Jurnal Pengabdian UNDIKMA:
Jurnal Hasil Pengabdian & Pemberdayaan kepada Masyarakat
https://e-journal.undikma.ac.id/index.php/jpu/index
Email: pengabdian@undikma.ac.id

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

Implementation of Building Information Modelling Training to Strengthen Design-Building Competencies of Vocational Teachers and Students

Ahmad Zulfikar*, Kinanti Wijaya, Sutrisno, Harry Wibowo, Rafika Hilmi Nasution, I Gede Wyana Lokantara, Fajar Arjuna, M. Andrey Harun, Jun Kristiani Nduru, Natachia Siburian, Nabilah Fernanda Daulay, Riansyah Putra, Wisnu Prayogo
Universitas Negeri Medan, Indonesia.
*Corresponding Author. Email: ahmadzulfikar@unimed.ac.id

Abstract: This community service program aims to improve the Building Information Modeling (BIM) competencies of vocational teachers and students at SMKN 1 Lubuk Pakam and to support the integration of BIM into vocational building design education. The program was implemented through demonstrations, hands-on training, and curriculum integration assistance. A total of 16 participants, consisting of teachers and students from the Building Modeling and Information Design program, took part in the activities. Data were collected using a BIM knowledge test, a perception questionnaire, a teacher readiness questionnaire, and a practical assessment rubric for BIM modeling skills. Descriptive statistics were used to summarize the data, while changes in participants' BIM knowledge were analyzed using the Wilcoxon signed-rank test. The results showed that the mean BIM knowledge score increased from 17.62 on the pre-test to 19.88 on the post-test. This improvement was statistically significant ($p = 0.039$), with a moderate effect size (0.65). Participants' perceptions of BIM also improved, with the mean score increasing from 3.44 to 4.09 and the proportion of responses in the high category rising from 51.3% to 90.0%. Teachers' readiness to integrate BIM into classroom instruction increased substantially, with the mean score rising from 2.00 to 4.36 and the proportion of high-category responses increasing from 13.9% to 94.0%. In addition, participants successfully applied fundamental BIM workflows and produced simple digital building models. These findings indicate that the program effectively enhanced participants' BIM knowledge, practical competencies, and teachers' readiness to integrate BIM into vocational learning. Nevertheless, sustained mentoring and advanced training are recommended to support the development of more complex BIM competencies and long-term curriculum implementation.

Article History:
Received: 09-06-2026
Reviewed: 15-07-2026
Accepted: 29-07-2026
Published: 20-08-2026

Key Words:
Building Information Modelling; BIM Training; Vocational Education; Teacher Competence; Curriculum Assistance.

How to Cite: Zulfikar, A., Wijaya, K., Sutrisno, Wibowo, H., Nasution, R. H., Lokantara, I. G. W., … Prayogo, W. (2026). Implementation of Building Information Modelling Training to Strengthen Design-Building Competencies of Vocational Teachers and Students. *Jurnal Pengabdian UNDIKMA*, *7*(3), 965-976. https://doi.org/10.33394/jpu.v7i3.21827

https://doi.org/10.33394/jpu.v7i3.21827

Introduction

The digitalization of the construction industry is on the rise (Sarwa et al., 2026). Design work is no longer two dimensional drafting as construction projects now demand integrated information, coordination, visualization and data-based decision making. As it allows to represent project information in a digital model across the building life cycle (Succar, 2009), BIM is one of the key technologies in Architecture, Engineering, Construction and Operation. BIM also facilitates better visualization and coordination among project stakeholders. It is useful for designers, engineers and constructors to identify potential design and construction problems before their occurrence on site (Azhar, 2011). Vocational education is being directly affected by this change. Vocational schools are expected to prepare the graduates to not only draw building plans but also to understand the digital workflows used by the construction industry. Students should be introduced to BIM concepts, model-based design and project information management early in building design programs. Teachers require adequate BIM competence to translate industrial technology into classroom learning. Without this competence, learning may still be concentrated on conventional drawing tools, while the industry moves more and more to integrated digital construction. Therefore, the need to relate education with industry practice is important in vocational schools offering building modelling and design programs. Students can develop stronger design literacy, spatial understanding and knowledge of construction coordination using BIM competence.

The integration of BIM into education is not just about teaching software commands. BIM learning should include concepts, workflows, collaboration, model development and practical outputs. Sacks and Pikas (2013) have identified the need to develop BIM education according to industry needs, learning topics and competency levels. Pikas et al. (2013) also indicated that BIM should be taught not only as a separate subject but also as a teaching tool in design, analysis and management courses. This indicates that BIM education need to be integrated with existing vocational subjects. The curriculum design of BIM has become a significant issue in architecture, engineering and construction education due to the increasing industry demand (Abdirad & Dossick, 2016). Abbas et al. (2016) also discussed the need of modern digital tools in construction education to prepare the graduates with relevant competencies for professional practice. “Moreover, BIM learning is supported by modular, practice-oriented activities. On the other hand, Bozoglu (2016) states that the collaboration and coordination learning modules can help the students understand BIM as an integrated process instead of a modelling activity. More recent work by Olowa et al. (2023) similarly shows that effective BIM-enabled education depends on technology readiness, attitudes of educators, organizational support and suitable teaching strategies. These studies indicate that BIM training for teachers and students should include demonstration, hands-on practice, and curriculum assistance. This approach is appropriate for community service activities as it meets the needs of practical skill development along with institutional learning.

SMKN 1 Lubuk Pakam was selected as a partner school because it offers a Building Modelling and Information Design concentration and has strong potential for developing BIM-based learning. The preliminary assessment showed that the school had one computer laboratory available to support digital design practice and the initial implementation of BIM-based learning. More concretely, the baseline assessment involved 16 participants and produced a mean BIM knowledge score of 17.62 out of 20. However, the lowest-performing test item was answered correctly by only 68.75% of the participants, indicating gaps in specific BIM concepts and technical modelling knowledge. However, teachers and students still faced several challenges in adopting BIM. Teachers were more familiar with AutoCAD and SketchUp, whereas the construction industry has increasingly adopted BIM-based workflows. The partner assessment identified the school’s main challenges as teachers’ limited experience with BIM, difficulties in integrating BIM into the vocational curriculum, and students’ limited BIM competencies. This condition is consistent with the findings of Sucipto et al. (2024), who reported that many vocational high school teachers in Indonesia had not implemented BIM-based learning because they lacked sufficient understanding and

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

mastery of the technology. Jaya et al. (2023) also demonstrated through a community service program that BIM training was relevant to teachers and students in Building Modelling and Information Design programs. Based on these identified needs, this community service program aimed to improve the BIM competencies of vocational teachers and students at SMKN 1 Lubuk Pakam and facilitate the integration of BIM into vocational building-design learning. Specifically, the program sought to strengthen participants' understanding of basic BIM concepts and practical modelling skills, while assisting teachers in aligning BIM-based activities with vocational subjects, learning materials, and classroom assignments. This approach also supports sustainable BIM adoption through continuous mentoring and institutional collaboration.

Method

1) Program Design and Empowerment Approach

The community service program employed a participatory and practice-based empowerment approach to improve the BIM competencies of teachers and students at SMKN 1 Lubuk Pakam. The program addressed two needs identified during the preliminary assessment: participants' limited experience in using BIM and teachers' difficulties in integrating BIM into vocational learning. Accordingly, the program combined BIM training, guided practice, and curriculum assistance. Operationally, the service team and the partner school jointly coordinated the program schedule, participant involvement, facility readiness, learning activities, and evaluation procedures. The partner school was actively involved in identifying learning needs, providing the training venue and computer laboratory, organizing participants, and aligning the activities with the school curriculum. During the training, participants observed BIM demonstrations, completed guided modelling exercises, discussed technical problems with the facilitators, and received direct feedback. Teachers also received assistance in developing BIM-based learning activities that could be adapted to vocational subjects. This participatory process allowed participants to ask questions, solve problems, and receive immediate support during the activity (Mulyana et al., 2026).

2) Location, Time, and Target Community

The community service program was conducted at SMKN 1 Lubuk Pakam, located on Jl. Galang, Tanjung Garbus Satu, Lubuk Pakam District, Deli Serdang Regency, North Sumatra, Indonesia. The school was selected because it offers a Building Modelling and Information Design concentration and has a computer laboratory that supports digital design learning. The overall community service program was conducted from April to December 2026, while the main BIM training and participant evaluation were carried out in June 2026. A total of 16 participants, comprising vocational teachers and students from the Building Modelling and Information Design concentration, participated in the program. Teachers were included because of their role in integrating BIM into classroom learning, learning materials, and practical assignments. Students were involved as the direct beneficiaries of BIM-based vocational learning. The activities were adjusted to the participants' varying levels of digital-design experience. The training focused on basic BIM concepts, guided building-modelling practice, model visualization, and the application of BIM in vocational learning. Facilitators provided direct assistance during the practice sessions so that participants could complete the assigned activities and discuss difficulties encountered during the learning process (Aphirta et al., 2026; Imami et al., 2023).

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

3) Implementation Stages

The program was implemented through five operational stages. The first stage involved needs assessment and coordination with the partner school. The service team and school representatives determined the activity schedule, participant requirements, availability of computers, training-room readiness, and division of responsibilities. The second stage was the preparation of training materials and practical assignments. The materials were adapted to the participants' initial competence and the learning needs of the Building Modelling and Information Design concentration. The third stage consisted of BIM training through demonstrations and guided hands-on practice. Facilitators demonstrated the basic modelling workflow, after which participants completed simple building-modelling exercises with direct assistance from the service team. The fourth stage involved curriculum assistance for teachers. Teachers discussed how BIM activities could be incorporated into vocational subjects, practical assignments, and learning materials. They were also assisted in preparing initial ideas for BIM-based classroom activities. The fifth stage consisted of monitoring and evaluation. Participants completed assessments before, during, and after the training to measure changes in knowledge, perceptions, readiness, and practical performance. Each implementation stage included clearly defined responsibilities for the service team and the partner school to ensure that the program was conducted systematically and according to the participants' learning needs. The service team was responsible for preparing materials, facilitating training, providing mentoring, and conducting evaluations. The partner school was responsible for organizing participants, providing facilities, and supporting the integration of program outputs into vocational learning.

4) Instruments and Data Collection

Four instruments were used in the program. The first was a BIM knowledge test administered before and after the training to measure changes in participants' understanding of fundamental BIM concepts and their application in building design. The second was a perception questionnaire used to assess participants' views regarding the usefulness and relevance of BIM to vocational education. The third instrument was a teacher-readiness questionnaire that assessed teachers' confidence, willingness, and preparedness to integrate BIM into classroom learning. The fourth instrument was a practice-assessment rubric used to evaluate participants' performance during the guided BIM exercises, including their ability to follow basic modelling procedures, complete the assigned tasks, and produce simple digital models. Data collection was conducted at three operational points: before, during, and after the training. Before the training, participants completed the BIM knowledge pre-test and initial questionnaires. During the training, facilitators used observation sheets and practice-assessment rubrics to document participant involvement, practical performance, and learning difficulties. After the training, participants completed the post-test and final questionnaires. The collected data were then organized into recap tables for analysis (Chaerul et al., 2025).

5) Data Analysis and Success Indicators

Quantitative data were analyzed using frequencies, percentages, and mean scores. The pre-test and post-test results were compared to determine changes in participants' BIM knowledge. Questionnaire responses were summarized according to their response categories to describe changes in participants' perceptions of BIM and teachers' readiness to integrate BIM into vocational learning. The distribution of the differences between pre-test and post-test scores was examined using the Shapiro–Wilk test. Because the score differences were not normally distributed, the Wilcoxon Signed-Rank Test was used to determine whether participants' BIM knowledge improved significantly after the training. Observation notes and

Jurnal Pengabdian UNDIKMA:
Jurnal Hasil Pengabdian & Pemberdayaan kepada Masyarakat
https://e-journal.undikma.ac.id/index.php/jpu/index
Email: pengabdian@undikma.ac.id

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

practice-assessment results were used to support the quantitative findings and describe participants' engagement and difficulties during the activities. Program success was evaluated using five operational indicators: (1) an increase in participants' BIM knowledge scores; (2) more positive perceptions of BIM; (3) greater teacher readiness to integrate BIM into vocational learning; (4) participants' ability to complete basic tasks; and (5) the availability of initial BIM-based learning activities or teaching-material drafts for classroom use.

Result and Discussion

Baseline Condition and Community Needs

The baseline condition showed that SMKN 1 Lubuk Pakam had strong potential to develop BIM-based vocational learning. The school already had a Building Modelling and Information Design concentration and a computer laboratory capable of supporting digital design practice. Its location in Lubuk Pakam, Deli Serdang, North Sumatra, was relevant because the school prepares students for careers related to building design and construction. Initial observations indicated that teachers and students were more familiar with AutoCAD and SketchUp than with BIM. This condition created a competency gap because the construction industry has increasingly adopted model-based design and digital project information workflows. Sacks and Pikas (2013) stated that BIM education should be aligned with industry needs, learning topics, and competency levels. Abdirad and Dossick (2016) similarly explained that BIM curriculum development requires clear learning strategies because BIM encompasses workflows, collaboration, and project information management. A similar challenge was identified at the partner school. Although the available facilities were adequate for digital learning, teachers and students still required BIM-oriented guidance, direct instruction, and hands-on assistance.

The pre-test results also indicated differences in the participants' initial levels of BIM understanding. As presented in Table 1, several test items had relatively low percentages of correct responses. Item 6 had the lowest percentage at 68.75%, followed by Item 2 at 75.00%, while Items 7, 12, and 13 each reached 81.25%. These findings indicated that participants still required support in understanding basic BIM concepts and technical modelling knowledge. Table 2 further supports this baseline finding by comparing the pre-test and post-test scores. The mean score increased from 17.62 in the pre-test to 19.88 in the post-test. The Wilcoxon Signed-Rank Test showed a statistically significant improvement, with a p-value of 0.039 and an effect size of 0.65. These results indicate that the training addressed an actual learning need at the partner school. Sucipto et al. (2024) reported that many vocational high school teachers in Indonesia still experience difficulties in adopting BIM because they have not fully mastered the technology. Olowa et al. (2023) also emphasized that effective BIM-enabled education depends on technological readiness, educator attitudes, organizational support, and appropriate teaching strategies. These findings are consistent with the conditions at SMKN 1 Lubuk Pakam, where a practical empowerment program was needed to connect available facilities, teacher readiness, student learning, and vocational curriculum requirements.

Implementation of Applied Community Empowerment

The applied community empowerment program was implemented through a practice-based BIM training model. The activity began with an introduction to the basic concepts of Building Information Modelling and its role in vocational design learning, followed by direct explanation and hands-on practice in the computer laboratory. This format was selected because BIM learning is less effective when participants receive only theoretical information.

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

Pikas et al. (2013) explain that BIM education should be implemented through clear procedures and practical learning tasks. Bozoglu (2016) also states that BIM learning modules should support coordination and collaboration so that participants can understand BIM as an integrated working process. In this program, the university team guided teachers and students through each stage of the basic modelling workflow. Participants practiced creating building elements such as walls, doors, windows, floors, and roofs. Teachers also received additional guidance on linking BIM activities with relevant vocational subjects. The empowerment process was participatory rather than one-way. Participants were encouraged to ask questions, discuss technical difficulties, and solve problems during the practice sessions (Sutanhaji et al., 2026). This approach helped the service team identify topics that required further explanation and provide immediate feedback during the activity (Prayogo et al., 2022). The direct assistance also demonstrated the practical role of the service team in reducing the competency gap between conventional drawing tools and BIM-based modelling.

Community Participation and Interaction

The active participation of teachers and students in each of the learning sessions reflected the community participation during the BIM training. The participants were not only placed as listeners since they also asked questions and followed the modelling process directly through computer-based practice. Fig. 2 depicts the interaction between the service team and the participants in material explanation and hands-on practice assistance. This training format allowed for practical learning as the service team could offer immediate support if participants experienced technical problems during the session. Teachers and students were guided to understand BIM as a building design workflow, instead of merely a software operation. This approach is aligned with Pikas et al. (2013), who proposed BIM education with clear procedures and practical implementation tasks so that learners can relate concepts to real modelling activities. Similarly, Bozoglu (2016) also explained that BIM learning should encourage collaboration and coordination as the participants need to understand the relation between model elements and project information. In this programme, there was participation when, with the direct support of the facilitators, the participants made walls, doors and windows and floors and roofs. The computer laboratory setting also enabled peer interaction as participants could observe what each other were doing and compare modelling outcomes. Discussions were held amongst teachers on how BIM practice could be turned into vocational learning activities. During the session, students were engaged as end-users performing the BIM practice tasks. This interaction made the training more relevant to the needs of the school community and reinforced the connection between the training material and vocational learning practice.

The quality of community interaction can also be found out by the learning outputs and the evaluation results achieved in the BIM training program. Figure 1 presents the participant outputs from the BIM practice session. The figure indicates that the participants were able to produce simple building forms with basic visualisation capabilities. Figure 2. Final documentation of the training participants and school representatives, and the university team at the end of the activity. This documentation demonstrates ongoing support from the partner school to sustain participation through program completion. Table 1 also supports this discussion, as several test items improved after the training. Item 6 increased by 31.25 % and was the highest improvement among the evaluated items. Item 2 increased by 25.00% and Items 7, 12 and 13 increased by 18.75%. These improvements suggest that the interaction of participants during the practice session helped to reinforce understanding of specific BIM topics. Table 2 further indicates that the average score rose from 17.62 in the pre-test to 19.88

in the post-test. The Wilcoxon Signed-Rank Test indicated a significant improvement (p=0.039, effect size=0.65). Abbas et al. (2016) highlighted the need for practical exposure in BIM education to enable learners to connect digital tools with construction competencies. Olowa et al. (2023) also found that effective BIM-enabled education depends on technology readiness, educator readiness, organisational support, and suitable learning tasks. The interaction within this program is a reflection of these factors, where participants received direct mentoring, practice with real tasks, discussion on the classroom application and production of simple BIM models during the activity.

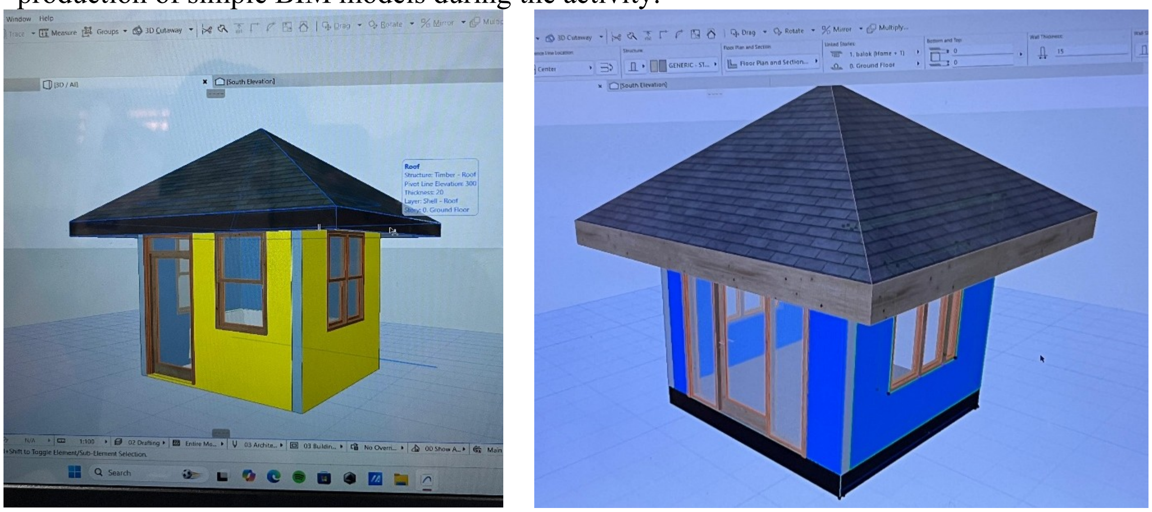

Figure 1. Participant outputs from the BIM practice session showing simple building modelling and visualization results

Table 1. Item-based comparison of correct answers in the BIM knowledge test

Item	Pre-test (%)	Post-test (%)	Gain (%)
1)	100.00	100.00	0.00
2)	75.00	100.00	+25.00
3)	100.00	100.00	0.00
4)	100.00	100.00	0.00
5)	100.00	100.00	0.00
6)	68.75	100.00	+31.25
7)	81.25	100.00	+18.75
8)	87.50	100.00	+12.50
9)	87.50	100.00	+12.50
10)	93.75	100.00	+6.25
11)	87.50	87.50	0.00
12)	81.25	100.00	+18.75
13)	81.25	100.00	+18.75
14)	87.50	100.00	+12.50
15)	87.50	100.00	+12.50
16)	87.50	100.00	+12.50
17)	93.75	100.00	+6.25
18)	87.50	100.00	+12.50
19)	87.50	100.00	+12.50
20)	87.50	100.00	+12.50

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

Program Outcomes and Impact Evaluation

The program results showed that practice-based BIM training improved participants' knowledge, practical awareness, and confidence in using digital modelling for vocational learning. These outcomes were reflected in the participants' hands-on activities and the modelling outputs presented in Figure 1. The simple building models demonstrated that participants were able to follow basic BIM workflows, create building forms, apply visual elements, and understand the relationships among model components. This finding is important because BIM competence should not be assessed solely through test scores but also through participants' ability to produce digital models and use them as learning resources. BIM supports visualization and helps project stakeholders identify potential design and construction problems before implementation in the field (Azhar, 2011). Participants' direct involvement in the modelling process enabled them to understand these functions more effectively. Pikas et al. (2013) also note that BIM education requires practical procedures and structured learning tasks to help learners connect theoretical concepts with actual design activities. The item-based comparison of correct responses before and after the training, presented in Table 1, further supported these findings. Item 6 showed the highest increase, with a gain of 31.25%, followed by Item 2 with an increase of 25.00%. Items 7, 12, and 13 each increased by 18.75%. These improvements indicate that the training strengthened participants' understanding of BIM concepts that were relatively weak during the pre-test. Participants' perceptions of BIM also improved, with the mean score increasing from 3.44 to 4.09 and the proportion of responses in the high category rising from 51.3% to 90.0%. Teachers' readiness to integrate BIM into learning increased from a mean score of 2.00 to 4.36, while responses in the high category increased from 13.9% to 94.0%.

Table 2. Inferential statistical analysis of BIM knowledge scores

Analysis Component	Result
Number of participants	16
Mean pre-test score	17.62
Mean post-test score	19.88
Mean difference	2.25
Shapiro-Wilk test for score difference	$p < 0.001$
Data distribution	Not normal
Statistical test used	Wilcoxon Signed-Rank Test
Wilcoxon statistic	8.00
p-value	0.039
Effect size	0.65
Interpretation	Significant improvement

The evaluation of impact demonstrated that there was a significant improvement in the learning of the participants after the introduction of BIM training. Table 2 shows the inferential statistical analysis of BIM knowledge scores based on the comparison of pre-test and post-test results. The mean score was 17.62 in the pre-test and 19.88 in the post-test. The Shapiro-Wilk test showed that the difference in scores was not normally distributed. Then, the Wilcoxon Signed-Rank Test, a paired comparison test, was used to examine the improvement in learning after the training. The result showed a significant improvement with a p-value of 0.039 and an effect size of 0.65. This result demonstrates that the training was very effective in improving participants' knowledge of BIM. According to Abbas et al. (2016), BIM education should involve practical experience so that students can connect digital tools with construction management competencies. Olowa et al. (2023) also explain that effective BIM-enabled education is dependent on technology readiness, educator

Jurnal Pengabdian UNDIKMA:
Jurnal Hasil Pengabdian & Pemberdayaan kepada Masyarakat
https://e-journal.undikma.ac.id/index.php/jpu/index
Email: pengabdian@undikma.ac.id

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

readiness, task structure, and institutional support. These ideas are in line with the programme results at SMKN 1 Lubuk Pakam because the activity combined direct mentoring and practice tasks and participant evaluation, and curriculum discussion. Figure 2 also supports the impact evaluation because it shows the participation of teachers and students and school representatives and the university team at the end of the activity. This participation shows that the program was received by the partner school and supported by the learning community. Also, the results show that more mentoring is needed to support more advanced BIM deliverables like schedules, quantity take-off, and complete technical drawings.

Figure 2. Group photo of the BIM community service program participants, university team, and SMKN 1 Lubuk Pakam representatives after the training activity

Adoption of Innovation, Sustainability, and Replication Potential

The sustainability of the program depends on teacher readiness, the availability of BIM-based teaching materials, continued access to computer facilities, and the school's capacity to incorporate BIM practice into regular learning activities. The increase in teacher readiness from 2.00 to 4.36, together with the rise in high-category responses from 13.9% to 94.0%, provides an initial foundation for continuing BIM-based learning at the partner school. As a concrete sustainability plan, SMKN 1 Lubuk Pakam is expected to implement three follow-up actions. First, participating teachers will develop initial BIM-based lesson plans, student worksheets, practice modules, and assessment rubrics aligned with the Building Modelling and Information Design (DPIB) curriculum. Second, simple BIM practical sessions will be gradually incorporated into relevant vocational subjects, beginning with basic modelling, visualization, and drawing production before progressing to quantity take-off, project scheduling, technical drawing sheets, and model coordination. Third, the university service team will provide follow-up academic and technical assistance to review the teaching materials and support teachers during the early stages of classroom implementation. The implementation of this plan should be monitored through the availability of BIM-based teaching materials, the number of vocational subjects incorporating BIM practice, the frequency of practical sessions, and the learning outputs produced by students. These indicators will allow the school and the service team to evaluate whether the training results are being sustained after the completion of the community service program.

At the time of reporting, a formal Memorandum of Understanding or Memorandum of Agreement specifically addressing follow-up BIM activities had not been documented. Therefore, the establishment of an MoU or MoA between SMKN 1 Lubuk Pakam and the university is proposed as a subsequent institutional step to formalize continued mentoring, curriculum development, facility support, and periodic evaluation.

Conclusion

The community service program at SMKN 1 Lubuk Pakam successfully improved the BIM competence of vocational teachers and students through practice-based training and vocational curriculum assistance. The program helped participants understand basic BIM concepts, follow simple modelling workflows, and produce digital building models during the hands-on practice session. The knowledge test showed clear improvement. The mean score increased from 17.62 in the pre-test to 19.88 in the post-test. The Wilcoxon Signed-Rank Test also showed a significant improvement with a p-value of 0.039 and an effect size of 0.65. Participant perception of BIM improved from 3.44 to 4.09, while teacher readiness to integrate BIM into learning increased from 2.00 to 4.36. These results indicate that the activity had a positive impact on BIM literacy, practical awareness, and teacher readiness for vocational learning. The program also showed that BIM can be introduced effectively through direct mentoring, simple modelling tasks, and curriculum-oriented discussion.

Recommendation

Community service programmes should provide extended mentoring after the main BIM training so that teachers can use the materials more confidently in classroom learning. Follow-up activities can be aimed at the development of BIM-based lesson plans and student worksheets, and practice modules and assessment rubrics aligned with the Building Modelling and Information Design curriculum. The partner school is encouraged to integrate simple BIM modelling tasks into regular vocational subjects so that students can build up their skills through gradual practice. The first stage can concentrate on basic modelling and visualisation and drawing output as the basis for learning digital design. The next stage can go further with more advanced topics like quantity take-off and project scheduling and technical drawing sheets and model coordination. Educational institutions and local stakeholders can also help guarantee the sustainability of this programme by increasing the availability of BIM software and preparing computer laboratory facilities and fostering collaboration between schools and universities and construction industry partners. Other vocational schools that have building design programmes and adequate computer laboratory facilities can replicate similar programmes. The training model can be adapted to the readiness of the teacher and the skill level of the students, as well as to the available software and the needs of the school curriculum. Future practitioners are also encouraged to combine technical BIM training with curriculum assistance, because teachers need software skills and strategies to make learning sustainable.

References

Abbas, A., Din, Z. U., & Farooqui, R. U. (2016). Integration of BIM in construction management education: An overview of Pakistani engineering universities. *Procedia Engineering, 145*, 151–157. https://doi.org/10.1016/j.proeng.2016.04.034

Abdirad, H., & Dossick, C. S. (2016). BIM curriculum design in architecture, engineering, and construction education: A systematic review. *Journal of Information Technology in Construction, 21*, 250–271.

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

Aphirta, S., Prayogo, W., Winandari, M. I. R., Notoprayitno, M. I., Yanidar, R., & Ersa, N. S. (2026). Pemberdayaan masyarakat melalui pengolahan limbah kotoran hewan menjadi pupuk organik berbasis waste to value di Kecamatan Ciambar. Jurnal Pengabdian Masyarakat, 4(1), 26–37. https://doi.org/10.59562/abdimas.v4i1.12384

Azhar, S. (2011). Building information modeling (BIM): Trends, benefits, risks, and challenges for the AEC industry. *Leadership and Management in Engineering, 11*(3), 241–252. https://doi.org/10.1061/(ASCE)LM.1943-5630.0000127

Barlian, E., Jeumpa, K., Kurniawan, H., Prayogo, W., Wardana, N., & Yolanda, Y. (2026). Pemanfaatan mesin pelontar bola dalam peningkatan keterampilan teknik tenis meja pada Komunitas Persatuan Tenis Meja Garuda Nabontar. Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM), 9(7), 70–83. https://doi.org/10.33024/jkpm.v9i7.26035

Bozoglu, J. (2016). Collaboration and coordination learning modules for BIM education. *Journal of Information Technology in Construction, 21*, 152–163.

Chaerul, M., Daffa, A. S. N., Kholif, A. N., Aisyarah, N. R., Nurulloh, R. H., & Prayogo, W. (2025). Applying circular economy principles to strengthen organic waste management using BSF maggots in RW 02 Jamaras, Bandung, Indonesia. International Journal of Community Engagement Payungi, 5(3), 468–485. https://doi.org/10.58879/ijcep.v5i3.110

Ersa, N. S., Yusrizal, T., Gustami, H., Akmal, A., Najmuddin, N., Herdianti, W., & Prayogo, W. (2026). Penerapan pemurnian air darurat pasca banjir bandang dengan pelatihan masyarakat untuk peningkatan ketahanan lokal di Aceh, Indonesia. Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM), 9(4), 377–398. https://doi.org/10.33024/jkpm.v9i4.25352

Imami, A. D., Algifari, M. H., Mufti, A. A., Yandra, I. N., Larasati, N. A., Zhabiyan, D. A., Maghrival, K., Marpaung, T. K., Sormin, E., Firmansyah, A., Awfa, D., Azizah, R. N., Suryawan, I. W. K., & Prayogo, W. (2023). Peningkatan penanganan sampah anorganik melalui digitalisasi operasional Bank Sampah di Kecamatan Candipuro, Lampung Selatan. International Journal of Community Service Learning, 7(3), 360–369. https://doi.org/10.23887/ijcsl.v7i3.64253

Jaya, I. M., Susila, I. N. D., Surakarta, P. G., Sudiarsa, M., & Sutapa, K. (2023). Pelatihan Building Information Modelling (BIM) untuk kompetensi keahlian Desain Pemodelan dan Informasi Bangunan bagi guru dan siswa SMK N 1 Abang, Karangasem. *Jurnal Vokasi, 7*(3), 251–256.

Mulyana, R., Darwin, D., Wardana, N., Putri, M. D., Hutria, W., Emilia, E., Kasmita, K., Rassy, R. P., Raissilki, M. I., Prayogo, W., & Berlian, E. (2026). Edukasi terpadu berbasis komunitas melalui pendekatan smart village untuk mendukung Program Kampung Iklim. Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM), 9(6), 378–404. https://doi.org/10.33024/jkpm.v9i6.25898

Olowa, T., Witt, E., Lill, I., Rasheed, A. S., Abdulmumin, A., & Adebiyi, R. (2023). Critical factors for effective BIM-enabled education: An adaptive structuration theory perspective. *Buildings, 13*(12), 3044. https://doi.org/10.3390/buildings13123044

Pikas, E., Sacks, R., & Hazzan, O. (2013). Building information modeling education for construction engineering and management. II: Procedures and implementation case study. *Journal of Construction Engineering and Management, 139*(11), 05013002. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000765

Vol. 7, No. 3 (August 2026)
E-ISSN : 2722-5097
Pg : 965-976

Prayogo, W. (2026). Peran organisasi mahasiswa dalam penguatan pengabdian kepada masyarakat: Studi kasus Ikatan Mahasiswa Teknik Lingkungan Indonesia periode 2015/2016. Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM), 9(4), 337–362. https://doi.org/10.33024/jkpm.v9i4.25371

Prayogo, W., Novrianty, I., Purwanti, A., Mulyana, R., Panjaitan, N. H., Fitria, L., Awfa, D., Ikhwali, M. F., Zamani, I. S., Arifianingsih, N. N., Muklis, M., Purnawan, P., Sunarsih, S., Suryawan, I. W. K., Azizah, R. N., Imami, A. D., & Septiariva, I. Y. (2022). Pelatihan pengolahan sampah dengan metode Takakura dan pembuatan stringbag bagi kelompok anak usia dini di Desa Bukit Lawang, Sumatera Utara. International Journal of Community Service Learning, 6(3), 381–395. https://doi.org/10.23887/ijcsl.v6i3.50044

Sacks, R., & Pikas, E. (2013). Building information modeling education for construction engineering and management. I: Industry requirements, state of the art, and gap analysis. *Journal of Construction Engineering and Management, 139*(11), 04013016. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000759

Sarwa, S., Azahar, R., Salamah, U., Sitorus, H. F., Zulfikar, A., Putra, R., Fatahillah, A., Atika, L., & Prayogo, W. (2026). Peningkatan kualitas layanan pembelajaran flipped classroom melalui penguatan literasi digital pada dosen Fakultas Teknik Universitas Negeri Medan, Indonesia. Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM), 9(5), 273–292. https://doi.org/10.33024/jkpm.v9i5.25386

Succar, B. (2009). Building information modelling framework: A research and delivery foundation for industry stakeholders. *Automation in Construction, 18*(3), 357–375. https://doi.org/10.1016/j.autcon.2008.10.003

Sucipto, T. L. A., Sajidan, Akhyar, M., & Roemintoyo. (2024). Investigating Building Information Modelling (BIM) adoption in vocational high school learning. *Proceedings of the 5th Vocational Education International Conference*, 1096–1101. https://doi.org/10.2991/978-2-38476-198-2_155

Sutanhaji, A. T., Susilo, A., Hardoko, H., Rahardjo, S. S. P., Khotimah, M., Setyono, L., Hamada, I. F., & Prayogo, W. (2026). Penguatan BUMDes melalui diseminasi teknologi eco-enzyme dan pupuk organik untuk mendukung perencanaan TPS3R di Desa Tegalweru, Kabupaten Malang, Indonesia. Jurnal Pengabdian Masyarakat, 4(1), 6–20. https://doi.org/10.59562/abdimas.v4i1.12105