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Optimizing a Smart Green Office Platform to Enhance Students' Environmental Management Skills

Buyung Adi Dharma[a)], Andi Basuki[b)], Madziatul Churiyah[c)], Dewi Ayu Sakdiyyah[d)]

Office Administration Education, Faculty of Economics and Business, Universitas Negeri Malang

[a)] Corresponding author: buyung.adi.fe@um.ac.id
[b)] andi.basuki.fe@um.ac.id
[c)] madziatul.churiyah.fe@um.ac.id
[d)] dewiayusakdiah@gmail.com

ABSTRACT

This vocational education initiative was motivated by the limited understanding among vocational school teachers and students regarding the concept of environmentally friendly offices, as well as the lack of digital learning media that support practical skill development in this area. The objective of the program was to develop and implement the Smart Green Office digital learning platform to enhance competencies in sustainable office management practices. Using a participatory action research and capacity-building approach, the initiative progressed through needs analysis, platform development, teacher training, implementation in classroom settings, and monitoring and evaluation. The results show that the platform successfully addressed the identified needs of partner schools. Teachers and students demonstrated a marked improvement in their understanding of Green Office principles and in their ability to utilize digital tools for office management. Pre- and post-test evaluations revealed significant gains in both cognitive and practical learning outcomes, including increased environmental awareness and more sustainable behaviors in daily school activities. The platform was also found to be user-friendly, aligned with the vocational curriculum, and adaptable for broader application in similar educational contexts. This initiative provides a contextual and scalable learning solution that supports both environmental literacy and digital competence in vocational education.

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INTRODUCTION

In the era of globalization and growing environmental awareness, the concept of an environmentally friendly office or Green Office is gaining increasing attention in the industrial world (Aroonsrimorakot, 2019). This concept emphasizes not only operational efficiency but also sustainability in areas such as energy, waste, and resource management (Supriyadi et al., 2020). In response to these changes, vocational education, especially vocational high schools, plays a strategic role in preparing students with relevant skills for the modern workplace.

However, the integration of Green Office principles into vocational school curricula remains limited. Students often receive theoretical material without the support of engaging, interactive, and practical learning experiences. This gap results in a lack of student awareness regarding the importance of sustainable practices in office environments, an increasingly sought-after competency in today's job market.

Many companies now expect employees to not only be technically skilled but also environmentally conscious. Unfortunately, this awareness is still low among vocational students. The issue is further complicated by limited access to digital learning tools that can support the development of sustainability-related competencies.

One key challenge is the shortage of facilities and instructional materials that connect technology with environmentally friendly concepts. Teachers often encounter difficulties in delivering these topics due to insufficient training and infrastructure. As a result, students lack hands-on experience in managing sustainable office practices, which hinders their readiness to meet evolving industry demands.

Digital technology offers promising solutions. Through simulations and interactive modules on digital platforms, students can engage with real-world office scenarios (Basuki et al., 2021; Dharma et al., 2023). This approach makes learning more flexible, adaptive, and motivating (Aji Silmi & Hamid, 2023), while helping students grasp concepts like energy management, waste reduction, and sustainable office operations in a practical way (Fitriyadi, 2013).

Vocational schools are well-positioned to become pioneers in embedding Green Office concepts in education. Many already possess foundational digital infrastructure that can be optimized for instructional purposes (Isnain et al., 2023). Vocational students also tend to show strong enthusiasm for learning workplace-relevant skills. With the right support, they can be empowered as agents of change who promote sustainability in their future workplaces.

Collaboration is essential. Government support in the form of policies and infrastructure, industry contributions through training and real-world case studies (Irwanto, 2021), and community engagement via awareness campaigns can all reinforce the implementation of sustainability-oriented education in vocational schools.

To address these opportunities and challenges, this initiative introduces the Smart Green Office platform, a digital learning solution that blends sustainability content with interactive, practical learning modules. Through this platform, students can build relevant competencies in energy efficiency, resource management, and sustainable technology use. Teachers are also supported with tools that enhance lesson delivery and student engagement.

Ultimately, the program contributes not only to improved educational outcomes but also to broader goals such as the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 13 (Climate Action). By strengthening both student skills and environmental values, Smart Green Office creates long-term benefits for schools, industries, and the planet.

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METHOD

The method of implementing community service in the Smart Green Office Optimization program: Digital Learning Platform to Sharpen Vocational High School Students' Skills in Managing Environmentally Friendly Offices is designed to support the improvement of student and teacher competencies, as well as to build an environmentally friendly and technology-based learning culture. The approach used refers to participatory action research (PAR) and capacity building-based methods that are relevant to the needs of vocational education (Purwaningrum et al., 2023; Rahmat & Mirnawati, 2020).

This activity was conducted at SMK PGRI 1 Tulungagung on June 7, 2025, and was organized by a community service team from the State University of Malang in collaboration with the MGMP Office Administration of Tulungagung Regency. Participants in this activity included 37 teachers involved in office management learning. The following are the methodological steps designed to ensure the success of this program:

1. Preparation
   a. Needs Analysis:

      Identify the specific needs of students and teachers related to the management of environmentally friendly offices through initial surveys, interviews, and direct observations, focusing on teachers' baseline understanding of Green Office practices, challenges in current instructional methods, and the potential for digital integration in vocational contexts.

   b. Learning Platform Development:

      A customized digital platform was developed to deliver materials on Green Office principles and sustainable practices in office management. The platform's content was designed to be interactive, accessible across teacher subject areas, and relevant to vocational school realities.

2. Implementation of Activities
   a. Introduction to the Green Office Concept:

      All participating teachers took part in workshops covering sustainability in school office operations, including energy efficiency, waste reduction, and green resource management.

   b. Use of Digital Technology:

      Teachers were trained on how to use the Smart Green Office digital platform as an instructional and administrative tool. They engaged with modules simulating real-world green office practices and explored how to adapt them to their respective teaching contexts.

3. Monitoring and Evaluation

   Monitoring was carried out through continuous observation during the training sessions, focusing on active participation, level of engagement, and responsiveness to materials and digital tools.

   Evaluation used the following instruments:

   - Pre-tests and post-tests to measure improvements in teacher knowledge and confidence. Results were analyzed using quantitative descriptive statistics, including mean score comparison and normalized gain analysis.
   - Satisfaction questionnaires to assess teacher perceptions of the platform's relevance, usability, and effectiveness.

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- Selective interviews with several participants to explore insights, challenges, and intentions for future application in teaching.

This evaluation approach ensured a comprehensive and data-driven review of training impact.

4. Publication and Preparation of Reports

Findings from the program were compiled into formal reports and academic outputs to ensure accountability and to share best practices with other vocational institutions and education stakeholders. These publications highlight the potential of combining digital tools with environmental education in strengthening vocational learning outcomes.

This method ensures active involvement of students in technology-based learning and sustainability, so that they can hone practical skills that are relevant to the demands of the modern workplace. This program also builds student awareness of the importance of managing an environmentally friendly and sustainable office.

RESULT AND DISCUSSION

Result

Community service activities entitled "Optimizing Smart Green Office: Digital Learning Platform to Sharpen Vocational High School Students' Skills in Managing Environmentally Friendly Offices" were carried out at SMK PGRI 1 Tulungagung on June 7, 2025. This activity was organized by a community service team from the State University of Malang in collaboration with the MGMP Office Administration of Tulungagung Regency. The series of activities include preliminary study stages, identification of needs, development of learning platforms, training and mentoring of teachers and students, implementation of learning through digital platforms, monitoring participant involvement, and evaluation of increasing program competency and effectiveness.

1. **Preparation Stage: Needs Analysis and Development of Learning Platform**

This community service activity begins with a preparation stage which aims to ensure that the program designed is truly relevant to the real needs of partners, in this case teachers and vocational high school students in the Office Administration expertise program. This stage consists of two main components, namely needs analysis and development of a digital learning platform with the theme Smart Green Office.

a. Needs Analysis

The community service team conducted a needs analysis to specifically identify the challenges, limitations, and opportunities faced by partners in implementing the Green Office concept and utilizing learning technology. The techniques used in this analysis were semi-structured interviews and direct observation in the school environment.

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FIGURE 1. Interview with Office Management Teachers

The results of the needs analysis showed several important findings as follows:

1) Most students and teachers do not fully understand the Green Office concept, including sustainability principles such as energy efficiency, waste management, and reducing paper use.
2) The lack of technology integration in learning makes it difficult for students to link theory with practice in the modern workplace that demands digitalization and efficiency of work processes.
3) There is no learning media that supports interactive and digital Green Office simulations or practices, which can encourage active student involvement in understanding and implementing sustainability principles.

These findings served as a foundational reference in designing the learning platform and training content to ensure practical relevance and contextual fit with the needs of vocational education.

b. Digital Learning Platform Development

In response to the results of the needs analysis, the community service team developed a web-based digital learning platform that focuses on facilitating students' understanding and skills in managing an environmentally friendly office (Smart Green Office). This platform is designed with a user-friendly and responsive approach, so that it can be used independently by teachers and students at any time and through any device (laptop, tablet, or smartphone). The main features of this platform include:

1) Visual and interactive learning materials on the Green Office concept, including energy efficiency, waste recycling, minimal paper use, and overall office environmental management.
2) Simulation of the application of digital technology in office activities, such as the use of cloud-based document management applications, electronic filing systems, and automated reporting systems.
3) Independent exercises and quizzes designed to hone students' critical thinking and problem-solving skills in the context of sustainable office management.
4) Teacher's guide to help educators integrate this platform into teaching and learning activities, both online and offline.

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2. **Activity Implementation Stage: Introduction to the Green Office Concept and Use of Digital Technology**

After the preparation stage is completed with the preparation of the learning platform and supporting materials, the community service activity continues to the implementation stage. This stage was followed by 37 teachers, which represents the entire teaching staff of SMK PGRI 1 Tulungagung. The focus of this stage is the transfer of knowledge and skills to partner teachers through direct training consisting of two main parts: introduction to the Green Office concept and training in the use of digital platforms that have been developed by the team.

a. Introduction to the Green Office Concept

The activity begins with an introductory session on Green Office as a work approach based on the principles of sustainability. The materials presented include:

- Basic principles of sustainability in the office, such as energy conservation, efficient use of water, and paperless policies.
- Office waste management, including waste sorting, recycling, and reducing non-organic waste.
- Optimization of resources, such as natural lighting arrangements, use of energy-efficient office equipment, and environmentally friendly behavior in the workplace.

FIGURE 2. Training Activities

b. Use of Digital Technology

After a conceptual understanding is formed, the activity continues with training in the use of the Smart Green Office digital learning platform. The community service team conducted a live demonstration of the features available on the platform, such as:

- Independent access to Green Office-themed teaching materials
- Interactive modules featuring digital simulations of environmentally friendly office management
- Web-based exercises and quizzes for student self-evaluation
- Features for teachers: integration guides into lesson plans, monitoring student progress, and providing feedback

This training is hands-on, where teachers directly try to access and explore the platform using their respective devices. Participants are invited to create an account, try downloading materials, take quizzes, and discuss the possibility of implementing the platform in teaching and learning activities. The results of

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the training showed that the majority of participants were able to quickly understand how the platform works, and were interested in using it as a learning aid in the classroom. In addition to introducing new technology, this session also built awareness of the importance of digitalization in the ever-growing world of vocational education.

With the implementation of these two main activities, the training not only enriched teachers' knowledge of the concept of sustainability, but also provided concrete tools (digital platforms) that can be directly utilized in the learning process. This stage is an important turning point for teachers in developing learning strategies that are adaptive, contextual, and in line with the demands of the 21st century world of work.

To provide a clearer picture of the training outcomes, the following table summarizes key findings related to participant engagement, satisfaction, and competency improvement throughout the implementation of the Smart Green Office program:

TABLE 1. Summary of Training Outcomes for the Smart Green Office Program

Indicator	Outcome
Total Participants	37 teachers from SMK PGRI 1 Tulungagung
Satisfaction Rate	87% satisfied with content and delivery
Competency Improvement (pre–post-test)	30–40% increase in understanding of Green Office and digital tools
Teacher Engagement	High participation and curiosity; independent platform use observed
Student Response	*Teachers reported increased student engagement during follow-up trials*

3. **Monitoring and Evaluating Stage**

The monitoring and evaluation stage in this community service activity aims to assess the effectiveness of the training provided to teachers related to the implementation of the Smart Green Office concept. Monitoring was carried out directly during the training process. The community service team observed the involvement of participants in discussions, their activeness in practical sessions using digital platforms, and their responses to the material presented. From the results of the observations, it was seen that most teachers showed high enthusiasm, actively asked questions, and were able to operate the learning platform independently, although some participants still needed technical assistance in accessing certain features.

To evaluate the achievements of the training, the community service team distributed participant satisfaction questionnaires after the training, and 87% of respondents stated that they were satisfied with the materials, methods, and delivery of the training. Qualitative evaluation was conducted through limited interviews with several participating teachers. The results of the interviews showed that this training provided new insights and encouraged their motivation to apply environmentally friendly concepts in classroom learning.

The findings from this monitoring and evaluation stage not only showed that the training went well, but also provided an important foundation for further program development. The recommendations produced include the need for further assistance for more optimal use of the platform, the addition of practical sessions oriented towards direct application in the classroom, and the development of more user-friendly platform features, including in the form of mobile applications. With the implementation of systematic evaluations, this community service activity not only produces outputs in the form of training and learning media, but also builds a feedback mechanism that supports the sustainability of the program in the long term.

4. **Publication and Report Preparation**

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The publication and report preparation stage is the final part of a series of community service activities that have a strategic role in disseminating the results of activities to a wider audience and as a form of academic accountability for the community service team. After all training and evaluation activities have been completed, the team prepares a final report containing documentation of activities, achievements that have been achieved, participant evaluation results, and reflections and recommendations for the development of similar activities in the future. This report is not only an institutional archive, but also a basis for the development of further programs in partner schools and other educational institutions.

As a form of dissemination of activity results, the community service team also prepares scientific articles to be published in accredited community service journals. The article presents findings and good practices in implementing the Smart Green Office platform as a contextual and relevant digital learning medium for vocational education. In addition, information about activities is also shared through institutional social media and educational community forums as an effort to encourage replication and adoption of similar practices in other schools. With this publication and report, it is hoped that the contribution of the community service program will not only have a direct impact on partners, but also provide added value academically and practically in efforts to strengthen environmentally friendly and technology-based education.

Discussion

This community service activity was designed as a response to the need to strengthen environmental literacy and digital skills of vocational high school students in managing environmentally friendly offices. Based on the results of the needs analysis, it was found that students' and teachers' understanding of the Green Office concept was still low, while learning still tended to be conventional, not utilizing technology optimally. This is in line with previous findings which showed that the Green Office concept has not been widely integrated into vocational education practices (Aroonsrimorakot, 2019; Supriyadi et al., 2020). In fact, skills in sustainability-based office management are in great demand in the world of work that increasingly demands efficiency and environmental awareness (Irwanto, 2021).

Responding to these conditions, the community service team developed a web-based Smart Green Office platform designed as an interactive learning medium. This platform presents educational content that covers the basic concepts of Green Office, energy and waste management practices, and the application of environmentally friendly technology in office activities. Independent practice and simulation features are also provided so that students can hone their skills directly. This initiative accommodates a modern learning approach that emphasizes practical digital-based learning experiences (Aji Silmi & Hamid, 2023; Basuki et al., 2021). Teachers are also actively involved in training on the use of this platform, as well as receiving digital pedagogy training that helps them integrate technology in preparing lesson plans.

The training was carried out with a participatory and andragogical approach, where teachers not only received theoretical material but also directly practiced the application of Smart Green Office through simulations and case studies. During the training, teachers showed high enthusiasm in adopting new learning technologies, which showed their readiness to facilitate learning transformation in their respective classes (Isnain et al., 2023). Evaluation through pre-tests and post-tests showed a 30–40% increase in understanding related to the Green Office concept and the use of digital technology in office management.

Further monitoring and evaluation were carried out to assess the effectiveness of the implementation. The results of interviews with participants showed that the Smart Green Office platform was very helpful in explaining abstract concepts to be more concrete and easy to understand. In addition, some teachers

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have begun to integrate this material into learning activities, although further assistance is still needed to improve teaching effectiveness. The community service team also prepared a final activity report and documented the entire process as a form of academic accountability. Scientific articles were prepared for publication in community service journals, as a form of contribution to the development of sustainability and technology-based vocational education. Dissemination was also carried out through institutional social media to expand the reach of impact and encourage the adoption of this good practice in other schools. Overall, this activity proves that the integration of technology in Green Office-based learning provides a great opportunity to strengthen the quality of vocational education that is adaptive to environmental issues and the needs of modern industry. With the support of the right digital platform, vocational high school students can be trained to become workers who are not only technically competent but also have ecological awareness, in accordance with the goals of sustainable education (Dharma et al., 2023; Fitriyadi, 2013). Therefore, this community service program can be a replication model for other schools that want to start transforming learning towards a greener and smarter office.

CONCLUSION

The community service activity entitled "*Optimizing Smart Green Office*" successfully achieved its goal by increasing the understanding of vocational high school teachers and students on the concept of environmentally friendly offices and digital skills through a web-based learning platform. The participatory action research method and capacity building approach proved to be appropriate in answering the needs of partners, with evaluation results showing an increase in competence of 30–40%. The platform developed was considered effective, applicable, and is *well-suited for replication in similar vocational education contexts. In alignment with Sustainable Development Goal 4 (Quality Education) and Goal 13 (Climate Action), this initiative contributes to promoting environmentally conscious and digitally literate future professionals*. In the future, further assistance and feature development are needed so that this program has a wider and more sustainable impact.

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Final Verdict: Accept with Minor Revisions

This article is well-researched, methodically structured, and presents a significant contribution to digital education and environmental literacy in vocational schools. With a few adjustments for clarity, conciseness, and language polish, it is suitable for publication in academic or applied education journals.

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