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Cultivating Physics Teacher Creativity through Local Wisdom-Based Learning Design

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ABSTRACT

This activity aims to foster physics teachers' creativity in designing contextual and meaningful learning by integrating local wisdom values into the teaching and learning process through a community service program. The activity was implemented in Trenggalek Regency, targeting physics teachers who are members of the Physics MGMP. The implementation involved three main stages: (1) dissemination of local wisdom-based learning concepts, (2) mentoring in designing creative learning tools that integrate cultural elements and regional potential, and (3) reflection and evaluation of the learning design results. The results of the activity demonstrated an increase in teachers' understanding and skills in identifying local potential as a resource for physics learning, as well as their ability to package this information into engaging, innovative, and relevant media and learning scenarios for students. Furthermore, this training successfully fostered a collaborative spirit among teachers in developing creative learning ideas rooted in Trenggalek's local values, such as utilizing natural phenomena, traditional arts, and community activities as contexts for physics. Thus, this activity provides a real contribution in improving the professional competence of physics teachers and encouraging the realization of character-based and sustainable learning based on local wisdom.

INTRODUCTION

Teacher professional development in the Independent Curriculum era demands that teachers be able to design learning that is creative, contextual, and relevant to their students' socio-cultural environment. Although various studies have shown that local wisdom-based learning can improve conceptual understanding and student engagement (Hikmawati, 2023; Morales, 2016), many physics teachers still fail to integrate regional cultural contexts into their learning materials. This is evident from initial findings that teachers still tend to present physics material abstractly and disconnected from students' daily lives (Kember & Hong, 2008), resulting in less meaningful learning and a lack of creativity.

The result of the participant needs analysis (Table 2) reinforce this gap, indicating a lack of professional experience related to learning innovation. The average ability to comprehend local wisdom concepts (indicator a) persists within the satisfactory range, whereas difficulties in formulating innovative learning strategies are minimal. These findings underscore the need for intervention through structured training that not only provides knowledge but also supports practice, evaluation, and reflection.

In the context of physics learning, local wisdom can be a rich source of inspiration and teaching material because many physical phenomena can be found in cultural activities and community traditions, for example, the principles of sound and waves in traditional musical instruments or the concepts of force and pressure in local agricultural or fishing activities (Susanto et al., 2023). Studies show that physics concepts can be linked to traditional games, the environment, and local culture, thus helping students understand them in a more meaningful way (Morales, 2016). There are two main benefits to using

local knowledge in physics lessons. First, students can more easily grasp physics concepts because the material is linked to the reality they know and experience. Research shows that learning that utilizes local wisdom has been proven to strengthen conceptual understanding and student engagement. Second, cultural values and regional character can be instilled through the learning process so that education not only produces students who are intellectually intelligent but also have strong character and cultural identity. Thus, local wisdom serves as a bridge between modern science and students' real lives while simultaneously strengthening cultural identity and locality in education (Mardatillah et al., 2025). Studies on contextual learning models based on local wisdom demonstrate the relevance of these two aspects.

Through this phase, it is hoped that teachers' abilities in identifying local potential, linking it to physics concepts, and developing innovative learning strategies will improve. This approach also strengthens the spirit of collaboration among teachers within the MGMP forum, a professional forum for sharing knowledge and best practices. This training activity also serves as a vehicle for empowering teachers to become agents of change in their respective schools. By developing the ability to design learning based on local wisdom, teachers are expected to become drivers of learning innovation that is more adaptive to the socio-cultural environment. The creativity that emerges from this activity is expected to extend beyond learning design to include student project development, classroom action research, and scientific publications based on contextual learning outcomes.

Furthermore, this activity contributes to the achievement of sustainable development goals (Sustainable Development Goal 4: quality education; Sustainable Development Goal 11: preservation of local culture) by providing a learning model that is not only academically efficient but also rooted in local communities and culture. Thus, the training "Cultivating Physics Teacher Creativity through Local Wisdom-Based Learning Design" is not only a program to improve teachers' professional competence but also a strategic initiative in restoring the essence of education rooted in local culture. The results of the activities demonstrate that teachers are increasingly able to identify local potential as learning resources, integrate it into engaging learning designs, and foster a collaborative and creative spirit among fellow educators. This program represents a concrete step toward building a contextual, character-based, and sustainable learning ecosystem in Trenggalek Regency.

METHOD

Design

In general, this activity consists of three main stages: (1) socialization of the local wisdom-based learning concept, (2) training and mentoring in creative learning design, and (3) reflection and evaluation of the learning design results. The three stages were planned in order so that participants could gain conceptual understanding, practical skills, and reflective experience to create innovative and relevant learning in the local context.

The first stage, socializing the idea of learning based on local wisdom, was done by giving out materials and having interactive discussions about the basic ideas of contextual learning, the philosophy of local wisdom, and the importance of combining regional culture and potential in physics learning. In this stage, participants are introduced to

various examples of the application of local wisdom in science learning, such as utilizing natural phenomena around Trenggalek (waves, karst rocks, or local agricultural systems) as a context for explaining physics concepts.
The second stage, mentoring in creative learning design, focuses on identifying and analyzing local cultural content. Participants are assisted by the PKM team in designing physics learning materials (RPP, LKPD, learning media, and assessments) that integrate elements of local culture and potential.
The third stage, reflection and evaluation of the learning design results, is conducted to obtain feedback. Participating teachers are provided the opportunity to present the learning designs they have developed, followed by discussions to improve and refine the products. Reflection is aimed at raising teachers' awareness of the importance of creativity, collaboration, and local cultural values in increasing the relevance of physics learning in schools.

Participants
This community service activity was implemented using a participatory-collaborative approach, which positions teachers as active participants in the learning and competency development process. The program was implemented in Trenggalek Regency, with five physics teachers who are members of the Trenggalek Regency Physics MGMP. This approach was chosen because it is believed to have a direct impact on increasing teacher creativity in designing contextual, local wisdom-based learning.

Instrument
Table 1 displays five main indicators used to assess the level of teacher creativity in designing local wisdom-based learning using a rating scale of 1–4. These indicators include (I) uniqueness of ideas and novelty of solutions, (II) fluency and flexibility in generating various alternative ideas, (III) relevance, depth, and accuracy of local context integration, (IV) innovation of media and learning strategies used, and (V) completeness, detail, and consistency of learning planning. All of these indicators serve as the basis for evaluating the extent to which teachers are able to apply creativity in designing innovative and contextual physics learning.

Tabel 1. The level of teacher creativity.

No	Indicators	Ave. Score
		1-4
I	Uniqueness of ideas, novelty of solutions	
II	The fluency and flexibility of ideas, along with the generation of numerous alternative solutions, are essential	
III	Relevance, depth, and appropriateness to local context	
IV	Media Innovation/Learning Strategies	
V	Completeness, detail, and consistency	

Data Analysis
Data analysis was conducted to determine the average creativity score during the training. Table 2 shows that the score range was on a scale of 1–4. A score of 3.25–4.00 was categorized as high, indicating a very acceptable level of creativity. A score of 2.50–

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3.24 was categorized as adequate, indicating sufficient creativity but still able to be improved. A score of 1.75–2.49 was categorized as low, indicating that teachers' creativity was still limited and required training intervention. A score of 1.00–1.74 was categorized as "poor," indicating that creativity was very low and required intensive mentoring. These categories were used as a reference for analyzing the development of teachers' creativity before and after the training.

Tabel 2. Data Analysis.

Scores	**Criteria**
3,25-4,00	High
2,50-3,24	Adequate
1,75-2,49	Low
1,00-1,74	Poor

RESULT AND DISCUSSION

This training was held to facilitate teachers' creativity in identifying teaching materials based on local wisdom. This session was based on the results of the pre-training analysis, shown in Table 1 below:

Table 3. Pre-training analysis results.

Education Levels	**Teaching Experience (years)**	**Experience Attending Training**	**Average**			
			(a)	**(b)**	**(c)**	**(d)**
Master's Degree	17	Yes	3.8	3.0	4.0	3.3
Bachelor's Degree	35	No	3.5	3.3	2.4	3.0
	16		2.3	2.0	3.0	3.0
	15		3.0	4.0	1.8	3.8

Description:
(a) Understanding of the Concept of Local Wisdom
(b) Experience Integrating Local Culture into Physics Learning
(c) Challenges in Designing Creative Learning
(d) Readiness for the Independent Curriculum and Contextual Approach

Table 3 shows the varied educational backgrounds and teaching experience of the teachers who responded. The highest qualification level was a master's degree, and the lowest was a bachelor's degree. Their teaching experience is also varied, averaging over 10 years.

In terms of training experience, only two teachers reported having attended previous training; the others had not. This may impact their insight and skills in integrating current concepts into their learning, particularly those related to the Independent Curriculum and approaches based on local cultural contexts.

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The average score for understanding the local wisdom concept indicates that teachers with experience and higher education tend to have a better understanding. Conversely, those with less experience indicated a need to improve their understanding of the concept of local wisdom in their learning.

For the indicator of experience integrating local culture into physics learning (indicator b), teachers with the highest scores indicated that, despite their relatively short teaching experience, they tended to try local context-based learning approaches. Conversely, teachers with the lowest scores indicated limited use of culture-based approaches in their teaching and learning activities.

The readiness indicator for the Independent Curriculum (indicator d) shows that teachers have the highest readiness, with a score of 3.8. This can be attributed to their training experience and the possibility of more frequent curriculum adaptations in elementary schools.

The pre-training results showed that teachers' understanding of the concept of local wisdom, their ability to integrate it into their learning, and their readiness to implement the Independent Curriculum varied considerably. Teachers with higher educational backgrounds and prior training experience tended to be better prepared and scored higher on several aspects of local culture-based learning. However, some teachers still needed more in-depth guidance, particularly regarding creative implementation in learning activities.

The analysis results in Table 4 show a clear increase in teacher creativity after participating in the Cultivating Physics Teacher Creativity through Local Wisdom-Based Learning Design training.

Table 4. Pre-training analysis results.

Indicator	Ave. Score (Pre-Training)	Criteria	Ave. Score (Post-Training)	Criteria
I	2,18	Low	3,08	Adequate
II	2,08		2,92	
III	2,16		3,06	
IV	2,04		2,94	
V	2,16		3,3	High

In the pre-training phase, the average teacher scores on the five creativity indicators—idea uniqueness, idea flexibility, local context relevance, learning media innovation, and completeness of learning design, which fall into the Low category. This condition illustrates that before the training, teachers still experienced limitations in generating new ideas, designing alternative strategies, and integrating elements of local wisdom into physics learning. Furthermore, the low scores of indicators IV and V indicate a lack of optimal development in media innovation and consistency of learning planning. However, after participating in the training, the average scores on all indicators increased significantly to the range of 2.92–3.30, which reflects the Adequate to High category. This improvement indicates that teachers are starting to be able to develop more creative and unique ideas, design more flexible learning strategies, and utilize local wisdom more appropriately and relevantly in learning activities. The indicator for completeness and consistency in learning design achieved the highest increase (3.30), indicating that the

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training successfully strengthened teachers' ability to develop more systematic and structured learning tools. Overall, these data confirm that the training provided was effective in enhancing physics teachers' creativity, particularly in integrating Trenggalek's local wisdom values into innovative, contextual learning designs that align with the demands of the Independent Curriculum.

Following the training, reflections indicated increased positive perceptions of the training materials and process (Table 5). The average score for the quality of the training materials and methods was high, indicating that participants found the material relevant and the delivery method aligned with current learning needs. This conclusion indicates that the training materials were well-designed and easily understood by participants with diverse teaching backgrounds.

Table 5. Participant feedback.

No	(a)	(b)	(c)	(d)	Feedback and Suggestions
1	4.0	4.0	3.8	3.3	Activities like this should be held more frequently.
2	4.0	4.0	3.8	3.3	Continue with collaboration between academics and practitioners to produce meaningful outcomes.
3	3.5	3.3	3.3	3.0	Conduct further follow-up training sessions.
4	3.3	3.0	3.0	2.7	More time is needed to deepen essential materials and applications in preparing learning instruments.
5	3.3	3.0	3.5	3.3	Regular similar activities are recommended.
Conclussion					Very good and helpful, especially for elementary school teachers.

Note:
a: Quality of Training Materials
b: Method and Implementation Process
c: Benefits and Impact of Training
d: Overall Evaluation of the Training

However, ratings for the benefits and impact of the training, as well as the overall assessment, varied. Several participants expressed that the training time was insufficient to understand the material fully. There was a need for further guidance, particularly regarding the application of concepts in the development of learning instruments and their implementation in the classroom. This suggestion demonstrates the importance of sustainability and post-training guidance for ensuring successful implementation.

Participants' suggestions largely emphasized the importance of program sustainability. Several teachers proposed conducting similar activities regularly, which would involve collaboration between lecturers and educational practitioners from schools. This idea is believed to result in more meaningful and applicable learning outcomes for various levels of education, particularly in the context of local wisdom-based learning.

Overall, pre-training data and training reflections suggest that the training had a positive impact on increasing teachers' knowledge and preparedness in developing contextual learning. Despite some challenges related to duration and in-depth material, the training was deemed highly beneficial and had a direct impact on teachers' ability to understand and implement local culture-based learning in accordance with the requirements of the Independent Curriculum.

This training had a significant positive impact on improving teachers' understanding of integrating local wisdom into the learning process. Teachers who previously had a limited understanding of the concept and application of local culture-based learning have now demonstrated improved ability to identify the potential of local wisdom in the school environment and incorporate it into learning activities. This type of instruction is a crucial asset in creating a more contextual, meaningful, and relevant learning experience for students.

Furthermore, this training also increased teachers' awareness of the importance of creativity in designing learning tools. Teachers began to understand that learning is not solely oriented toward delivering material but also needs to encourage students to develop critical, creative, and collaborative thinking skills. Although some teachers still felt the need for further guidance, this change in learning orientation indicates a paradigm shift toward a more progressive direction.

In the context of implementing the Independent Curriculum, this training served to strengthen teachers' readiness to implement project-based learning and contextual approaches. The training opened up space for discussion and critical reflection on how these curriculum concepts can be translated into more concrete learning practices that are tailored to student characteristics. Thus, this training directly contributed to improving teachers' professional competence in responding to the demands of current education policy.

CONCLUSION

The training successfully provided teachers with an understanding and improved skills in integrating local wisdom into their learning, although further mentoring is needed to strengthen its application in real-world practice. The training method was deemed effective, the material was deemed relevant, and teachers' readiness to support the implementation of the Independent Curriculum (Curriculum Merdeka) improved. Therefore, it is recommended that the training be conducted on an ongoing basis with structured mentoring.

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