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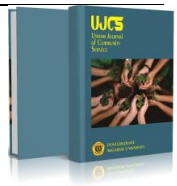

Strengthening Teachers' Competence in Developing Diagnostics Tests for Learning

Erlin Eveline[1*], Herman S. Wattimena[1], Heppy Sapulate[1], John Rafafy Batlolona[1], Gazali Rachman[1], David Tuhurima[1], Cicylia Triratna Kereh[1], Marasi Bless Suryan[1], Anastasija Limba[1], Juliana Nirahua[1]

[1] Physics Education, Pattimura University, Ambon, Indonesia.

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Corresponding Author:
Erlin Eveline
erlin.eveline12@gmail.com

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Abstract: The purpose of this community service is to strengthening teachers' competence about diagnostics test for deep learning approach. The community service is conducted to address the challenges of Indonesia's new curriculum policy about deep learning based on meaningful learning. The implementation methods include opening, materials explanation, discussion, assessment, and closing. Assessment was conducted by questionnaire and test. The result of the assessment from the questionnaire shows positive responses from teachers. The average scores each statement ranges from 82% to 97%. It indicates a high level of participant satisfaction with the community service. The teachers gained strengthened knowledge about deep learning and the development of diagnostic instruments. The results indicate that the teachers found this community service beneficial, relevant to classroom needs, and applicable in teaching. In addition, most teachers were aware of diagnostic instruments (61,1%), but only a few teachers had ever developed them (5.6%) or conducted them in their classroom (11.1%). It shows that the implementation of the diagnostics test is still limited before conducting the training. The result of the assessment from the test shows the mean score obtained by the teachers was 86,67. A total of 16 out of 18 teachers (88,9%) scored ≥ 80, which is categorized as good, while 2 teachers scored below 80. Thus, the percentage of teachers exceeded the predetermined achievement indicator of 70%. It is hope that this activity can help teachers in supporting deep learning approach at classroom.

Keywords: Diagnostics, Test, Deep Learning Approach, Teacher.

Introduction

The deep learning approach refers to meaningful learning, where students actively connect new knowledge with their prior understanding. Meaningful learning is a process where students construct new knowledge from their previous knowledge apply it in real-life situations (Vallori, 2014). The concept of meaningful learning was introduced by Ausubel, who stated that what students already know plays a crucial role in what the student will learn next. Students learn new concepts by linking them to the knowledge they already possess. Therefore, meaningful learning occurs when students make connections between prior knowledge and new information (Sexton, 2025).

This approach not only enhances students' cognitive abilities but also promotes the relevance of their learning experiences. Students can directly see how their learning applies to real-life situations. For example, when students are provided with meaningful learning through real-world problems such environmental pollution or the growth and development of plant, these topics are connected to their prior knowledge, there are more likely develop the right knowledge and critical thinking that are essential for the 21st century. Moreover, the implementation of deep learning encourages students to understand concepts more critically and relates the material to authentic experiences.

Identifying students' difficulties, students' weaknesses or misconceptions through diagnostic

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instrument is the first step toward achieving meaningful learning objectives in deep learning approach. Diagnostics test can give information for teachers to remediate students' learning difficulties, students' weaknesses or misconceptions so that teachers can provide appropriate treatment for students. The information obtained from the test will serve as an important guide for teachers in designing effective, relevant, and contextual deep learning. AM & Hadi (2023) stated that diagnostic tests are used to detect students' weaknesses so that teachers can provide follow-up actions to address those weaknesses. Hidrovo, Macías, Baque, & Valdez (2020) stated that, to improve the quality of education, proper planning is required to support learning that allows students who have learning difficulties to strengthen their knowledge.

However, many teachers have not yet implemented diagnostic tests in their deep learning practices. In addition, some teachers are already familiar with diagnostics tests, but the information they have is not comprehensive enough, resulting in a limited understanding of the concept. Meanwhile, the development of test instruments must meet certain requirements in accordance with test theory – such as having rubrics and ensuring validity and reliability so that the instruments used are appropriate for measuring students' performance. Audiwinanda & Mahmudi (2024) explained that the quality of an instrument is determined by its validity, reliability, level of difficulty, discriminating power, and the effectiveness of alternative answer. Thus, the solution offered in this community service activity consists of two types of training: (1) training on developing diagnostic test instruments to identify student's prior knowledge and misconceptions, and (2) training on implementing the deep learning approach in classroom teaching. It is necessary to conduct training on the development of diagnostic test instruments to support the implementation of deep learning approach. This training could help teachers develop valid and reliable test instruments that can support the achievement of deep learning objectives. The activity was carried out through training sessions, mentoring, and evaluation to ensure that teachers are able to apply the acquired skills effectively in their respective classroom.

Method

The target participants for the community service activity were teachers at SMA Negeri 57 in Central Maluku and SMA Negeri 8 in Ambon. The selection of the target audience was based on the schools' needs, as discussed with the school administration. Participants were trained in developing diagnostic test instruments that could support a deep learning approach. The activities took place during September and November 2025. The time was determined based on the school's readiness and the availability of teachers to participate. The activity was conducted during school working hours at the school's headmaster's request.

The stages of the activity implementation were preparation, implementation, and evaluation. The team at the preparation stage prepared community service equipment, including instruments, banners, training materials, and speakers, and coordinated with the school. The materials prepared were (1) a deep learning approach, (2) the development of a diagnostic test instrument. The selection of materials was based on the needs of teachers at SMA Negeri 57 in Central Maluku and SMA Negeri 8 in Ambon. The team then coordinated with the school to determine the implementation time. The implementation stage included opening the activity, presenting the materials, and evaluating. Evaluation included administering questionnaires and a comprehension test to participants.

This community service project used a qualitative descriptive method. The aim was to assess teachers' knowledge after the training. Data collection during the evaluation stages includes teachers' opinions on the activity, gathered through a questionnaire, and test results, collected at the end of the activities. Questionnaires were administered to assess teachers' opinions about the material presented and overall participant satisfaction with the activity.

Result and Discussion

The community activity aimed to improve teacher competence by enhancing their understanding and ability to develop diagnostic instruments that aligned with the principles of the deep learning approach. The activity involved delivering materials to enhance teachers' knowledge of diagnostic test instruments and deep learning, and evaluating the results.

This activity took place at SMA Negeri 57 Maluku Tengah (State Senior High School 57, Central Maluku) on September 24, 2025 and SMA Negeri 8 Ambon (State Senior High School 8, Ambon) on November 14, 2025, and was attended by teachers from the school. The activity was conducted in the classroom at the school. The activity began with an opening session from the team, followed by a speech from the Principal, and continued with the official start of the community service program.

Following the opening ceremony, the event continued with a presentation session led by the moderator. The moderator opened the session by introducing the two presenters and outlining training's

general theme. The moderator also explained that the challenges teachers frequently face in classroom learning include difficulties, misconceptions, and prior knowledge, which can impact student learning outcomes.

Figure 1. Opening of the community service

Figure 2. Opening of the community service at SMA Negeri 8 Ambon

The first material is about a deep learning approach. The speaker explained the concept of deep learning and its relationship with diagnostic instruments. The speaker also provided examples of deep learning applications of in classroom instruction. The second material concerns the development of diagnostic instruments for deep learning. In this session, participants were guided to understand the steps in developing diagnostic instruments. These steps include material analysis, identifying misconceptions or student learning difficulties, creating instrument grids, writing instruments, testing, examining trial results, assembling items into a test, administering tests, and analysing student test results. The speaker also conveyed the importance of using diagnostic instruments in deep learning to map students' prior knowledge.

Figure 3. The speaker while presenting materials at SMA Negeri 57 Maluku Tengah

Figure 4. The speaker while presenting materials at SMA Negeri 8 Ambon

Following the presentation, the session continued with a question-and-answer session. The teachers enthusiastically asked questions related to the material. Several teachers also shared personal experiences in classroom learning related to the implementation of diagnostic tests. The event continued with a summary by the moderator, followed by a thank you to the presenters and participants for their active participation.

Figure 5. Question and Answer (Discussion)

The activity continued with an evaluation. The evaluation was carried out to obtain feedback on the implementation of community service that were adjusted to the objectives of the activity, namely solving the problem that many teachers still do not understand the concept of deep learning because this concept has only recently been implemented in education policy so understanding is not evenly distributed among teachers and many teachers still did not understand the techniques for developing appropriate diagnostic test instruments and in accordance with test theory. Participants were given questionnaires and comprehension test questions related to the material presented. These results were analysed to assess the problem-solving that was carried out.

Figure 4. Filling out the questionnaire and material comprehension test questions

As a basis for assessing activity achievement, the indicator established in Table 1 is that 70% of teachers experienced increased competency in developing diagnostic test instruments to support a deep learning approach. All the teachers completed a questionnaire and a comprehension test of the material. This activity generated data on teacher responses to the community service activity and scores on the teacher comprehension test.

The evaluation results consist of two parts: the teacher response questionnaire and the student understanding test. The questionnaire instrument consists of two parts: Questionnaire 1 (yes/no questions) and Questionnaire 2 (Likert scale 1-4). Questionnaire 1 aims to analyse needs and understand the level of teacher adoption. In other words, the goal is to determine whether the PKM theme is needed in the school and how many respondents are familiar with the diagnostic instrument.

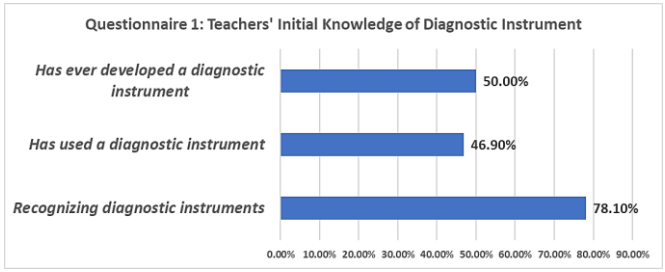

Figure 5. Percentage of Teachers' Initial Knowledge of Diagnostic Instruments

The pie chart shows that most teachers were aware of diagnostic instruments (78,1%), but only half of them had ever developed (50%) or conducted (46,9%) such instruments in their classroom. This indicates that the implementation of diagnostic instruments remained suboptimal before the training, and that, according to Questionnaire 1, half of the teachers had never implemented them before the activity.

Questionnaire 2 aimed to determine participant satisfaction with the community service activity. The results of questionnaire 2 indicated positive teacher perceptions of the training, suggesting that participants were satisfied with the community service activity. The statement item "*this activity can improve my ability to develop diagnostic instruments for learning*" received positive responses from all participants (except one teacher, who did not respond). It shows that the teachers considered the activity beneficial and applicable to their teaching practice.

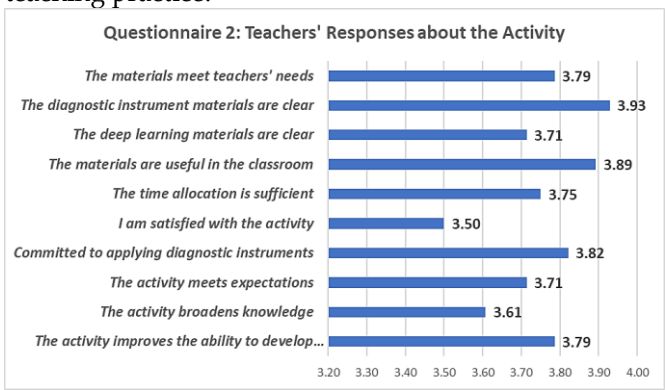

Figure 6. Teacher Responses to Training Activities

The results of questionnaire 2 showed that the average score for each statement ranged from 3,50 to 3,93. It indicates high participant satisfaction with the training activities. Based on the analysis of questionnaires 1 and 2, teachers' responses to the community service activities were generally very positive. Teachers gained knowledge about in-depth learning and the development of diagnostic instruments. The key statement item, "The diagnostic instrument materials are clear," received the highest mean score (3,93). These results indicate that teachers

found the activity helpful, appropriate to classroom needs, and applicable in learning.

Test questions were given to measure teacher competency after the community service activity. The questions covered the concepts and application of diagnostic instruments. The test results of 32 teachers indicated an average score of 86.40. 82% of the teachers achieved scores of 80 or higher 80, which is categorized as good. Thus, the percentage of teachers exceeded the established achievement indicator of 70%. Similar training has been conducted, such as a workshop on identifying learning styles as a foundation for implementing deep learning in teaching and learning process. This training helped teachers identify students' learning styles. The results of the training showed that it had a significant effect on teachers' ability to identify students' learning styles at the beginning of the learning process (Sri Hartati Wulandari et al., 2025). Community service activities related to diagnostic tests can serve as a bridge to narrow the gap between students' abilities and the material they need to understand. Training activities on the implementing the deep learning approach can also enhance teachers' pedagogical competence, including their ability to understand student characteristics, design compelling learning experiences, and integrate technology into the teaching process (Atmojo et al., 2025).

Conclusion

Based on the questionnaire and posttest results, it can be concluded that the training activity successfully improved teachers' competency in developing diagnostic test instruments. After the activity, most teachers demonstrated a better understanding and were able to create items in accordance with the principles of good instrument development (material, construction, and language). The training activity also contributed to broadening teachers' insights into deep learning, which is oriented towards critical, reflective, and meaningful thinking skills.

Acknowledgments

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