defense university, and consisted of several questions about simple CBRN-E-related cases. In practice, 17 respondents filled out the questionnaire. After completing the questionnaire, they were introduced to CBRN-E threats through interactive discussion between academics from the Department of Chemistry, Faculty of Military Mathematics and Natural Sciences, The Republic of Indonesia Defense University, and the students through a long-distance online platform (Zoom Meeting®). The discussion was specifically focused on some chemistry applications for defense purposes. A related teacher in the school also assisted the students in this activity to boost their excitement of gaining the socialization materials.

RESULT

Before the main session, the participants were asked to fill out the pre-test in the form of a designed questionnaire. The students carefully completed the questionnaire during the pre-test session. Some students were confused regarding the CBRN-E term since they had not heard it before. Yet, the facilitator decided to keep the answer for the subsequent socialization session. The questionnaire results are displayed in figure 1.

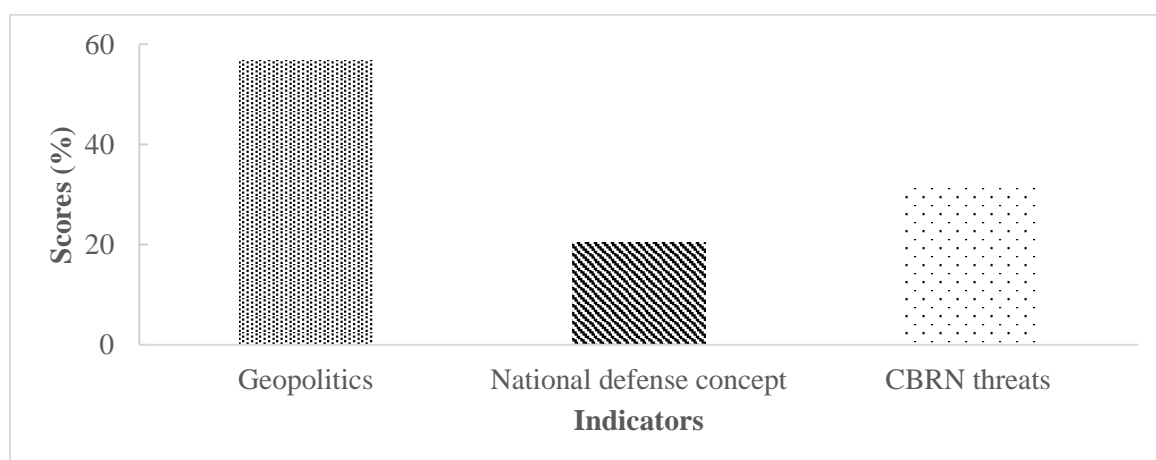


Figure 1. Participants' Initial Understanding of Defense and Security Topics

According to figure 1, most participants did not have enough basic understanding of national defense concepts and CBRN threats, while their basic knowledge of geopolitics was

slightly higher than others. figure 2 depicts a list of media to monitor updated global politics and conflicts was also obtained in this work.

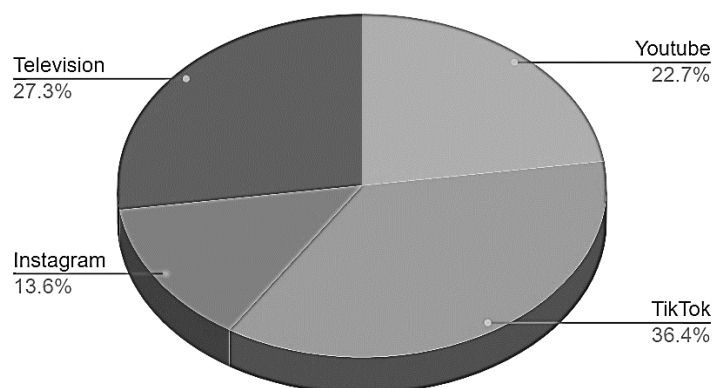


Figure 2. Respondents' Sources for Obtaining Geopolitics Information

Figure 2 shows that the respondents obtained their geopolitics from several sources, i.e., television (27.3%), Instagram® (13.6%), Youtube® (22.7%), and Tik Tok® (36.4%). Interestingly, only 27.3% of participants followed the updated geopolitics news from television. That information may affect their interest and career preferences since post-questionnaire results show that most participants were interested in working on science and defense activities for their future jobs (figure 3).

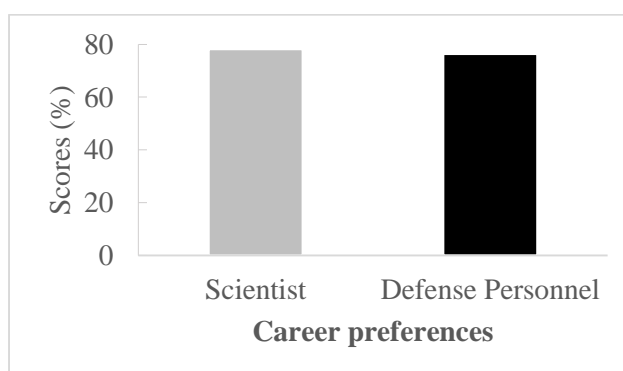


Figure 3. Career Preferences of Participants Related to Anticipation of CBRN-E Threats

It can be seen in Figure 3 that most of the participants have a relatively equal career preference for scientists and defense personnel. This finding is quite interesting since although the participants have not been exposed to a comprehensive national defense concept, they had already put a particular interest in their professional careers as defense personnel.

DISCUSSION

During the discussion session, some students were excited regarding CBRN-E topics and the application of chemistry for defense purposes. For example, they easily connected the biological and explosive threats with the previous COVID-19 pandemic and the Beirut Blast in Lebanon that occurred in 2020. Furthermore, they actively asked about CBRN-E threats by connecting those with some popular science fiction movies. Regarding their chemistry understanding to anticipate CBRN-E threat, most participants mainly discussed explosive materials. For example, they explained their experience in handling Sodium elements within a particular organic solvent instead of water to avoid undesired explosive reactions. Meanwhile, most participants obtained geopolitics information from online digital platforms of popular

social media, such as Instagram®, Youtube®, and TikTok®. A third of participants gained those from TikTok® indicated that this social media not only entertained content but also updated information regarding current geopolitics conditions, such as war, conflicts, etc. This finding is relevant to Zúñiga, et.al and Milakovich found that social media exposure could enhance citizens' interest in geopolitical content (Ibardelozza et al., 2022). The student's critical thinking level to properly collect and gain the geopolitics content shall be assessed from our perspective. Thus, we encourage subsequent studies to take place on this concern.

Regarding career preferences, several new branches, or humbly defined as new perspectives, apply chemistry and those related prospective careers, such as scientists in bioanalytical pharmaceutical chemistry and chemistry for defense (Naulina et al., 2023). As one of the promising jobs, preparing scientists in chemistry for defense requires a strategic and comprehensive program to prepare the youth generation to master the technical aspect of this theme. Therefore, we introduced potential features of chemistry topics for developing defense technologies in the remaining session. To support national defense purposes as well as to introduce the development of chemistry applications in the defense aspect, some knowledge and current applications of chemistry for defense to the younger generation were carefully delivered to the participants so that they will be able to be properly prepared to anticipate CBRN threats in the future.

Consequently, several new insights were delivered to the participants, such as potential features of nata de coco to be developed as a bulletproof material (Bolilanga et al., 2022) and innovative ideas to accelerate medical team personnel in high altitudes by consuming particular red blood cell-stimulating hormone (Stiawan & Lubis, 2023) or to boost the physical performance of athletic workers requiring proper endurance in relatively heavy exercises (Khairillah et al., 2024). In addition to the technical aspect of chemistry application for defense, the high school students were also asked to build their soft skills and character. We predict these ideas could develop science learning in Indonesia, especially chemistry learning activities integrated with chemical thinking and critical thinking skills (Liliasari, 2007, 2009b, 2009a). For example, the theme of explosive materials could be applied to the critical thinking-based teaching activities of thermochemistry and rate of chemical reaction topics (Kartimi & Liliasari, 2012; Redhana & Liliasari, 2008).

In further application, the CBRN-E integration into high school chemistry learning material can be gradually broadened into prospective technologies to neutralize or tackle the threats since several studies displayed promising ideas that may be applicable in several contexts. For instance, the utilization of simple inorganic salt solution ($\text{Ca}(\text{ClO})_2$) as a decontamination agent, e.g., for decontaminating used infusion bottles (Tedy Aryani et al., 2024) could be informed on the topic of salt or redox.

CONCLUSION

This community service only provided limited information regarding the preparedness of the current generation in Indonesia to anticipate unpredicted CBRN-E threats. Based on responses from a representative of Indonesian local high school students during the socialization, it can be fairly implied that learning materials or socialization content of CBRN-E topic could be effectively delivered to the tertiary-level secondary school students since they could easily gain updated geopolitics information from their social media.

Furthermore, integrating science topics in the high school curriculum and national defense concepts is essential. The learning materials could be consistently developed and properly accommodated to strengthen national defense. Researchers in the related field shall proactively introduce and creatively display science-based defense development activities through social media as the main source for many young people. As a suggestion, national defense concepts

could also be socialized into popular social media since current Indonesian generations gain updated information from those sources.

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