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Introduction to Digital Forensics: Educational Initiatives Through Webinars And Workshops on Recovering Lost Files in the Windows Operating System

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ABSTRACT

A webinar and workshop titled "Introduction to Digital Forensics" was held online on July 12, 2025, to improve public understanding of digital data security. Twenty participants attended the event, which included both a pre-test and a post-test. Results showed an increase in participant understanding, with scores on volatile data increasing from 73.7% to 88.2%, on non-volatile data from 72.2% to 82.4%, and on the definition of digital forensics from 84.2% to 88.2%. Furthermore, participant satisfaction was high, with 60% scoring excellent and 30% scoring good. This event was deemed successful in providing a basic understanding of digital forensics and raising awareness of the importance of data protection in the digital age.

Kegiatan webinar dan workshop bertema "Pengenalan Digital Forensik" dilaksanakan secara daring pada 12 Juli 2025 untuk meningkatkan pemahaman masyarakat tentang keamanan data digital. Kegiatan ini diikuti oleh 20 peserta dan mencakup sesi pre-test dan post-test. Hasil menunjukkan peningkatan pemahaman peserta, dengan nilai pada materi data volatile naik dari 73,7% menjadi 88,2%, data non-volatile dari 72,2% menjadi 82,4%, dan definisi digital forensik dari 84,2% menjadi 88,2%. Selain itu, tingkat kepuasan peserta juga tinggi, dengan 60% memberi nilai sangat baik dan 30% memberi nilai baik. Kegiatan ini dinilai berhasil memberikan pemahaman dasar digital forensik dan meningkatkan kesadaran akan pentingnya perlindungan data di era digital.

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A. INTRODUCTION

The development of digital technology today is extremely rapid, bringing significant changes to people's lives, from how we communicate and work to accessing information. However, not all segments of society are ready to face the negative impacts of these advancements. Many still do not understand the dangers in the digital world, such as the spread of hoaxes, data theft, and misuse of personal information (Saputra, 2023)(Aabid et al., 2025).

A lack of knowledge about digital security is the primary reason why people easily become victims of cybercrime. Digital literacy is not just about being able to use technology, but also about how to protect personal data and act wisely when using digital media (Niyu & Gerungan, 2022)(M. Syafiih et al., 2024).

Through community service activities, we strive to provide education that is easy to understand and can be immediately practiced. One way is by introducing the basics of digital forensics, such as how to recover lost files on a computer. This activity is a first step to raise awareness that digital devices can serve as important evidence in legal cases(Firmansyah, 2024) (Ode Muhram, 2025).

This research was conducted online with 20 respondents, comprising university students and members of the general public. Although the webinar and workshop were open to participants from across Indonesia, they were centered in Jakarta, facilitated by Muhammadiyah University of Jakarta, the organizing institution. The selection of Jakarta also has academic relevance, given that urban areas with high levels of digital activity tend to face greater risks of cybercrime, such as personal data theft, the spread of hoaxes, and digital-based fraud. Therefore, this activity not only serves as a form of community service by the university but also addresses the real needs of urban communities to improve their basic understanding of data security and digital forensics.

The training is conducted directly and interactively so that participants not only gain knowledge but also practical experience. Participants are also encouraged to understand the importance of protecting personal data and using digital devices safely (Putra & Rusmawan, 2024)(Marulitua Butarbutar, 2025).

The enthusiasm of the participants demonstrates that activities like this are greatly needed. By increasing public awareness through community service activities, it is hoped that a digital culture that is safe, wise, and responsible can be created(Vivi et al., 2025)(Faraby, 2024).

Figure 1: Process of Explaining Material to Participants

B. METHODS

To carry out the community service activities that have been planned, the organizing team has outlined several stages to be carried out gradually. This program consists of two main parts: public education through webinars and hands-on training through workshops. The implementation stages are explained as follows :

Stage 1 – Activity Socialization

At the beginning of the preparation, the team disseminates event information through various social media platforms. Digital posters and registration links https://tinyurl.com/545j7672 are shared via Instagram, LinkedIn, and WhatsApp groups to reach a broader audience.

Stage 2 – Material Preparation

Next, the team prepares materials for the webinar and workshop in the form of PowerPoint slides. These materials are then presented by the main speaker during the event.

Stage 3 – Participant Pre-Test

Before the activity begins, participants are asked to complete a pre-test through the link https://tinyurl.com/4zbz6nc9. This test contains questions related to the topics to be discussed and is used to measure participants' initial knowledge before comparing it with the post-test results.

Stage 4 – Educational Webinar

The webinar session serves as an introductory stage that explains the basic concepts of digital forensics, especially regarding techniques for recovering files from flash drives. The material includes an introduction to digital forensics, the importance of data recovery, types of data that can be restored, and supporting software. Participants are also introduced to simple forensic processes in the Windows operating system, starting from media identification to data acquisition and initial analysis.

Stage 5 – Practical Workshop

In the final stage, participants engage in a live simulation to apply the theories they have learned. With initial guidance, they use software such as Recuva, Autopsy, and FTK Imager to recover deleted files from flash drives. Before the session, participants were asked to install these applications to ensure the session runs smoothly and efficiently.

C. RESULTS AND DISCUSSION

This webinar and workshop activity was organized by students from the Informatics Engineering Study Program, Faculty of Engineering, Universitas Muhammadiyah Jakarta. The event was conducted online via Zoom Meeting on Saturday, July 12, 2025, from 13:30 to 15:40 WIB. The event link was accessible at: https://s.umj.ac.id/FTUMJ-02.

This activity was attended by 20 participants, the majority of whom came from the Informatics Engineering Study Program, accompanied by several participants from outside the institution. The atmosphere was interactive, marked by a question-and-answer session

between participants and presenters, which enriched the course of the discussion and added educational value to the material presented.

Table 1: webinar and workshop agenda

No	Time	Activity	PIC
1	12.30 - 13.00	Preparation	All committee
2	13.00 - 13.05	Opening Remarks	Muhammad Haryanda
3	13.05 - 13.10	Qur'an Recitation	Rizky Maulana
4	13.10 - 13.15	National and Muhammadiyah Anthem	Muhammad Haryanda
5	13.15 - 13.20	Welcoming Speech by Chief of the Committee	Oldi Alfani Sunan Saleh
6	13.20 - 13.25	Introduction of Webinar Speaker 1	Rizky Maulana
7	13.25 - 14.00	Webinar Material 1	Reza Ade Maulana
8	14.00 - 14.05	Introduction of Webinar Speaker 2 & Workshop Trainer	Rizky Maulana
9	14.05 - 14.30	Webinar Material 2	Oldi Alfani Sunan Saleh
10	14.30 - 15.10	Workshop Session	Oldi Alfani Sunan Saleh
11	15.10 - 15.20	Q&A Session	Rizky Maulana
12	15.20 - 15.25	Group Photo	Rizky Maulana
13	15.25 - 15.30	Closing Session	Rizky Maulana

Community service activities were then carried out by the stages described in the previous table.

Stage 1 – Activity Dissemination

The initial stage involves disseminating information about the program, with the team making announcements to the public through various social media platforms. This strategy also aims to attract potential participants by distributing specially designed promotional flyers, as shown in Figure 1.

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Figure 2 Registration Promotion Flyer

Stage 2 – Preparation of Learning Materials

At this stage, the presenter prepares presentation materials in PowerPoint slide format designed to be easily understood by participants. The material covers topics related to Data Security and Digital Forensics, such as Computer Ethics, ethical use of shared files, introduction to digital forensics, and the process of acquiring volatile and non-volatile data. Several tools and techniques are also introduced, including Bekasoft RAM-Capture, Volatility3, FTK Imager, and Autopsy.

Stage 3 – Participant Pre-Test Completion

At this stage, participants were asked to take a pre-test prepared by the organizing team. The test contained questions about digital forensics, such as the definition of digital forensics, volatile data acquisition, and non-volatile data acquisition. The purpose of this pre-test was to measure the participants' initial understanding before the activity began. A total of 19 participants completed the test, and the results showed that the majority had a fairly good basic understanding of the material to be discussed.

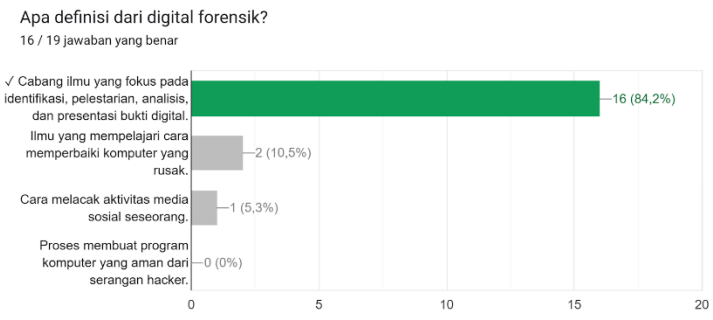

Figure 3: Pre-Test Understanding Digital Forensics

Based on Figure 3, 19 participants took the pre-test. A total of 84.2% of them answered correctly on questions about the definition of digital forensics, indicating that most participants already had a fairly strong initial understanding of the basic concepts being tested.

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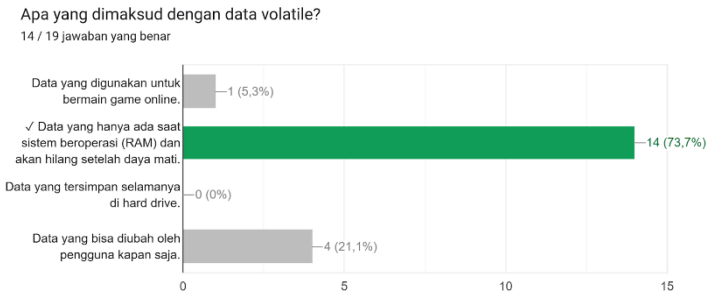

Figure 4: Pre-Test Data Volatile

Figure 4 shows the pre-test results on the topic of volatile data, with a total of 19 participants responding. A total of 73.7% of them gave the correct answers, indicating that the participants' understanding of this concept was quite good.

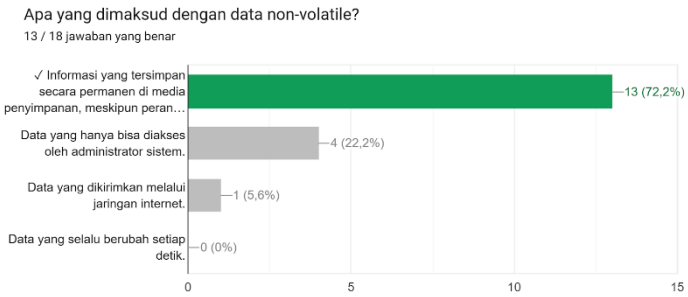

Figure 5 Non-Volatile Data Pre-Tes*t*

Based on Figure 5, a total of 19 participants answered the question on non-volatile data, with 72.2% providing correct responses. This percentage reflects a fairly good level of understanding of the topic, although some participants still showed gaps in fully grasping the material.

Stage 4 – Public Education Through Webinar

In this stage, Webinar 1 was conducted and presented by Reza Ade Maulana. The material covered topics such as computer ethics, ethical dilemmas in the digital world, cyber threats including viruses and malware, types of malware and their modes of transmission, as well as basic principles of data security and preventive measures. The session concluded with a summary and actionable follow-up steps for participants.

The session was interactive, with participants actively participating via Zoom's chat feature. This interaction helped participants gain a deeper understanding of cybersecurity, particularly in terms of website protection.

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Figure 6 Webinar I: Computer Usage Ethics and Data Security

The second webinar was presented by Oldi Alfani Sunan Saleh, who discussed an introduction to digital forensics, its urgency, and the main processes involved. The material focused on data acquisition, both volatile and non-volatile data, as well as acquisition methods on Windows operating systems.

This session also featured an interactive Q&A session via Zoom's chat feature, providing participants with an opportunity to discuss directly with the speakers. The webinar concluded with a summary of the material and follow-up instructions that participants could apply. Through this session, participants gained a more solid understanding of the role of digital forensics in cybersecurity, particularly in the management and protection of digital data.

Figure 7 Webinar II Introduction to Digital Forensics

Stage 5 – Training Workshop

This workshop, led by Oldi Alfani Sunan Saleh, served as a practical session for the material introduced in Webinar 2, with a primary focus on volatile data acquisition. Participants engaged in hands-on exercises using Bekasoft RAM-Capture to extract memory data from Windows-based systems. They then proceeded to the process of non-volatile data acquisition.

Before the session began, participants were instructed to install the necessary software and prepare sufficient storage space, given that the size of the memory dump file depends on RAM capacity. This workshop provided an important hands-on

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learning experience in basic digital forensics, while emphasizing the crucial importance of accuracy in handling data at the early stages of the investigation process.

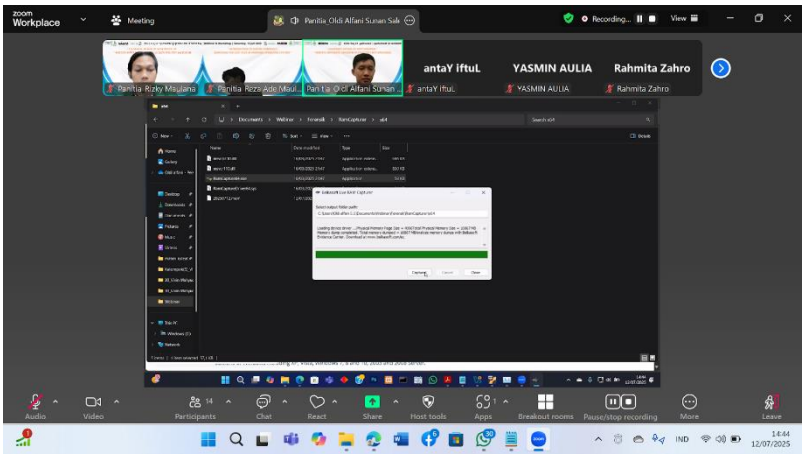

Figure 8 Volatile and Non-Volatile Data Acquisition Workshop

Stage 6 – Feedback and Post-Test Completion

At this stage, participants are asked to fill out a form that includes attendance confirmation, feedback, and post-activity tests, all submitted through a single Google Form.

To measure satisfaction levels, a Likert scale was used, allowing participants to express their level of agreement with several statements, ranging from "strongly agree" to "strongly disagree." A post-test was designed to assess the extent to which participants' understanding had improved after participating in the entire series of activities. In addition, participants' perceptions of the benefits of the session were also assessed using a five-point scale :

(5) Very Useful, (4) Useful, (3) Fair, (2) Slightly Useful, (1) Not Useful.

Participants responded to questions regarding content relevance, delivery clarity, and ease of understanding for each session.

1. How useful was the learning material presented in Webinar I?
2. How useful was the learning material presented in Webinar II?
3. How useful was the learning material presented in the Workshop?
4. Was the content of Webinar I relevant to your needs?
5. Was the content of Webinar II relevant to your needs?
6. Was the content of the Workshop relevant to your needs?
7. How easy was it to understand the material in Webinar I?
8. How easy was it to understand the material in Webinar II?
9. How easy was it to understand the material in the Workshop?

The post-test contained questions similar to those in the pre-test, allowing for a comparative assessment of participants' understanding before and after the webinar and

workshop sessions. Both the post-test results and participant feedback were collected through a form distributed at the end of the program.

Overall, participants demonstrated high enthusiasm for the materials delivered in each session. This was reflected in the feedback questionnaire, where the majority of respondents provided positive ratings and expressed satisfaction with the content delivery. On average, responses indicated that the materials were considered useful, relevant to their needs, and presented clearly and understandably.

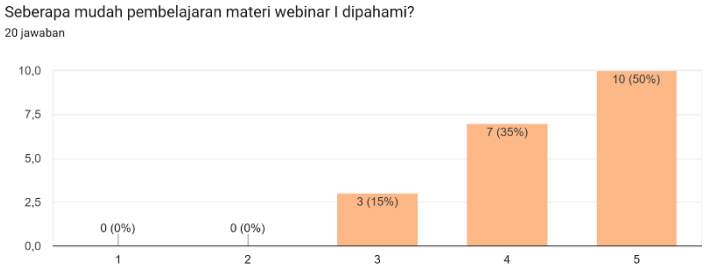

Figure 9: Participants' Understanding of Webinar I

Based on Figure 9, participants' understanding of the Webinar I material was classified as very good. 50% of respondents stated that the material was very easy to understand, while 35% rated it as fairly easy to understand. These results indicate that the material was delivered clearly and effectively.

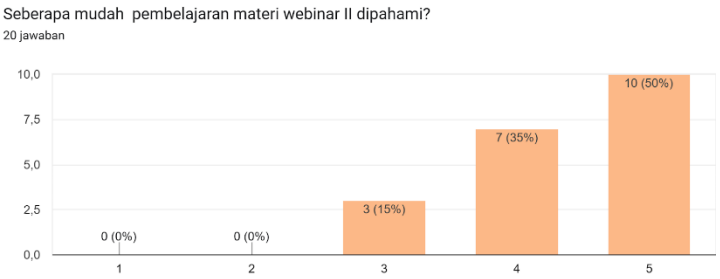

Figure 10: Participants' Understanding of Webinar II

Figure 10 shows that participants' understanding of the Webinar II material was also very good. 50% of respondents gave the highest rating, and 35% found the material easy to understand. This indicates that the delivery of the second webinar was effective and well comprehended by most participants.

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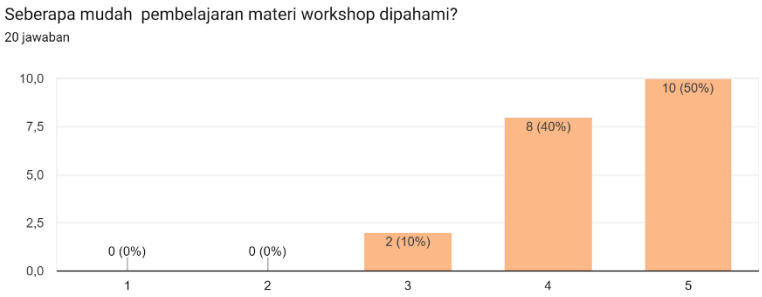

Figure 11: Participants' Understanding of the Workshop

Figure 11 shows a very positive response to the workshop material. Fifty percent of participants stated that the material was very easy to understand, and another 40% rated it as fairly easy to understand. These findings indicate that the delivery of the material was effective and successfully understood by the majority of participants.

The high level of satisfaction reflects the clarity and accessibility of the material, which enabled participants to absorb new knowledge well. Thus, this activity was deemed successful and received positive feedback from the audience.

In addition to filling out attendance and feedback forms, participants were also asked to take a post-test at the end of the program. The test was designed to assess the extent of improvement in understanding after participating in the webinar and workshop sessions. Below are selected results from the post-test completed by participants :

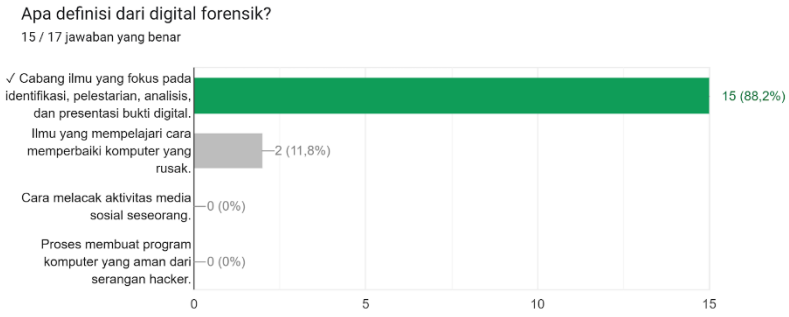

Figure 12 Post-Test Understanding Digital Forensics

Figure 12 shows that participants demonstrated a strong understanding of the definition of digital forensics. 88.2% (15 out of 17 participants) answered correctly, recognizing digital forensics as the discipline focused on the identification, preservation, analysis, and presentation of digital evidence. Only 11.8% responded incorrectly. This indicates that the core material was effectively delivered and well understood by the majority of participants.

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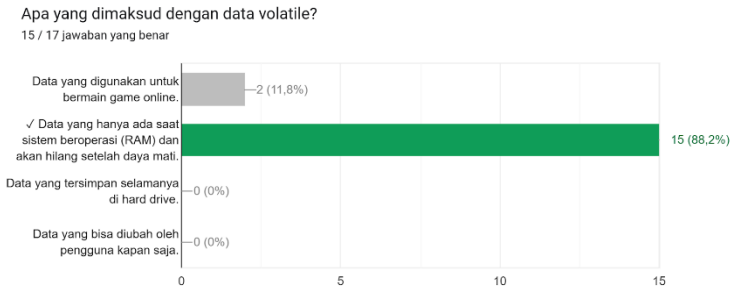

Figure 13 Post-Test Volatile Data

Figure 13 indicates a high level of understanding regarding the concept of volatile data. 88.2% (15 out of 17 participants) answered correctly, identifying volatile data as information that exists only while the system is running and is lost when power is off. Only 11.8% responded incorrectly. This suggests that the material was effectively delivered and well comprehended by the majority of participants.

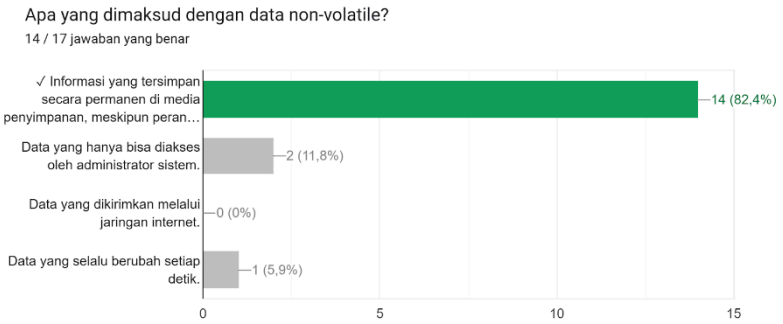

Figure 14 Post-Test Non-Volatile Data

Figure 14 shows that most participants understood the concept of non-volatile data well. A total of 82.4%, or 14 out of 17 participants, answered correctly, identifying non-volatile data as data that remains stored even when the device is turned off. Only a few participants answered incorrectly, indicating that the material was presented clearly and well understood by the majority of participants.

In general, the post-test results showed an increase in the number of correct answers to several questions, although the number of respondents was slightly lower than in the pre-test. This reflects an increase in participants' understanding of core materials such as digital forensics, volatile data, and non-volatile data.

After the completion of all activities, webinar and workshop participants received certificates of participation officially signed by the Head of the Informatics Engineering Study Program at Muhammadiyah University of Jakarta.

Table 2: Comparison of pre-test and post-test

Material	Percentage of Correct Answers (Pre-Test)	Percentage of Correct Answers (Post-Test)	Increase (%)
Digital Forensik	84.2% (16/19)	88.2% (15/17)	+4.0%

Data Volatile	73.7% (14/19)	88.2% (15/17)	+14.5%
Data Non-Volatile	72.2% (13/18)	82.4% (14/17)	+10.2%

Table 3: Participant satisfaction with webinars and workshops

Rating Scale	Number of Respondents	Percentage (%)	Interpretation
5 (Very Good)	12	60%	The speaker was very good at explaining the material and answering questions.
4 (Good)	6	30%	The speaker was good at explaining the material and answering questions.
3 (Neutral)	2	10%	Respondents have a neutral view.
2 (Kurang Baik)	0	0	-
1 (Tidak Baik)	0	0	-
Total	20	100%	-

D. CONCLUSION

The webinar and workshop titled "Introduction to Digital Forensics: Finding Lost Files in the Windows Operating System," held on July 12, 2025, proceeded smoothly and successfully achieved its primary objectives. The event significantly enhanced participants' understanding of the fundamental concepts of digital forensics.

Data from pre-test and post-test results showed a significant improvement. Participants' understanding of volatile data increased from 73.7% to 88.2%, while understanding of non-volatile data rose from 72.2% to 82.4%. Additionally, the understanding of the definition of digital forensics also improved from 84.2% to 88.2%.

Participant satisfaction levels were also high. Out of a total of 20 participants, 60% rated the program as "very good" and 30% as "good," resulting in 90% of participants expressing satisfaction with the content, delivery, and implementation of the activity. This achievement demonstrates that the activity successfully conveyed foundational understanding of digital forensics and enhanced awareness of the importance of data security in the digital world.

E.ACKNOWLEDGEMENTS

The organizing committee extends its deepest gratitude to the Computer Science Program, Faculty of Engineering, Muhammadiyah University of Jakarta, for the full support and facilities provided throughout the implementation of this event. Gratitude is also extended to the presenters, committee members, and all parties who actively participated and

collaborated closely in designing and successfully implementing this program. Special recognition is also given to all participants for their active participation and constructive feedback, which contributed to the overall success of the event.

F. AUTHOR CONTRIBUTIONS

During the webinar and workshop entitled "Introduction to Digital Forensics: Finding Lost Files in Windows Operating Systems," the entire team actively contributed according to their respective roles. Reza Ade Maulana served as the speaker for the session on digital security and ethics, prepared the materials, created certificates, and assisted with article writing. Oldi Alfani Sunan Saleh acted as the main expert on digital forensics, developed pre-test and post-test questions, and led the writing and revision of the article. Rizky Maulana designed promotional materials, tracked attendance and feedback, and documented the activities. Muhammad Haryanda managed registrations, guided the event, and contributed to the article. Rully Mujiastuti, M.M.SI, provided academic guidance from the planning stage to the final review. All these contributions significantly contributed to the success of the event and the successful publication of the article.

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