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Improving Teachers' Competence in Designing Contextual STEM-Based Learning Activities through Training and Mentoring

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Abstract

The development of twenty-first-century competencies requires teachers to design contextual and problem-oriented learning activities. However, many teachers still face difficulties in translating STEM concepts into practical classroom activities. This community service program aimed to improve teachers' competence in designing contextual STEM-based learning activities through training and mentoring. The program was conducted at CDAST, University of Jember, from February to March 2026, involving 25 teachers from various subject areas. The activities included needs identification, preparation of materials and templates, delivery of STEM concepts, demonstration of simple STEM activities, group workshops, mentoring, presentation, and evaluation. Data were collected through observation, questionnaires, and product assessment using a rubric. The results showed that participants produced five STEM Learning Activity designs. Participant responses were highly positive, with all indicators exceeding 90%, while product assessment scores ranged from 2.60 to 2.80 on a three-point scale. These findings indicate that practice-based training and mentoring effectively support teachers in developing applicable STEM learning designs.

Keywords: teacher training, STEM learning, contextual activity, community service

1. INTRODUCTION

The advancement of science and technology, along with the increasing demand for twenty-first-century competencies, requires school learning processes to move beyond content mastery and place greater emphasis on developing critical thinking, creativity, collaboration, communication, and real-world problem-solving skills. Contemporary learning should provide experiences that encourage students to connect academic concepts with phenomena in their surrounding environment. In this context, the STEM approach, which integrates Science, Technology, Engineering, and Mathematics, has become a relevant learning approach because it emphasizes interdisciplinary integration, problem solving, inquiry, design, collaboration, and the application of concepts in real-life situations. Portillo-Blanco et al. (2024) explained that integrated STEM learning needs to be built upon the principles of interdisciplinary integration, real-world contexts, inquiry processes, design, collaboration, and active student engagement in solving problems.

STEM learning should not merely be understood as the combination of four disciplines, but rather as a learning approach that directs students to understand problems, design solutions, conduct testing, revise results, and reflect on the learning process. Through this approach, students do not only receive theoretical knowledge, but are also involved in scientific thinking processes, the use of technology, mathematical reasoning, and engineering design. Gümüş and Bozkurt Altan (2025) explained that STEM education presents interdisciplinary real-life problems, requiring students to employ thinking processes similar to those used by scientists, technologists, engineers, and mathematicians. In addition, Aini et al. (2025) emphasized that the engineering design process in STEM learning can help students understand problems, design solutions, test designs, and improve products based on evaluation results.

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In school learning practices, STEM can be developed through simple activities that are closely related to students' daily lives, such as designing tools, conducting measurements, processing data, utilizing materials available in the surrounding environment, testing products, and formulating solutions to problems in the school environment. Therefore, STEM learning does not always require complete laboratory facilities or expensive technology. STEM learning can be developed through contextual activity designs that are adapted to students' characteristics, subject areas, school facilities, and real problems in the surrounding environment. Costa et al. (2022) emphasized that STEM teacher professional development linked to real-world scenarios can help teachers design more meaningful and applicable learning activities. Similarly, Maryani et al. (2024) showed that the integration of STEM with the Contextual Teaching and Learning approach can promote students' critical thinking skills through learning experiences that are closely connected to everyday life.

STEM learning is also strongly related to contextual issues such as the environment, clean water, energy, simple technology, and sustainability. Kopbossyn et al. (2025) showed that the integration of STEM with sustainability issues is widely developed through project-based learning, inquiry, engineering design, and environmental contexts. This study confirms that context-based STEM learning can help students understand real-world problems while developing thinking and problem-solving skills. In a broader context, Purnamaningtyas et al. (2026) also demonstrated that the development of integrated STEM teaching materials remains an important need for improving science learning outcomes, particularly because students require structured and contextual learning activities that connect concepts with practice.

Although STEM learning has great potential, its implementation in schools still faces various challenges. Some teachers are familiar with the term STEM, but they do not yet fully understand how to integrate the elements of science, technology, engineering, and mathematics into a practical learning activity design. Other common challenges include the limited availability of STEM activity examples that are suitable for school conditions, the absence of activity design templates, limited tools and materials, and teachers' limited experience in developing real-world problem-based learning. Surahman and Wang (2023) explained that STEM teacher professional development programs remain an important concern because STEM implementation requires appropriate program design, training strategies, and support for teachers. Similarly, Zuhaida et al. (2025) stated that STEM professional development has become an important topic over the last decade due to the increasing need for teachers to integrate STEM into learning.

Improving teacher competence is an important factor in the successful implementation of STEM. Teachers need not only to understand STEM concepts in general, but also to have competence in identifying contextual problems, formulating learning objectives, integrating STEM elements, designing design-based activities, determining learning products, and developing assessments of both process and outcomes. Caner and Ogan-Bekiroglu (2025) emphasized that identifying integrated STEM teacher competencies is important to support the management of learning processes and the effective success of STEM integration. In addition, Boz (2023) showed that teacher professional development in STEM integration at the elementary school level needs to be directed toward strengthening conceptual understanding, learning design skills, and the implementation of learning strategies that are aligned with students' needs.

Training and mentoring programs are relevant strategies for helping teachers develop these competencies. Effective training should not only involve the delivery of materials, but should also include demonstrations, practice in developing designs, group discussions, feedback, presentations, and reflection. Hasim et al. (2022) showed that STEM professional development activities can influence teachers' knowledge and instructional practices in the classroom. Martins et al. (2024) also demonstrated that professional development in STEAM/STEM education contributes to strengthening teachers' pedagogical content knowledge. Therefore, STEM training should be directed toward practical and applicable activities that produce learning products that can be implemented.

In addition to training, mentoring is also needed so that teachers receive direct guidance in developing learning designs. Mentoring helps teachers clarify contextual problems, balance the integration of STEM elements, adjust activities to school facilities, and improve designs so that they are more ready to be used. Mumcu et al. (2022) stated that teachers expect STEM professional development programs to provide conceptual clarity, implementation examples, and support in learning practices. Mumcu et al. (2023) also showed that teacher development in integrated

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STEM can be directed through the preparation of more systematic lesson plans. This indicates that teachers need training activities that do not stop at the theoretical level, but continue into the process of developing and refining learning designs.

Practice-based training activities are important because STEM learning needs to produce activities that can be implemented meaningfully in the classroom. Lo (2021) explained that effective STEM teacher professional development needs to be designed based on the principles of active, collaborative, sustainable, and practice-relevant learning. Haines et al. (2024) also showed that STEM professional development can be implemented through flexible activity designs, including online formats, as long as best practices such as collaboration, reflection, and teacher support are maintained. Similarly, Bufasi et al. (2025) emphasized that STEM teacher professional development needs to be conducted continuously so that teachers can improve their knowledge, pedagogical skills, and readiness for classroom implementation.

In the Indonesian education context, strengthening STEM learning is also relevant to the development of twenty-first-century skills. Tishana et al. (2025) showed that STEM implementation at the senior high school and vocational high school levels in Indonesia has positive outcomes, particularly in promoting critical thinking, creativity, and collaboration, although its effectiveness is still influenced by teaching quality, resource availability, and institutional support. Prastika et al. (2024) also showed that professional development programs for teachers and education personnel in STEM learning in Indonesia need to be directed toward improving teachers' ability to understand STEM concepts, prepare learning tools, and implement learning activities that are appropriate to school conditions. Meanwhile, Marthinu et al. (2026) emphasized the importance of contextual STEM training to bridge the gap in STEM implementation across various educational regions.

Based on these problems, this community service program was conducted to improve teachers' competence in designing contextual STEM-based learning activities. The program was designed in the form of training, demonstration, workshop, mentoring, product presentation, evaluation, and reflection. Rodríguez et al. (2024) explained that STEM teacher education needs to consider disciplinary integration systematically so that teachers are able to connect various fields of knowledge in learning designs. In addition, Ekawati et al. (2025) showed that collaborative workshops can have a positive impact on teachers' understanding of STEM and classroom learning practices. Therefore, this community service program was not only directed toward improving conceptual understanding, but also toward strengthening teachers' skills in developing STEM Learning Activity designs.

Through this program, teachers were provided with an understanding of the basic concepts of STEM, examples of contextual learning activities, a STEM Learning Activity design template, and opportunities to develop and present learning design products. The objectives of this community service program were to improve teachers' understanding of STEM learning concepts, train teachers to design contextual STEM-based learning activities, produce STEM Learning Activity design products, and encourage teachers to implement these designs in the classroom. This program is expected to serve as an effective training and mentoring model to support the improvement of teacher competence, particularly in developing learning that integrates science, technology, engineering, and mathematics contextually.

2. MATERIALS AND METHODS

This community service program was conducted in the form of training and mentoring for teachers in designing contextual STEM-based learning activities. The program was designed to address teachers' needs in understanding STEM concepts in a practical manner and in developing learning designs that are simple, contextual, and applicable in the classroom. The activity was carried out at CDAST, University of Jember, from February to March 2026, involving 25 teachers as participants. The participants came from various subject areas. The involvement of teachers from different subject backgrounds was intended to ensure that the STEM activities designed could be adapted to the characteristics of each subject, students' conditions, and school facilities.

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The implementation of the program was carried out through several stages. The first stage was preparation, which included coordination with partners, identification of teachers' needs, preparation of training materials, provision of examples of STEM activities, development of activity design templates, and preparation of evaluation sheets. The second stage was material delivery. At this stage, the community service team provided explanations of the basic concepts of STEM, the importance of contextual learning, and examples of STEM implementation in school learning activities. The materials were delivered interactively through discussions and question-and-answer sessions so that participants could relate STEM concepts to their respective teaching experiences.

The third stage was demonstration and workshop. The community service team provided examples of simple STEM activities that could be conducted using easily available tools and materials. Afterward, the participants were divided into several groups to develop STEM-based learning activity designs. The designs included contextual problems, learning objectives, elements of Science, Technology, Engineering, and Mathematics, tools and materials, activity procedures, expected products, and forms of assessment.

The fourth stage was mentoring and presentation of results. Each group received guidance and feedback from the community service team during the process of developing the activity design. After the designs were completed, the participants presented their group work. These presentations served as a forum for sharing ideas, receiving feedback, and improving the designs so that they would be more ready to be implemented in classroom learning.

The fifth stage was evaluation and reflection. Evaluation was conducted through observations during the activity, assessment of the activity designs produced, and completion of participant response questionnaires. This evaluation was used to determine the achievement of the program, the benefits of the training for participants, and follow-up plans for implementing STEM activities in the classroom. In brief, the stages of the program are presented in Table 1.

Table 1. Stages of the training and mentoring program

No	Activity	Output
1	Coordination and activity preparation	Training materials, templates, and activity plan
2	Delivery of STEM materials	Participants' understanding of STEM concepts
3	Demonstration and workshop	Draft designs of STEM learning activities
4	Mentoring and presentation of results	Revised STEM activity designs
5	Evaluation and reflection	Participants' responses and follow-up plans

The success of the program was assessed based on the active involvement of participants during the training, the development of STEM-based learning activity designs, and participants' positive responses to the training and mentoring activities. Through these stages, the program was expected to help teachers develop learning activities that are more contextual, creative, and aligned with students' needs.

3. RESULTS AND DISCUSSION

This community service program was conducted in the form of training and mentoring on the design of contextual STEM-based learning activities for teachers. The program was carried out at CDAST, University of

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Jember, from February to March 2026 and involved 25 teachers as participants. The implementation of the program began with an opening session and an introduction to the objectives of the activity, followed by the delivery of material on the concept of STEM learning, a demonstration of simple STEM activities, a workshop on designing STEM Learning Activities, group mentoring, presentations of the designed activities, and evaluation and reflection. General documentation of the implementation of the training and mentoring program for designing STEM-based learning activities is shown in Figure 1.

During the program, the participants were actively involved in discussions, question-and-answer sessions, and the development of learning activity designs. The teachers worked in groups to develop STEM-based learning ideas that were aligned with their respective subjects, students' characteristics, and school facilities. Through the workshop process, the participants produced five STEM Learning Activity design products, which were then presented and received feedback from the community service team.

Figure 1. Implementation of the training and mentoring program for designing STEM-based learning activities

This program resulted in several main achievements, namely an increase in teachers' understanding of STEM learning, the development of contextual STEM-based learning activity designs, improved teacher creativity in utilizing simple materials, and positive responses from participants toward the implementation of the training and mentoring program. These achievements indicate that the community service activity not only provided conceptual understanding but also produced concrete products that can be further developed in the learning process.

At the material delivery stage, participants gained an understanding of the basic concepts of STEM and their application in contextual learning. The materials covered an introduction to the elements of Science, Technology, Engineering, and Mathematics, as well as examples of STEM implementation in simple learning activities. This activity helped teachers understand that STEM learning does not always require expensive equipment or complete laboratory facilities, but can be developed through real-world problems that are closely related to students' lives and by utilizing simple materials available in the school environment. The process of delivering STEM learning materials to the training participants is presented in Figure 2.

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Figure 2. Delivery of STEM learning materials to the training participants

The demonstration stage of simple STEM activities was an important part of the program because it provided teachers with a concrete illustration of how to integrate STEM elements into learning. Through the examples provided, participants could see that a contextual problem can be examined from various perspectives. For example, a simple water filtration activity can include the science element through the concept of filtration, the technology element through the use of simple tools, the engineering element through the process of designing and testing a filtration device, and the mathematics element through the measurement of volume, time, and comparison of filtration results. The demonstration of a simple STEM activity by the community service team can be seen in Figure 3.

At the workshop and mentoring stage, participants were divided into several groups to develop STEM Learning Activity designs. Each group prepared its design based on the template provided by the community service team. The design components included the activity title, contextual problem, learning objectives, elements of Science, Technology, Engineering, and Mathematics, tools and materials, student activity procedures, expected products, and assessment forms. The mentoring process was conducted to help participants clarify the contextual problems, balance the integration of STEM elements, adjust activities to school facilities, and improve the designs so that they would be more ready to be implemented in the classroom. The workshop and mentoring activities for developing STEM Learning Activities are shown in Figure 3.

Figure 3. Workshop and mentoring in developing STEM Learning Activities

The main result of this program was the development of five STEM Learning Activity design products. These products were developed collaboratively by participants based on themes or contextual problems that were closely related to students' daily lives. Several themes of the activities developed focused on environmental issues, clean water, school gardens, energy saving, and the use of simple materials. These themes indicate that the participants began to understand the main characteristic of STEM learning, namely connecting learning concepts with real-world problems. The STEM activity designs prepared by the participants were then presented, as shown in Figure 4.

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Figure 4. Presentation of STEM activity design results by the participants

In general, the design products developed by the participants indicate that the teachers were able to develop STEM-based learning ideas in accordance with school conditions. The designed activities did not merely function as academic exercises, but also encouraged students to think critically, creatively, and solution-oriented in dealing with problems around them. This became one of the indicators that the training and mentoring program was able to help teachers transform STEM concepts, which were initially abstract, into more practical learning activity designs. A summary of the program results is presented in Table 2.

Table 2. Summary of the program implementation results

Activity Aspect	Output
Number of participant	25 teachers
Type of activity	Training, demonstration, workshop, mentoring, presentation, and evaluation
Products produced	Five STEM Learning Activity designs
Focus of activity	Designing contextual STEM-based learning activities
Main output	STEM activity designs that can be developed for classroom learning
Follow-up	Implementation of STEM activity designs in each teacher's classroom

Based on Table 2, the community service program produced outputs that were in line with the program objectives, namely improving teachers' competence in designing contextual STEM-based learning activities. The success of the program was not only measured by participant attendance, but also by teachers' active involvement in the workshop process and the production of learning design products. Participants' responses to the training implementation showed very good results. The response questionnaire was prepared using four options: Strongly Disagree, Disagree, Agree, and Strongly Agree. The results showed that most participants gave positive responses to the materials, activity examples, templates, mentoring, creativity of the activities, and plans for classroom implementation. Teachers' responses to the training implementation presented in Table 3.

Table 3. Teachers' responses to the training implementation

Statement	Strongly Disagree	Disagree	Agree	Strongly Agree	Positive responses
The training materials were easy to understand	0	1	7	17	96%
The STEM activity examples were relevant to school conditions	0	2	8	15	92%
The STEM Learning Activity template helped	0	1	6	18	96%

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teachers develop their designs					
Mentoring from the community service team supported the design process	0	1	5	19	96%
The activity encouraged teachers' creativity in using simple materials	0	2	7	16	92%
Teachers were interested in implementing STEM activities in the classroom	0	1	6	18	96%

Based on Table 3, all aspects obtained positive responses above 90%. The statement that the training materials were easy to understand received a positive response of 96%, indicating that the material delivery was well received by the participants. This is important because an initial understanding of STEM concepts serves as the basis for teachers to design more applicable learning activities. The relevance of the STEM activity examples to school conditions received a positive response of 92%. This result indicates that the examples provided by the community service team were considered suitable for teachers' needs and feasible to implement using simple facilities. This reinforces the understanding that STEM learning does not have to depend on complex facilities, but can be developed from materials and problems that are close to students' daily lives.

The STEM Learning Activity template received a positive response of 96%. This indicates that the provided template helped teachers develop learning designs in a more structured manner. The template served as a guide so that teachers did not merely write down activity ideas, but also described contextual problems, learning objectives, STEM elements, tools and materials, activity procedures, products, and forms of assessment. Mentoring from the community service team also received a positive response of 96%. A total of 24 out of 25 teachers agreed or strongly agreed that the mentoring supported the design process. This result shows that mentoring was an important component of the community service program. Teachers do not only need to be provided with materials, but also need opportunities for consultation, discussion, and direct feedback so that the designs they develop can be improved.

This activity was also considered capable of encouraging teachers' creativity in utilizing simple materials, with a positive response of 92%. This shows that the training successfully broadened participants' perspectives that STEM activities can be designed creatively using tools and materials available in the school environment. In addition, teachers' interest in implementing STEM activities in the classroom reached 96%, indicating the potential sustainability of this community service program. The visualization of the percentage of participants' responses to the training and mentoring program is presented in Figure 5.

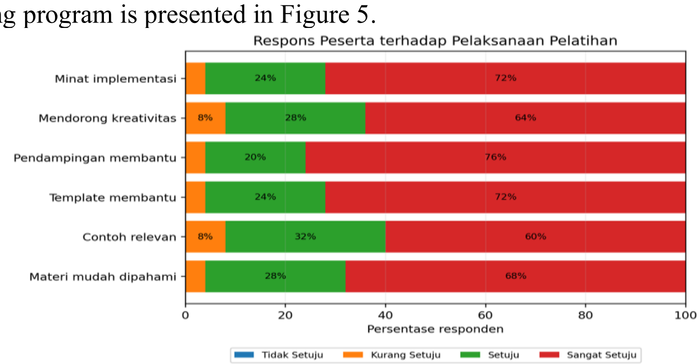

Figure 5. Percentage of participants' responses to the training implementation

In addition to participant responses, the success of the program was also assessed through the evaluation of the STEM Learning Activity design products. The products were assessed using a 1–3 scale rubric with five assessment aspects, namely the suitability of contextual problems, integration of STEM elements, feasibility of activities, clarity of learning products, and suitability of rubrics and reflection. Assessment of STEM learning activity products presented in Table 4.

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Table 4. Assessment of STEM learning activity products

Assessment Aspect	Score 1	Score 2	Score 3	Average
Suitability of contextual problems	0	5	20	2.80
Integration of STEM elements	0	6	19	2.76
Feasibility of activities	1	5	19	2.72
Clarity of learning products	0	7	18	2.72
Suitability of rubrics and reflection	1	8	16	2.60

Based on Table 4, the STEM Learning Activity design products developed by the participants were in the good to very good category. The aspect with the highest achievement was the suitability of contextual problems, with an average score of 2.80. This indicates that most teachers were able to raise problems that were close to students' lives. This ability is important because STEM learning emphasizes the relationship between academic concepts and real-world problems. Issues such as clean water, the school environment, energy saving, and the use of simple materials are examples of contexts that are easy for students to understand and can be developed into learning activities.

The integration of STEM elements obtained an average score of 2.76. This result shows that teachers began to be able to connect the elements of Science, Technology, Engineering, and Mathematics in one activity design. Nevertheless, several designs still need to be strengthened so that STEM integration is not merely presented as a mention of the elements, but is clearly reflected in the steps of student activities. For example, the Engineering element needs to be clarified through activities involving designing, creating, testing, and improving products. The Technology element also needs to be directed not only toward the use of digital tools, but also toward the use of simple tools that support problem solving.

The feasibility of activities obtained an average score of 2.72. This achievement indicates that most of the designs developed by teachers were realistic enough to be implemented in the classroom. Feasibility is an important aspect because this community service program did not only aim to produce designs that were conceptually interesting, but also designs that could be implemented under existing school conditions. The clarity of learning products also obtained an average score of 2.72. This result shows that most designs had sufficiently clear final products, whether in the form of simple tools, models, designs, or proposed solutions to contextual problems. Product clarity is important in STEM learning because students need to be directed to produce something that can be observed, tested, presented, and reflected upon.

The aspect with the lowest average score was the suitability of rubrics and reflection, with a score of 2.60. Although this score was still in the good category, the result indicates that teachers still need further strengthening in developing assessment instruments for STEM learning. In STEM learning, assessment should not only focus on the final result or product, but should also include students' working processes, design skills, group collaboration, testing, revision, presentation, and reflection. Therefore, future activities need to provide specific mentoring on the development of process- and product-based assessment rubrics. The average assessment scores of the STEM Learning Activity design products for each aspect are shown in Figure 6.

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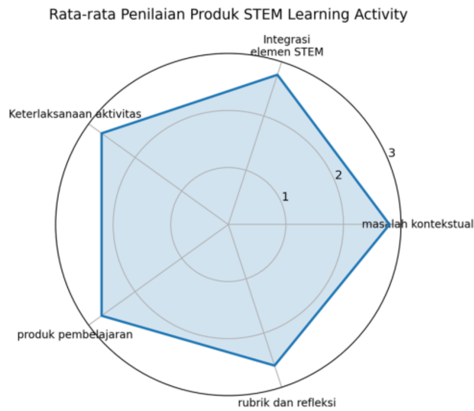

Figure 6. Average assessment scores of STEM Learning Activity design products.

Overall, the results of the program show that training and mentoring had a positive impact on teachers' competence in designing contextual STEM-based learning activities. Teachers gained conceptual understanding, activity examples, design templates, practical experience, and feedback on the products they developed. This program also encouraged teachers to be more creative in utilizing simple materials and developing learning activities that are closely related to students' lives.

With the development of five STEM Learning Activity products, high positive responses from participants, and product assessment results that were in the good to very good category, this program can be considered successful in achieving the objectives of the community service activity. However, several aspects still need to be strengthened, particularly in the development of assessment rubrics and learning reflection. Therefore, the follow-up to this program is to encourage teachers to implement the STEM Learning Activity designs in their respective classrooms, reflect on the learning implementation, and develop other STEM activity designs that are aligned with school needs. Group documentation with participants after the training and mentoring program is shown in Figure 7.

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Figure 7. Group documentation with the training participants.

4. EVALUATION OF THE PROGRAM

The evaluation of the program was conducted to determine the extent to which the training and mentoring activities achieved the objectives of the community service program, namely improving teachers' competence in designing contextual STEM-based learning activities. The evaluation focused on three main aspects: the achievement of program objectives, the quality of the design products produced, and the sustainability of STEM activity implementation in the classroom. Based on the results of the program implementation, the main objective of the community service activity was successfully achieved. This was indicated by the active involvement of 25 teachers throughout the training, workshop, mentoring, and presentation sessions. The participants did not merely attend the program passively, but were actively engaged in discussions, design development, product revision, and group presentations. This involvement indicates that the training and mentoring model was appropriate for helping teachers understand and develop STEM-based learning.

In terms of program outputs, the participants successfully produced five STEM Learning Activity design products. These products indicate that teachers were able to develop learning activities based on contextual problems, integrate the elements of Science, Technology, Engineering, and Mathematics, and design activities by considering school conditions. Thus, this program did not only improve teachers' understanding but also produced initial learning tools that can be further developed for classroom instruction. The results of participants' responses

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showed that the program received very positive feedback. Most response indicators were above 90%, including the ease of understanding the materials, the relevance of activity examples, the usefulness of the template, the quality of mentoring, the encouragement of creativity, and interest in classroom implementation. This shows that the training was considered relevant to participants' needs and provided practical benefits in helping teachers design STEM learning activities.

The evaluation of the design products also showed good to very good results. The strongest aspect was the suitability of contextual problems, indicating that teachers were able to identify real-world problems that were closely related to students' lives. In addition, the aspects of STEM element integration, activity feasibility, and clarity of learning products also showed good achievements. These results indicate that the activity designs developed by the participants have the potential to be implemented in classroom learning. Nevertheless, the evaluation also revealed several aspects that need to be strengthened. The development of assessment rubrics and reflection remained an area requiring further attention. Teachers still need mentoring in developing assessments that are not only oriented toward the final product, but also evaluate the design process, collaboration, testing, revision, presentation, and student reflection. In addition, several designs still need to be strengthened in terms of the Engineering and Technology elements so that STEM integration becomes more clearly reflected in the learning steps.

Overall, this training and mentoring program can be considered successful because it met several key indicators: participants were actively involved in the activities, five STEM activity designs were produced, participants showed highly positive responses, and teachers demonstrated interest in implementing the designs in their classrooms. This success indicates that practice-based training and direct mentoring can serve as an effective strategy for improving teachers' competence in designing contextual STEM-based learning. The follow-up to this program is the implementation of the STEM Learning Activity designs in each teacher's classroom. The community service team can provide further mentoring, particularly in refining assessment rubrics, strengthening the integration of Engineering and Technology elements, and evaluating the implementation of STEM activities in learning. Through these follow-up efforts, the results of the community service program will not stop at training products, but can have a direct impact on improving the quality of learning in schools.

5. CONCLUSION

This community service program was implemented through systematic data collection and activity stages, including coordination with partners, identification of teachers' needs, preparation of training materials and STEM Learning Activity templates, delivery of STEM concepts, demonstration of simple contextual STEM activities, group-based workshops, mentoring, presentation of products, and evaluation through observation, participant response questionnaires, and assessment of the learning activity designs. The main measurable contribution of this program was the improvement of teachers' competence in designing contextual STEM-based learning activities, as indicated by the active participation of 25 teachers, the production of five STEM Learning Activity designs, positive participant responses of more than 90% across all evaluated aspects, and product assessment results that were generally categorized as good to very good. These outcomes show that the training and mentoring activities had a practical impact on the teacher community by helping them transform abstract STEM concepts into applicable classroom learning designs that are contextual, creative, and aligned with school conditions. However, the results of this program were still limited to the design and initial evaluation stages, as the STEM Learning Activity products had not yet been fully implemented and evaluated in real classroom settings. In addition, several aspects still need strengthening, particularly the development of assessment rubrics, learning reflection instruments, and clearer integration of the Engineering and Technology elements in the learning steps. Therefore, future community service activities are recommended to focus on classroom implementation, follow-up mentoring, evaluation of student learning outcomes, refinement of STEM assessment instruments, and the development of more varied STEM activity models across different subjects and school contexts.

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