

Optimization and Implementation of STEM Integrated SIDILAN Through Learning Style Transformation Workshop

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Abstract

ABSTRACT

Public devotion article. This report optimizes and implements integrated SIDILAN with STEM through a workshop transformation-style study for the Community of Leading Teachers in Subang Regency. Activities: This responds to the needs of school teachers by using profile data from student studies, designing differentiated learning, and integrating STEM activities into contextual classroom practice. Workshop: This involved 37 school teachers and was basic and implemented for 20 hours of face-to-face lessons. The method used is participatory training with stages of preparation, pretest, conceptual reinforcement, SIDILAN practice, STEM learning design, LKPD development, product presentation, reflection, and posttest. The main products are a class profile map, STEM issue design, activity differentiation, an interactive media plan, a STEM LKPD draft, an assessment rubric, a teacher reflection journal, and a one-month action plan. The results of the pretest and posttest processing showed improvement in teacher competency in the form of N-gain of 0.35 on the criteria of moderate. Activities: This shows that SIDILAN can become a starting point for practical activities for teachers to identify student learning trends and translate them into learning differentiation in STEM-based learning. This program provides a workshop model that can be replicated for developing professional school teachers based on assisted STEM teaching that is technological, inclusive, and contextual.

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INTRODUCTION

Transformative education requires teachers to be able to design active, contextual, adaptive, and participant-centered learning. This is more important at the school level because the learning process is at this stage. This becomes the foundation for the development of knowledge, skills, character, and students' thinking abilities (Darman et al., 2024). Teachers do not only control material lessons. Teachers also need to choose approaches, media, activities, and forms of assessment that are appropriate to the instructional aims and the characteristics of students (Nurhayati et al., 2024).

Learning conditions at schools show that some teachers still face difficulty in developing cross-disciplinary learning. Learning activities are frequently implemented in a way that is separated based on the subject of the lesson. Learning is still ongoing and tends to put participants in an educative role as receivers of information. This pattern limits participants' opportunities to

educate themselves by observing problems, submitting questions, doing experiments, using technology, producing works, and finding solutions based on knowledge that has been studied (Darman et al., 2026). Therefore, increasing teacher competency is necessary, directed at the ability to design learning experiences that are more active and relevant to daily life.

One of the approaches that can be used to answer this need is the Science, Technology, Engineering, and Mathematics (or STEM) approach. The STEM approach unites science, technology, engineering, and mathematics in problem-oriented learning activities (Wibowo et al., 2024). The process gives participants a chance to link academic concepts with real-life situations. Participants not only learn concepts, but also how to design, test, improve, and explain solutions or products. The Ministry of Primary and Secondary Education also places STEM as an approach that combines four fields of knowledge to support contextual and integrated learning.

Implementation of STEM in schools. The basic principles are highly dependent on teacher competence (Hasbullah et al, 2025). Teachers must be capable of choosing appropriate problems, developing participants' education, connecting many concepts, and conducting assessments of concepts, managing activities of investigation, as well as assessing the process and results of study (Darman et al., 2024). A systematic review on the development of professional school teachers shows that STEM training is necessary to provide experience in active learning, opportunities to collaborate, practice designing learning, and support for applying results from classroom training (Wibowo et al., 2024). Training that only contains a presentation draft is not yet enough to build teacher readiness to carry out STEM learning consistently.

Besides the ability to integrate STEM, teachers need to understand diverse methods of participant education: receiving, processing, and using information. Diversity is often explained through the term learning style. However, the study of learning style should not be done by giving participants a permanent label as visual, auditory, reading, writing, or kinesthetic learners. Research evidence has not yet shown that modifying the teaching method to one style can consistently increase results. A more consistent approach is using diverse, multimodal, flexible, and appropriate learning strategies with character material as well as objective learning.

Understanding is important for basic school teachers. Teachers need to transform uniform learning into learning that provides diverse forms of representation, activity, interaction, and product study. For example, teachers can combine text, images, concrete objects, demonstrations, discussions, experiments, technology, and activity design. Variations are needed for the No For separate participate learning category and style learning provide participants to learn Andes to learn the learning, imp several experiences for participants to providing chance to participant educate For understand the draft through several number of experience Studies Study.

Many activities have made an effort to increase teacher competence through STEM training. Training covers the development of STEM-based digital teaching materials, design of 21st-century STEM-based learning, 21st-century leadership learning, STEM-based learning, as well as the use of technology devices in learning (Darman et al., 2025). Results of the activities show that the workshop can increase teachers' knowledge, skills, and beliefs about teacher self in designing STEM learning. Thus, the activities previously focused more on recognition of STEM concepts, development of teaching materials, or the use of certain devices. Integration between SIDILAN innovation, the STEM approach, and transformation of teachers' understanding of the diversity of learning processes is still not often discussed in an integrated way.

The other gap lies in the orientation of training. Some workshops stop at increasing participants' conceptual understanding. Teachers do not always get adequate support for change; the draft becomes design-ready learning and is implemented. Teachers also need concrete examples, worksheets, scenario-appropriate activities, media, and assessments with characteristics suitable for basic school participants. Thus, it is necessary to conduct a devotion activity that is not only to explain concepts, but also to facilitate teachers in analyzing learning practice, designing STEM activities, doing simulations, obtaining feedback, and arranging implementation plans in class.

Based on the needs stated, the public activity entitled "Implementation of Integrated STEM SIDILAN through Learning Style Transformation Workshop " was held as an effort to increase school teacher competency by forming adaptive, active, and integrated learning. SIDILAN is positioned as the main innovation, combined with the STEM approach, to help teachers change the learning pattern from material delivery to experience learning that fosters exploration, problem solving, collaboration, creativity, and reflection. Workshops are used because they give participants room to gain understanding through practice, discussion, and producing learning devices that can be used in teaching activities.

This activity is both scholarly and practical. In academic terms, these activities strengthen discussion about the development of teacher professionalism, the implementation of STEM at all levels of the school, and the significance and style of Study in a more critical and evidence-based way. In practice, this helps teachers produce more varied and appropriate learning activities that meet the needs of the class. This activity is also expected to reduce the use of monotonous methods and encourage teachers to use contextual problems as the basis for learning.

Objectives of the activity: devotion to the public. This is to increase the knowledge and competence of school teachers in implementing integrated SIDILAN with a STEM approach. In special activities, this aims to increase teachers' understanding of adaptive and multimodal learning, enhance teachers' ability to design STEM activities, and produce learning designs that can be implemented in class. This activity is expected to increase teachers' readiness, skills, and confidence in carrying out active, contextual, collaborative, and problem-solving-oriented learning.

METHOD

Activity Design

Activity design for this study uses a participatory training design with a one-group pretest-posttest evaluation—the design positions teachers as active participants in every stage of the activities. Participants not only accept explanations of concepts, but also practice using the system, discuss, compile learning products, present results, and reflect.

The participatory training design was chosen because the objective of the activity is not limited to presenting information regarding Science, Technology, Engineering, and Mathematics (STEM). Activities are also directed to change teachers' way of designing learning based on profile data obtained from students through SIDILAN (Wibowo et al., 2024). Through this design, improvement in teacher competency is measured by comparing knowledge before and after training. Quality products produced by participants were also observed to know teachers' ability in applying the training material.

A one-group pretest-posttest design is used by giving a pretest before the material is delivered and a posttest after the series of training is finished. In a simple design, the activity can be depicted as follows:

Pretest	Treatment		Posttest
O	Integrated workshop	SIDILAN	O

Note : (O) is a STEM knowledge instrument

Participants and Sampling Techniques

The population includes school teachers in Subang Regency. Participants who took part in the activity totaled 37 basic school teachers. The sampling technique used was saturated sampling or total sampling. All registered teachers as workshop participants and those who followed the

series of activities entered as participants for evaluation. This technique was chosen because the number of participants is relatively limited and all participants have appropriate characteristics with the objective of the activity.

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Training Duration and Material

The activity is implemented face-to-face. Workshop materials are developed gradually so that participants acquire conceptual understanding and experiential practice.

Main materials in the workshop include:

1. Draft-based STEM learning.
2. Understanding the profile and style of the study student.
3. Principles of differentiated learning.
4. Introduction to SIDILAN features and functions.
5. Practice profiling student profiles.
6. Interpretation of profile data of the study student.
7. Design STEM- based learning problems.
8. Compilation of differentiated learning activities.
9. Development of interactive learning media.
10. Preparation of STEM LKPD for student school base.
11. Compilation of rubric process and product assessment.
12. Reflection and compilation of action plans to carry out.

Training ongoing for 20 JP face-to-face. Main material covering draft STEM basics, style Study students, introduction to SIDILAN, practice identification profile learning, design STEM-based learning problems, differentiated activities, preparation of STEM LKPD, preparation of rubric assessment, reflection, and planning action to carry on.

The instrument activity consists of training PPT, teacher LKPD, pretest, posttest, product observation, and reflection. Teacher's LKPD contains ten sheet work , namely mapping beginning profile Study students , analysis need learning , election suitable elementary school material for STEM, design STEM- based learning problem , design activity differentiated , interactive media design , preparation of STEM LKPD for elementary school students , rubrics STEM process and product assessment , reflection transformation style study and plan action carry on implementation in schools .

Procedure Implementation

Implementation devotion consists of seven stages, namely preparation, pretest, reinforcement of the SIDILAN concept, practice, design of STEM learning, product development, as well as posttest and reflection.

Table 1. Workshop stages, activities, and expected outputs

Stage	Activity main	Task participant	Expected output
Preparation	Preparation of PPT, LKPD, instruments, and scenarios for SIDILAN practice	Learn information beginning and preparing device	Plan and equipment learning
Pretest	Measurement knowledge early teacher	Answer questions about competence beginning	Competency score beginning
Strengthening draft	Discussion about STEM, profile learning, and differentiated learning	Identifying problem classes and student needs	Understanding together about STEM and SIDILAN
SIDILAN Practice	Access and use SIDILAN to read profile data. Study	Map tendencies and needs. Study students	Profile map: study class
STEM Design	Designing STEM-based activity problems for school-based materials	Fill in sheet work 3, 4, and 5	STEM activity design and differentiated learning
Development product	Compiling media, LKPD, rubrics, reflections, and action plans to carry on	Fill in sheet work 6 to 10	Media draft, LKPD, rubric, reflection, and plan action carry on
Posttest and reflection	Measure knowledge at the end and evaluate participant experience	Answer the posttest and fill out the reflection sheet	Competency score and plan of action carried out

At the preparation stage, the team compiles materials, worksheets, evaluation instruments, and practice scenarios. The team additionally ensures readiness of devices and access for participants against SIDILAN. Stage two is implementation of the pretest. Participants take the test before receiving training materials. The pretest results are used to describe participants' initial ability. Stage three is strengthening concepts. The facilitator explains STEM concepts, student profile data, differentiated learning, and the relationship between student data and learning design. Participants then identify the learning problems they meet at school. Stage four is SIDILAN practice. Participants access the system, read profile data on the students they study, and compile a map of the needs for study classes. The facilitator accompanies participants during the practice process. Stage five is designing STEM learning. Participants choose appropriate school materials as a basis, determine contextual problems, compose investigation activities, design engineering processes, and determine the elements of mathematics and technology used. Stage six is product development. Participants compile learning media, STEM LKPD, rubrics, assessment activities, differentiated activities, reflect, and plan continued action—products presented for feedback from facilitators and other participants. The final stage is implementation, posttest, and reflection. Participants do the posttest, fill out the reflection sheet, and compose a plan for implementing the workshop results at each school.

Data analysis

Data analysis was performed descriptively. Improvement in teachers' ability is calculated by comparing pretest and posttest scores. Pretest and posttest were used to measure changes in teachers' knowledge before and after the workshop. The second instrument measures indicators of the same competency, namely understanding of STEM, student profile, differentiated learning, use of SIDILAN, compilation of STEM activities, and learning assessments.

The formula used is the normalized gain (N-gain), namely the difference score divided by the maximum reduced pretest score, with equation 1

$$\text{N-gain} = \frac{(\text{posttest mean} - \text{pretest mean})}{(\text{Skor max} - \text{pretest mean})} \dots\dots\dots (1)$$

Interpretation of normalized gain: low if $g < 0.30$, moderate if $0.30 \leq g < 0.70$, and high if $g \geq 0.70$.

RESULTS AND DISCUSSION

Results:

Workshop Implementation

STEM Integrated SIDILAN Implementation Workshop through Learning Style Transformation was implemented in a face-to-face format for 20 hours of lessons. This activity was attended by 37 school teachers, based in the Community of Moving Teachers, Subang Regency. The workshop was implemented using a participatory training approach, which places teachers as active participants in every stage of the activity.

Participants not only accept material about STEM, student profiles, student profile studies, and differentiated learning. Participants also practice using SIDILAN, discuss in groups, work on worksheets, compose learning products, present work results, and reflect. The approach used is intended to enable participants to connect conceptual knowledge with the design of basic learning practice at school. Documentation of the implementation activity is presented in Figure 1.



Figure 1. Implementation of the Integrated STEM SIDILAN Implementation Workshop

The workshop begins with a pretest to measure early-stage teacher ability, then focuses on strengthening STEM concepts, student profile studies, and differentiated learning. After gaining conceptual understanding, participants train to access and use SIDILAN to read and interpret student profile data. At the design stage, the teacher chooses school materials based on what can be developed into STEM-based learning problems. This activity is done in groups, as presented in Figure 2.



Figure 2. Design STEM- based learning Problem

Participants then compile learning activities that provide several forms of representation, interaction, practice, and learning products. The end stage of the workshop includes preparation of learning media, STEM LKPD, rubric assessment, reflection, posttest, and planning action to be carried out during one month.

Products Produced by Participants

The workshop produces ten types of products that are arranged gradually through LKPD. Each sheet of work is designed for direct participants, from reading profile data of study students to compiling the learning implementation plan at school. The main outputs presented by participants are in Table 2.

Table 2. Main workshop products based on LKPD SIDILAN integrated STEM

LK Code	Focus activity	Products produced by teachers
LK 1	Mapping the beginning profile of study students through SIDILAN	Profile table: study class
LK 2	Analysis of needs: study students based on the school	Needs map: visual support, oral interaction, practical work, independent learning, and collaborative learning.
LK 3	Selection of materials based on the school's appropriate STEM needs	List of materials and problems contextual
LK 4	Design STEM- based learning problems	Design simple STEM activities
LK 5	Design activity differentiated based on SIDILAN data	Several choice activities in one learning material
LK 6	Learning media design interactive	Media products or learning media design
LK 7	Development of STEM LKPD for student school base	Draft of STEM Student Worksheet
LK 8	Compilation rubric process and product assessment	Assessment rubric STEM learning
LK 9	Reflection transformation learning	Journal teacher reflection
LK 10	Compilation plan of action to continue in school	Plan action implementation during one month

Based on the results of reviewing products and participants' presentations, the two most prominent outcomes are mapping students' needs and designing STEM-based learning problems. Needs map: The study helps teachers understand that students in one class need support for different educational needs. Teachers start considering using pictures, videos, oral

explanations, discussions, direct practice, independent activities, and group work in one series of learning.

The map is not intended to provide permanent labels for students as visual, auditory, or sensory learners (kinesthetic). SIDILAN data is used as information to help teachers provide several choices and goal-directed activities for the same learning. Use of the data encourages teachers to design more flexible and reactive learning to the needs of the class.

In designing structured STEM learning, participants also showed their skill to connect school-based material with real problems. On the material change from objects, for example, teachers design challenges to make containers that can slow down the ice-melting process. In the material water cycle, teachers develop problem-solving exercises about puddles in the school yard. In the material energy unit, teachers design a simple project in the form of an electricity usage audit and an energy-saving campaign in the school environment. For example, the teacher shows that the material changes from conceptual learning to research and solution design. Participants not only list elements of science, technology, engineering, and mathematics separately. They make an effort to connect the four elements in one appropriate contextual problem with characteristics of the school-based student.

Improvement in Teacher Ability

A posttest is given after participants finish all stages of the workshop. Pretest and posttest results are used to describe changes in teachers' ability to understand SIDILAN, STEM, differentiated learning, as well as learning device compilation. Measurement results are presented in Table 3.

Table 3. Results of pretest, posttest, and N-gain of teacher abilities

Statistics	Pretest	Posttest
Minimum value	15.00	45.00
Maximum value	65.00	95.00
Average value	48.65	66.62
Average difference		17.95
Improvement against the pretest average		36.89%
N-gain		0.35
N-gain category		Currently

Based on Table 3, the average pretest score of participants was 49.72. After attending the workshop, the average score increased to 65.69. Thus, the average increase was 17.95 points. Compared to the pretest average, the increase is equivalent to 36.89 percent. The results of the N-Gain calculation produce a mark of 0.35. Based on the N-Gain criterion, the value is in the moderate category. The results of the increase in the N-Gain capability of each teacher are presented in Figure 3.

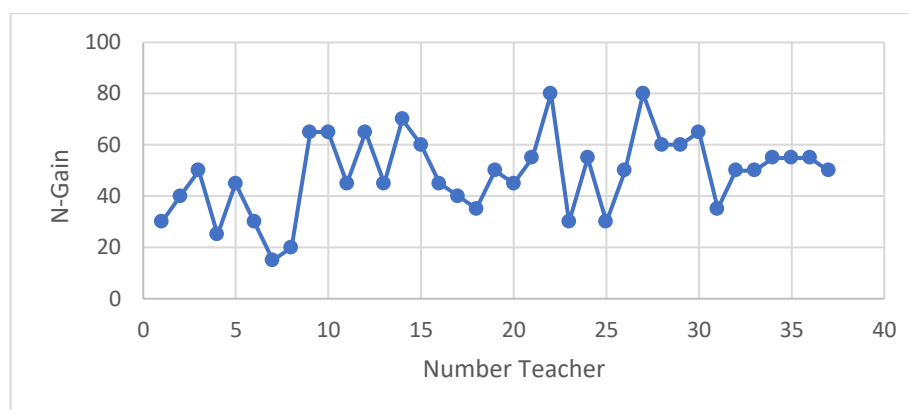


Figure 3. N-Gain of each Workshop Participant

Based on Figure 3, the increase in the N-Gain category tall was obtained by 4 teachers, while generally teachers achieved N-Gain in the category moderate. This result shows an improvement in teachers' ability in general after joining workshops. The improvement covers understanding of the use of SIDILAN, identification of students' needs, STEM learning concepts, differentiated activities, and device arrangement.

Thus, the average posttest score has not yet reached a very high score. This shows that participants have a basic understanding, but still need continued practice and mentoring. Integrating profile data, learning, technology, STEM, and differentiated learning is a complex competency, so it is difficult to master deeply through one series of workshops.

Discussion:

The average score increase from 48.65 to 66.62 shows that participatory workshops can help teachers understand concepts and stages of implementing integrated STEM SIDILAN. The N-gain value of 0.35 is in the moderate category. Findings show that the workshop provides benefits for improving participants' competence, but the impact has not yet reached the category of tall.

The current category can be explained by the characteristics of the material being studied. Teachers must control several abilities simultaneously, namely reading profile data, learning, choosing contextual problems, integrating STEM elements, designing various activities, compiling LKPD, and making assessment rubrics. Competence is not only regarding understanding concepts. Teachers also need experience in designing, implementing, evaluating, and repeatedly improving learning.

The workshop duration is 20 teaching hours. Has given time for participants to learn concepts and produce products at the beginning. However, the duration is not yet enough to see consistent implementation in class. Improvement in this category can currently be understood as the beginning stage of competency development. Participants have their own base for applying learning, but still need mentoring moments using the product together with students.

This result is in line with Boz's (2023) study, which confirms that developing STEM teacher professionals needs a combination of strengthening concepts, practice design, collaboration, and reflection. This workshop uses four elements: explanation of concepts, LKPD work, group discussions, product presentations, and reflection. This structure permits teachers to learn through direct experience, not only through lecture.

These outcomes also support the results of research by Zhou et al. (2023), which shows that professional development plays a role in increasing STEM teachers' efficacy. In this activity, the teacher gets a chance to choose materials, design problems, create activities, and present products. This experience gives the teacher a chance to build the belief that STEM learning can be implemented with materials and media available at school.

SIDILAN as a Basis for Learning Decision Making

An important contribution from this workshop lies in the use of SIDILAN as a basis for learning decision-making. SIDILAN is not only used to gather or display student data. The resulting data is used to guide teachers in determining how to support learning, the choice of activities, media, interactions, and products that can be provided in learning.

The flow can be seen from the connection between LK 1 and LK 10. Participants also map the study students' profile and analyze class needs. Participants then choose material, determine problems, compose STEM activities, develop LKPD, make rubrics, and compile action plans. With this channel, the decision-making process is not only based on teachers' customary teaching, but also on information about students' needs.

Findings strengthen SIDILAN's position as a technology supporter for instructional decisions. Technology Is Not placed as an end in itself, but as a tool to help teachers design learning. This is relevant to the Technological Pedagogical Content Knowledge (TPACK) framework, which stresses the connection between mastery of technology, pedagogical strategies, and lesson materials. Mardati et al. (2024) explain that TPACK relates to teachers' ability to develop differentiated learning in basic schools. In this activity, teachers not only learn how to operate the system. Teachers also use information from the system to determine learning strategies. This process shows the connection between technology, pedagogy, and content learning.

Liu et al. (2024) also emphasized that the development of digital professionals and community studies professionals supports embedding technology in STEM learning. Engagement of the Community of Moving Teachers, Subang Regency, in this activity becomes a relevant factor. The community can become a space for sharing products, discussing constraints, and evaluating learning implementation after the workshop ends.

Transformation Understanding about Learning Styles

Integration of study styles in the workshop must be interpreted critically. Data on students' study trends should not be used to give students a permanent label. Labeling can limit students' chances to gain broad learning experiences. Students who are considered to have visual tendencies, for example, do not always study through pictures. Students still need a chance to discuss, read, write, practice, and work the same way.

Transformative study is directed at changing how teachers design learning. Teachers are encouraged to switch from teaching the same to providing several forms of representation, activities, interactions, and learning products. SIDILAN data is used as information to begin designing multiple learning, not as a rigid basis for separating students.

Product results show that participants start by providing pictures, videos, oral explanations, experiments, discussions, and assignments gradually, with independent activities and group work. The pattern is closer to the principle of differentiated learning. The teacher provides several learning tracks but still directs all students to the same learning target.

Based on Integration Problem Contextual

Products arranged by participants show that contextual problem-based learning can help teachers integrate STEM elements (Winarni et al., 2025). Problems such as melting ice, waterlogging, and energy use are nearby phenomena occurring in students' lives. Context makes it easier for teachers to connect the draft lesson with activities such as observation, measurement, design, testing, and solution improvement.

In the activity of making a container so that the ice does not melt quickly, students can learn heat displacement as an element of science. Students use simple tools as elements of technology, design the receptacle as elements of engineering, and count time and compare results as elements of mathematics. This merging makes STEM not only a gathering of four terms, but also a problem-solving process.

Learning-based problems also change the role of teachers. Teachers do not only explain answers, but guide students to identify problems, submit guesses, choose materials, test drafts, note results, and reflect. These changes support more active, student-centered learning.

Implications Theoretical

In a way, theoretically, the results of the activity show that fusing technology, differentiated learning, and STEM can be arranged in one channel of learning development. Profile data study becomes a starting point. The data are then translated into pedagogical decisions and developed into STEM-based problem-based activities.

Findings: This strengthens the view that technology education gives benefits when used to support decision-making in learning. Using a system without action carries on pedagogical work; it only generates data. On the other hand, data connected with learning materials, activities, media, and assessments can help teachers design more differentiated learning.

The results of the activity also show that differentiated learning and STEM do not need to be positioned as two separate approaches. Differentiation gives several tracks for students involved in the learning process. STEM provides a context and analytical problem-solving process, connecting problems across many science disciplines. Integration of both allows teachers to maintain the same learning objective while delivering diverse support and activities.

Implications Practical

Practically, the workshop produces channel work that can be used by teachers when designing learning. The flow starts with reading student profiles, analyzing needs, choosing material, determining problems, composing STEM activities, providing varied activities, creating LKPD, and developing rubrics.

Ten LKPDs used in the workshop can become a teacher's work device after the activity ends. Teachers can use the return format for different materials and classes. Workshop products can also be entered into the community Study school to be studied and developed together.

N-gain results in the current category show the necessity of ongoing action. The school can carry out mentoring for one month through weekly meetings, class observations, product discussions, and reflection. Mentoring is important so that knowledge acquired during the workshop becomes steady practice and learning.

Teachers also need to conduct evaluations to assess students. The data needed is not only learning results in the form of marks, but also pupil engagement, work quality, product capability, and the ability to solve problems and difficulties that arise during learning.

Implications Policy

Activity results give input for schools, teacher communities, and government agencies in education in designing development programs for professional teachers. Training in technology and STEM should not only be in the form of a seminar or socialization. The program needs to cover practice, product preparation, implementation in class, observation, feedback, and reflection.

The Department of Education and Management teacher community can develop sustainable mentoring programs after the workshop. Mentoring can be done through community study Groups, teacher work, lesson study, or academic supervision. The pattern can help teachers improve products based on real classroom experience.

Schools also need to provide support in the form of access to devices, internet connections, time for collaboration, and policies for sharing good practice. Support is important because teachers' ability to use technology is influenced not only by training, but also by the work environment and the availability of power sources.

Policy development on teacher competency should avoid using profile data to provide a permanent label for students. Profile data must be used flexibly as one of the sources of

information. Permanent teachers need to consider assessment results, diagnostic results, readiness for learning, interests, character, material, and learning objectives.

Contribution and Added Value Activity

Contribution main activity: This consists of integrating SIDILAN, STEM, and differentiated learning into one workshop flow. Activities do not stop at the introduction, application, or delivery of STEM concepts. Participants use profile data to produce learning decisions and products that can be applied in class. Added value also lies in the use of ten-sheet work that forms stages from assessment to planning and continues into action. This structure creates a more systematic learning development process. The teacher does not create STEM LKPD without understanding students' needs and learning problems.

This activity also shows that STEM integration can be done using close material and problems in students' lives. Teachers do not have to use complex technology or expensive laboratory equipment. Simple media can be used during the activity, including the process of investigation, design, testing, measurement, and reflection. Contribution activity: This is not intended as a claim that SIDILAN is the only tool for designing adaptive instruction. SIDILAN provides an operational model that connects student profile data with STEM learning design and differentiation.

Limitations Activity

This activity has several limitations. First, evaluation uses a one-group pretest -posttest design without group comparison. The design can describe changes in participants' scores, but it cannot yet ensure that the change is caused only by the workshop.

Second, participants are only 37 teachers in Subang Regency. Participant characteristics can differ from those of teachers who are not part of the professional community. Therefore, the results of the activity cannot yet be generalized to all school teachers. Third, the measurement was done quickly after the workshop. Evaluation has not yet measured participants' long-term knowledge of Power Stand. The posttest scores also do not yet show that the teacher has applied all skills consistently in class.

Fourth, evaluation: more focus on knowledge and structured products during the workshop. Activities do not yet measure changes in practice teaching, student involvement, decision-making skills, or student study results after implementation.

Fifth, the duration of 20 hours of lessons is enough for strengthening concepts and product composition early, but not yet enough for repeated implementation mentoring. Some participants still need support in integrating STEM elements and composing process assessment and products. Sixth, results analysis has not yet fully displayed the characteristics of a psychometric instrument. Validity and reliability of the pretest, posttest, questionnaire reflection, and rubric product need to be reported to strengthen measurement reliability.

Recommendation

The activity also needs a stronger evaluation design. Research can involve a comparator group or use a quasi-experimental design so that the impact of the workshop can be analyzed more convincingly. The number of participants also needs to be expanded by involving teachers from several schools, sub-districts, or regencies.

Measurement needs to be done several Weeks or some months after the workshop. Measurement can evaluate Power Stand knowledge, consistency in using SIDILAN, and sustainability of STEM implementation in the classroom.

The next step is also necessary to measure the impact of the program on students. Variables that can be analyzed include involvement in learning, problem-solving ability, creativity, work ethic, scientific literacy, numeracy, and study results.

Pretest, posttest, reflection, and rubric instruments need to be tested for validity and reliability. The assessment product should involve more than one assessor for consistency in evaluation. Class observations, teacher interviews, document analysis, and student responses can support analysis.

In the implementation stage, schools need to continue activities through mentoring for one month, as designed in LK 10. Mentoring can include trials of devices in class, observation of peers, discussion of results, LKPD revisions, and documentation of good practices. Products that have been repaired can be collected in the repository teacher community so that they can be used and developed sustainably.

CONCLUSION

Activity devotion to the public through the STEM Integrated SIDILAN Implementation Workshop was successfully implemented in a face-to-face format for 20 hours of lessons, involving 37 school teachers from the Community of Moving Teachers Subang Regency. Activities This in accordance with goals that have been determined, namely increase teacher knowledge and competence in using profile data Study students, designing STEM- based learning problems, and develop activity more learning adaptive and differentiated approach training participatory through presentation concept, practice use of SIDILAN, discussion group, arrangement products, presentations, and reflections give chance to the teacher to connect knowledge conceptual with need classroom learning.

Evaluation results show that the average teacher score increased from 48.65 in the pretest to 66.62 in the posttest. The increase of 17.95 points and an N-gain value of 0.35 indicates improvement in competence in the moderate category. The findings show that the workshop provides benefits for teachers' understanding of SIDILAN, STEM, student profile studies, and differentiated learning.

In a theoretical way, these activities show that technology learning, STEM, and differentiated learning can be integrated through a systematic flow, starting from mapping student needs until compiling learning devices. Practically, the ten-sheet work used in the workshop can serve as a guide for teachers in developing contextual, active, and student-centered learning. At the policy level, the results of the activity show the importance of developing professional teachers who are not merely shaped by socialization, but also include practice, product preparation, classroom implementation, feedback, and sustainable assistance.

Furthermore, development activities need to be directed at mentoring implementation in schools, observing learning practice, and evaluating impact on involvement as well as student study results. Future research can involve more participants more widely, use group comparisons, conduct long-term measurements, and test instrument validity and reliability more deeply. With this development, STEM-integrated SIDILAN has the potential to become a development model supporting teacher competency learning at the school base in a way that is adaptive, contextual, and sustainable.

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AUTHOR CONTRIBUTION STATEMENT

Contribution writer that is designing activities (DR, FC), compiling material (MA, EW, II) facilitate workshops (DR, AT, ZA), design service (MA, EW, II), data collection and analysis (DR,

AT, ZA), as well as interpretation results, writing manuscript (DR, FC), revision script (DR, FC), checking reference (FC) and finalization articles (DR, FC)

AI Disclosure Statement

The writer used ChatGPT to inspect error letters, words, and writing in text, checking conformity of the writing to the journal template. All content scripts have been reviewed and edited thoroughly by the author, so the writer is still responsible for ensuring full authenticity and exactness in the publication.

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