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Improving Digital Health Information Literacy for Adolescents through Search Engine Optimization

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Abstract: Internet use is increasing every year, most of the reason is finding information (80.1%). Along with this, misinformation is circulating, including health information, so digital literacy is needed, especially for teenagers or Generation Z who are technology savvy. This activity aims to increase teenagers' digital literacy and help them search for appropriate health information through search engines. This Community Service is carried out using the Participatory Action Research (PAR) method with direct face-to-face presentation of material and practice on the given topic. Participants were 43 high school/equivalent level students aged 15-19 years. Most participants were 16 years old (46.51%) and female (88.37%). The average knowledge of participants regarding appropriate health information in the pre-test was 60.21, and the post-test was 88.65. A total of 40 out of 43 participants experienced an increase in scores (93.02%) after lectures and practice. This activity concluded that participants' knowledge and skills increased regarding using search engines to manage appropriate health information.
Keywords: health information; search engines; teenager

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INTRODUCTION

Nowadays, the public's search for health-related information has become easier. Information technology has transformed many aspects of human life, including healthcare. The progress in information technology provides broader access for the public to easily and quickly search for information. Health information that was once only available from print sources or professionals has now evolved with the use of the internet. Approximately 72% of adults seek health information online. The relationship between humans and information has changed since the advent of the internet, and a crucial source of health information in America is "online resources" (Fox, 2014).

Data released by We Are Social in February 2022 regarding internet usage in Indonesia shows a population of 277.7 million (an increase of 1% from 2021); connected mobile devices amounting to 370.1 million (a 3.6% increase from 2021); internet users totaling 204.7 million (a 1% increase from 2021); and

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active social media users reaching 191.4 million (a 12.6% increase from 2021). On average, internet usage lasts for 8 hours and 36 minutes per day (a 3% decrease), significantly longer than the duration of watching television, which is 2 hours and 50 minutes per day. The duration of social media usage consistently increases each year, reaching 3 hours and 17 minutes per day in 2022. The primary reasons for Indonesians using the internet are to seek information (80.1%) and find inspiration (71.9%) (Riyanto, 2023).

Internet and social media are widely used as sources of health information in Indonesia. The most frequently used social media applications are WhatsApp, YouTube, Wikipedia, and Facebook. These applications are utilized for their diverse features, including sharing, commenting, messaging, tagging, and uploading photos. Facebook is the most suitable social media application for meeting these needs (Rosini & Nurningsih, 2018). Other findings indicate the use of two types of information media. The primary information medium is reliable health information websites, while the supporting medium includes social media such as LINE, WhatsApp, BBM Group, and electronic media such as television (Prasanti, 2017).

Access to health information is not limited to adults but extends to all age groups, including teenagers. Teenagers, currently classified as Generation Z, are a technologically literate group. Generation Z is familiar with and accustomed to using gadgets from an early age due to being born and growing up during the rapid development of the internet (Adiansah et al., 2019). Easy and abundant access to information, proficiency in using social media and the internet, and the need for health information make teenagers vulnerable to obtaining inaccurate health information. During the COVID-19 pandemic, 90% of health-related fake news was spread on the internet, especially on social media, causing fear among the public and affecting mental health (Umasugi, 2022). Health information and medical services are widely available, and people only need to search for keywords such as medicine, prescriptions, healthy living, and healthcare facilities on the Internet (Maharani et al., 2021).

Digital literacy serves as a solution to address the issue of spreading incorrect health information. Various institutions, including health institutions, the government, communities, and educational institutions, can conduct digital literacy for the public. Despite being proficient in using the internet and social media, especially teenagers, they still need education on using health information flooding society to be critical and wise (Fitriarti, 2019).

Various community service activities have been carried out to enhance digital literacy. Activities in Ridan Permai Village involved informative sessions, aiming for residents to operate various digital devices for marketing and increasing commodity sales. The results showed increased awareness in the village community about the importance of using social media wisely, adding benefits to the economy (Witarsa et al., 2021). Another activity took place in Gunungsari Village, intending to guide teenagers in healthy digital media usage and educate parents (mothers) on accompanying their children in using the internet responsibly. This was done through training sessions, resulting in positive impacts where teenagers could protect themselves by not sharing personal data, and parents (mothers) could recognize the characteristics of gadget addiction, preventing their children from accessing inappropriate sites (Candrasari et al., 2020).

The development of technology accompanying widespread information dissemination undoubtedly brings

positive impacts but, on the other hand, can also have negative consequences. Health information, especially the extensive and widespread use of drugs, may become part of daily consumption for the public without verifying its accuracy. The high use of the internet and social media among teenagers can lead to the widespread circulation of misinformation. Therefore, this activity aims to enhance teenagers' digital literacy to seek accurate information, verify the truth of health information, and filter health information before sharing it.

METHOD

The Community Service was conducted using the Participatory Action Research (PAR) method. The PAR approach focuses on empowering the community because it consistently meets the interests and resolves problems occurring within the community. PAR is a method that raises awareness in the community about their capabilities and the problems they face. It also enhances community participation in the transformation that is implemented (Afandi et al., 2022; Qomar et al., 2022). This activity is carried out in two ways: material presentation and direct independent practice on the prepared topic, followed by analyzing the improvement of adolescent knowledge. The activity started with a pre-test and concluded with a post-test as an evaluation measure. Implementation took place in a face-to-face setting at the Bintang Persada Institute of Technology and Health Campus on September 24, 2022. Participants were high school students aged 15-19, totaling 43 individuals.

The following media were used to facilitate the delivery of material:

1. Laptop, projector, and screen for presentations.
2. Lecture materials in the form of PowerPoint presentations and videos.
3. Roll cables to supply electricity.
4. Laptop/phone (provided by each participant).

The design of the community service implementation is presented in Figure 1.

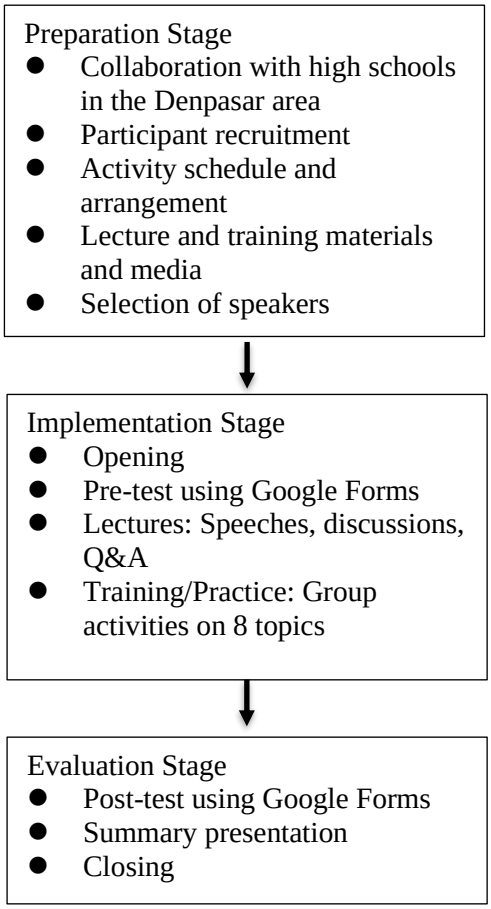

Figure 1 Community service design

Topics covered during the training/practice include:

1. Lack of sleep causes obesity in teenagers.
2. Vaping is healthier than conventional cigarettes.
3. Cucumber causes vaginal discharge.
4. Spicy food causes acne.
5. Oily skin doesn't need moisturizer.
6. Shouldn't shampoo during menstruation.
7. Eating carbohydrates at night causes weight gain.
8. Teenage girls don't need additional iron.

The results of pre-test and post-test scores are further analyzed to determine the increase in adolescents' knowledge level and skills before and after receiving the material.

RESULTS AND DISCUSSION

Community service is conducted based on research results aimed at improving the quality of life for the community. This activity was well-received by partners because the topics addressed are common issues among today's teenagers. Health information has become a widespread issue with a plethora of inaccurate information, exacerbated by technological advancements that amplify health information dissemination. Teenagers, as a tech-savvy generation, are a primary target for misinformation in health information. Therefore, various efforts are made to reduce the spread of misinformation among teenagers.

The younger generation is proficient in using digital devices and engaging in activities such as playing, learning, and socializing through the internet. Various social media content is widely available and easily accessible. The inability of the younger generation to filter such widely spread content results in difficulties in receiving and managing information. The ease with which society accesses information makes social media an integral part of life, regardless of its diversity, relevance, and validity levels. The presence of social media paints a picture of a boundless world (Restianty, 2018).

Understanding digital literacy is crucial for interacting in the present era. Everyone must take responsibility for the use of technology in their daily lives. Stakeholders, including families (parents), educators, educational institutions, and the government, must collaborate to guide teenagers, enabling them to develop critical and creative thinking. This aims to create a conducive social and community life (Restianty, 2018).

This activity is carried out to increase teenagers' awareness of health information through the utilization of search engines. As a generation proficient in technology, teenagers are required to be more critical in managing the health information they acquire. The participants in this activity are 43 individuals, and their characteristics are detailed in Table 1.

Table 1 Characteristics of respondents' ages

Age (yo)	Results	
	Number (n)	Percentage (%)
15	5	11.63
16	20	46.51
17	15	34.88
18	3	6.98
Total	**43**	**100**

The participants in this activity range in age from 15 to 18 years and come from various high schools in the city of Denpasar. The participation of these individuals has been approved by their respective schools and accompanied by their teachers. The most common age among participants is 16 years old (46.51%). The characteristics of gender are detailed in Table 2.

Table 2 Characteristics of respondents' gender

Gender	Results	
	Number (n)	Percentage (%)
Male	5	11.63
Female	38	88.37
Total	**43**	**100**

The characteristics of participants based on gender are detailed in Table 2. Most participants are female, totaling 38 individuals (88.37%).

The first stage of this activity is the initial assessment (pre-test) to determine adolescents' initial level of understanding regarding accurate health information. All participants completed the pre-test to assess the level of adolescent knowledge before receiving the material. The results of the pre-test are presented in Table 3.

Table 3 Pre-test results

Category	Score Value
Average	60.21
Lowest	29
Highest	86

The pre-test results in Table 3 indicate that the average knowledge score of adolescents regarding accurate health information is 60.21, categorized as sufficient. Although the average score is in the sufficient category, there are still participants with low scores. Twenty participants (46.51%) scored below the average, with the lowest score being 29 from one participant (2.33%). The question related to examples of search engines providing scientific information was the most commonly answered incorrectly, with 26 participants (60.47%) giving the wrong answer. This indicates a lack of knowledge among teenagers regarding accurate health information. The pre-test results show that the participants, teenagers, need knowledge and skills in using search engines to access accurate health information.

The second stage involves a material presentation with two titles. The first title is presented by Pharmacist Gusti Ayu Oviani, S.Farm., M.Pharm.Sci. The content covers information such as the development of information, characteristics of misinformation, target groups vulnerable to misinformation, and media for spreading misinformation. This topic is crucial for participants to deepen their understanding of what information is and the characteristics of misinformation. The presentation emphasizes how teenagers are a target for misinformation, intending to raise awareness among them. In the concluding part of the presentation, it is highlighted that the media for spreading misinformation are abundant, and teenagers frequently use some of these media.

There are currently no clear rules governing the creation of information on platforms that may lead to the spread of misinformation/hoaxes. Platform users are free to create and disseminate information without critically evaluating the content, which cannot be confirmed for its accuracy and facts. The high number of false/hoax news circulating in society presents various incorrect information with content that systematically misleads the public (Irhamdhika, 2022).

Hoaxes typically contain sentences encouraging widespread sharing of information; the source is not provided and its validity is unclear; dates and/or deadlines are not included, and they often use the names of large companies or famous individuals (Halawa & Lase, 2022). Therefore, in this digital era, it is important for teenagers to understand the characteristics of hoaxes so that they, as one of the targets of hoax information, do not become victims of the spread of false news. In the future, teenagers should be able to discern and be critical when receiving information or news with unclear sources (Hamzah & Putri, 2020).

The second title is presented by Pharmacist I Gede Bagus Indra Marangyana, S.Farm., M.Farm. The content covers the definition of search engines, the types that can be used to find accurate information, and how to use search engines. A search engine is a web-based program designed to obtain information within the World Wide Web (www). Information is retrieved by entering appropriate keywords into the search engine. There are many search engines on the Internet, each with its own advantages. Google is the most widely

used search engine because it is well-known, frequently used, and easy to use for information retrieval. Other examples of search engines providing scientific information include Sinta, Garuda, and Rama Repository. Sinta provides scientific information from accredited journals in Indonesia. Garuda provides scientific information from e-journals, conferences, and research reports in Indonesia. Rama Repository provides research reports from various campuses in Indonesia, including final projects, theses, and dissertations. There are several tips and tricks to optimize search engines, such as using unique and specific terms, hyphens to narrow down searches, numbers, quotation marks, asterisks, and searching for multiple topics simultaneously (Zulkarnain et al., 2022). Documentation during the material presentation is presented in Figure 2.

Figure 2 Material presentation

The third stage involves training/practice to enhance understanding and provide skills to adolescents in analyzing health information. Participants are divided into small groups and given specific topics. Participants are asked to conduct searches using search engines to verify the given topics. The community service team facilitates each group. Participants are facilitated in using keywords in search engines and conducting analysis.

This training aims to achieve Higher Order Thinking Skills (HOTS) for participants in this activity. HOTS represents levels of thinking (C1 to C6), starting from remembering, understanding, calculating, analyzing, evaluating, and the highest level, which is creating. In the cognitive domain, HOTS is at the level (C4–C6) of analyzing, evaluating, and creating. HOTS questions are interpreted as questions that aim to stimulate students' thinking patterns so that they are not only at the level (C1–C3) of memorizing or remembering but must be able to think critically and creatively (C4–C6) (Irmawati et al., 2021).

Each group presented the training results to other participants so that they could receive opinions from their peers. The participants' training is shown in Figure 3.

Figure 3 Training/practice

The fourth stage is the post-test, which is an evaluation of adolescents' understanding of the topics that have been presented. This evaluation is conducted to determine participants' knowledge level after being given material exposure and direct training.The post-test results for participants are presented in Table 4.

Table 4 Post-test results

Category	Score Value
Average	88.65
Lowest	69
Highest	100

The participants' post-test scores show that the average score is 88.65, which is considered very good. There are 26 participants (60.47%) with scores

above average, and the highest score of 100 is obtained by 6 participants (13.95%). The question related to examples of search engines providing scientific information was the most commonly answered incorrectly during the pre-test and in the post-test, only 5 participants (11.63%) answered incorrectly. The post-test results indicate an increase in participants' knowledge after the presentation of material and training.

The pre-test and post-test participants' scores are compared to evaluate changes in the level of knowledge. The evaluation results are detailed in Figure 4.

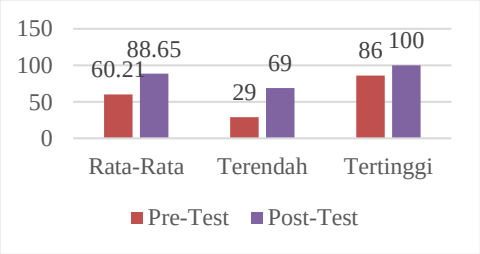

Figure 4 Comparison of pre-test and post-test results

The comparison of pre-test and post-test results shows that the average, lowest, and highest scores all increased after the material and training were provided. The most significant increase was observed in the lowest score, which increased from a score of 29 to 69. The results of the evaluation of increases and decreases in participant outcomes are presented in Table 5.

Table 5 Categories of pre-test and post-test results

Category	Results	
	Number (n)	Percentage (%)
Increase	40	93.02
Remain the same	1	2.33
Decrease	2	4.65
Total	**43**	**100**

Table 5 indicates that there are still participants who obtained the same score (2.33%), and there are participants whose scores decreased compared to the pre-test (4.65%). The scores decreased by 4 to 6 points due to accidentally answering a question correctly during the pre-test. Out of the 43 participants, 40 (93.02%) experienced an increase in scores in this activity. This means that this community service activity successfully improved the majority of participants' knowledge and digital literacy skills in using search engines to manage accurate health information. The community service activity concluded with the announcement of the best participants and a group photo. Documentation of the activity is shown in Figure 5.

Figure 5 Closing of the activity

CONCLUSION

This community service activity demonstrates an improvement in the knowledge and skills of adolescents in utilizing search engines to obtain accurate health information. The implementation of this activity needs to be continued on a larger scale to minimize the spread of misinformation among adolescents.

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