

# Measuring Awareness of the Importance of Green Computing Among Indonesian Senior High School Students: A Sample Study of One School

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## Abstract

Green computing socialization was conducted at SMK Muhammadiyah 8 Medan on May 31, 2025, to enhance student awareness regarding environmentally friendly technology practices. The primary issue addressed was the need to build a collective responsibility towards the environment within the school's digital culture. The purpose of this study is to measure the level of student awareness and evaluate the effectiveness of the education program which utilized lectures, demonstrations, and interactive discussions. The research method used is descriptive with a participatory approach, collecting data through observation and questionnaires. The results indicated a significant improvement in understanding among the 27 participants, with 8 participants responding "very understood" and 14 participants responding "understood" regarding the material. The activity had a positive impact, fostering enthusiasm for applying energy-saving principles in daily life. These findings highlight the potential of green computing education to form a generation that is not only academically competent but also ecologically responsible.

**Keywords:** *Green computing; student awareness; energy efficiency.*

## I. INTRODUCTION

Green Computing, or eco-friendly computing, is a sustainable approach to the use, development, and disposal of information technology and computer systems. It encompasses the entire lifecycle of technology, from design and manufacturing to usage and final disposal, aiming to reduce negative environmental impacts and increase energy efficiency.

In the context of education, schools are not only places for academic learning but also for character building. Current school curricula rely heavily on technology, necessitating computer laboratory facilities. However, existing laboratory systems often fail to provide adequate education regarding energy conservation and environmental impact, creating a gap in student character development regarding responsible technology use.

Green computing, also called sustainable computing, is the process of developing and optimizing computer chips, systems, networks, and software in such a manner that can maximize efficiency by utilizing energy more efficiently and minimizing then egativeenv ironmental in fluence onthes urrounding. The term "green computing" refers to practices that lessen the negative effects of technology on the environment. Due to the improvements in modern technology, various devices, mechanisms, and software have been developed, and lots of studies have been conducted to optimize and increase those technologies (Paul et al., 2023).

Climate change is profoundly affecting nearly all aspects of life on earth, including human societies, economies, and health. Various human activities are responsible for significant greenhouse gas (GHG) emissions, including data centers and other sources of large-scale computation. Although many important scientific milestones are achieved thanks to the development of high-performance computing, the resultant environmental impact is underappreciated (Lannelongue et al., 2021).

Green computing aims to bridge this gap by promoting approaches such as "Green Use" (minimizing electricity consumption), "Green Disposal" (recycling e-waste), "Green Design" (energy-efficient hardware), and "Green Manufacture" (minimizing waste during production). Previous views by Vithoba (2010) suggest solutions like energy efficiency, reducing paper waste, and recycling are essential practical steps.

Therefore, implementing green computing socialization at SMK Muhammadiyah 8 Medan is crucial. This study aims to develop and execute a socialization program to measure and increase environmental awareness among students and the surrounding community. It contributes to creating a foundation for students to become wise technology users who can balance digital needs with environmental conservation.

## II. RESEARCH METHODOLOGY

The research employed a quantitative descriptive method with a participatory approach through counseling and training. The activity was

conducted on May 31, 2025, with the following stages:

#### A. Activity Design

1. Delivery of basic theory via lectures and presentations.
2. Interactive discussions and Q&A sessions.
3. Mentoring on practical applications of green computing.

#### B. Research Participants

The participants consisted of 27 students from the Visual Communication Design (DKV) and Accounting classes, comprising 5 male students and 22 female students.

#### C. Data Collection Techniques

Observation: Direct observation of participation and enthusiasm during the session.

Questionnaire: Distributed via Google Form using a Likert scale (1-5) to measure material understanding and program satisfaction.

#### D. Analysis Techniques

Data were analyzed descriptively by evaluating the responses from the questionnaires to determine the level of understanding and satisfaction of the participants after the activity.

### III. RESULTS AND DISCUSSION

#### A. Evaluation Results

The socialization activities received positive responses. Based on the evaluation of material understanding:

1. 8 participants (approx. 29.6%) responded that they "Very Understood" the material.
2. 14 participants (approx. 51.8%) responded that they "Understood".
3. 5 participants responded that they "Quite Understood".

This data indicates a significant success rate in transferring knowledge, where the majority of students moved from being unfamiliar with the term "Green Computing" to having a solid grasp of the concept.

#### B. Student Responses

Based on the questionnaire regarding the execution of the activity:

1. Material Clarity: 44.4% of students gave a maximum score (5/5) for ease of understanding the material.
2. Media Presentation: 59.3% rated the presentation media as 4/5, indicating it was easy to understand and not boring.
3. Speaker Performance: 51.9% rated the speakers' organization and delivery as 4/5, while 44.4% gave a perfect score of 5/5.

#### C. Discussion

Green Computing, or referred to as Komputasi Hijau in Indonesian, is a term used to refer to sustainable and environmentally friendly practices in the usage, development, and disposal of computer technology and information systems. Green computing involves not only end-users but also encompasses the entire technology lifecycle, starting from product design, manufacturing processes, usage, to final disposal (Hakim et al., 2025)

### IV. CONCLUSION

Based on the comprehensive analysis of the socialization activities conducted at SMK Muhammadiyah 8 Medan on May 31, 2025, it can be concluded that the program serves as a pivotal strategic step in bridging the gap between technical competency and ecological awareness among vocational students. The results of the post-activity evaluation indicated a substantial shift in knowledge standards, where the majority of participants (approximately 81.5%) achieved a level of "Understood" or "Very Understood." This quantitative success validates the effectiveness of the participatory learning method—combining theoretical lectures with practical demonstrations—in simplifying complex Green Computing concepts into actionable knowledge for students.

Furthermore, the qualitative observations revealed that the intervention successfully ignited a critical mindset among students. This was evidenced by the high enthusiasm and the depth of questions raised during the interactive sessions, particularly regarding the long-term environmental impacts of their daily digital habits. The program has not only transferred technical knowledge but has also laid a strong foundation for a sustainable digital culture within the school environment. Consequently, the students are now better equipped to become agents of change who can responsibly navigate the challenges of the modern digital era, balancing their technological needs with a profound commitment to environmental preservation.

### V. RECOMMENDATIONS

In light of the findings and to ensure the sustainability of the initial positive impacts observed at SMK Muhammadiyah 8 Medan, several comprehensive recommendations are proposed for the school administration, educators, and relevant stakeholders:

1. Curriculum Integration: Schools should move beyond ad-hoc socialization and formally integrate Green Computing modules into the core Information and Communication Technology

(ICT) curriculum. Specific topics such as "Energy-Efficient Coding," "Sustainable Hardware Lifecycles," and "E-Waste Management" should be embedded into relevant subjects like Computer Systems and Basic Networking.

2. Infrastructure and Policy Optimization: The school is advised to implement concrete "Green Policies" in computer laboratories. This includes standardizing the procurement of energy-star-rated devices, installing automatic power management software to shut down inactive systems, and establishing a dedicated e-waste collection corner to facilitate proper recycling protocols.
3. Student-Led Initiatives: To foster peer-to-peer learning, the formation of a "Green IT Ambassador" squad or a student club dedicated to environmental technology is highly recommended. These student groups can lead regular campaigns, peer monitoring of energy usage, and creative upcycling projects for old electronic components.
4. Community Engagement: The scope of impact should be expanded by establishing partnerships with local environmental NGOs or certified e-waste recyclers. Schools can organize periodic "E-Waste Drop-off Days" involving not just students but also the surrounding community, thereby positioning the school as a hub for environmental awareness.
5. Longitudinal Monitoring: Future research and school evaluations should adopt a longitudinal approach. Periodic assessments should be conducted every semester to track whether the increase in knowledge translates into consistent long-term behavioral changes, ensuring that the eco-friendly habits formed are permanent and evolving.

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