

Implementation of the Deep Learning Approach in Elementary Schools

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ABSTRACT

The deep learning approach is the latest innovation in the Indonesian education system proposed by the Ministry of Primary and Secondary Education in early 2025. The essence of this approach is to create a learning process that is aware, meaningful, and joyful for students. The purpose of the study is to examine the implementation of deep learning from the way teachers plan, organize, implement, and evaluate deep learning in elementary schools. The research method uses a qualitative method with interview data collection techniques and observation of learning in the classroom. The respondent is an elementary school classroom teacher in the Mantrijeron Yogyakarta Ministry of Education who has implemented deep learning. Thematic data analysis with the help of atlas.ti application 9. The results of the research of elementary school teachers implementing deep learning are still very limited, starting from making a learning plan exactly the same as the example from the ministry, there are no new innovations, learning activities that are just following the directions of the curriculum reference book have not shown creativity independently of the teacher and in terms of organizing students, educators emphasize more on grouping students in learning. A tool to measure the success of deep learning can be done by means of project-based assessments, percentages and self-assessment.

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1. INTRODUCTION

Indonesia's education challenges lie in the learning crisis that causes low quality of learning even though access to primary and secondary education is good and adequate. Less effective learning approaches or methods lead to low literacy skills in reading and numeracy of students in Indonesia. Learning outcomes that are not in accordance with expectations, one of the causes is the inequality of learning effectiveness among schools or madrasas and geographical areas in Indonesia (Luckha & Niron, 2024). This inequality arises due to several factors, such as the use of traditional learning approaches

and methods(Rzabayeva, Kassymova, & Pratama, 2024) by teachers and lack of readiness of students in following the learning process. Learning tends to be one-way through lectures(Hanim, Sari, & Soe'oed, 2020), with assessments that emphasize more on memorization, as well as learning activities that have not been able to develop students' creativity and critical thinking skills(Hidayati et al., 2023). In this context, education plays a strategic role in ensuring that students not only have technical readiness, but are also equipped with soft skills(Zhao, Zheng, Xu, & Wu, 2019), character, and critical thinking skills that are important to optimize the potential demographic bonus towards the achievement of the vision of a Golden Indonesia 2045(Kemendikdasmen, 2025). Adaptive thinking skills built through learning are important assets for the next generation(Lindriany, Hidayati, & Muhammad, 2023)(Suryani & Samodra, 2025). For this reason, the Ministry of Primary and Secondary Education introduced an in-depth learning approach.

The application of deep learning at all levels of education is an approach to acquiring knowledge(Fathinnaufal & Hidayati, 2020) in order to respond to global changes, manage new information, utilize the latest technologies, and build new understandings in the midst of the complexity of today's world(Theobald et al., 2020). Common skills such as critical thinking and problem-solving skills are key aspects of deep learning and can be integrated into curriculum organization(Patmasari et al., 2023). The Deep Learning approach is based on three main principles, namely awareness, meaning, and joy. This means that comprehensive and structured learning does not only play a role in improving the quality of education in Indonesia. The implementation of this deep learning strategy is designed to prepare the younger generation to face global challenges(Rahman, Ahyar, & Zulharman, 2025), provide quality education that is relevant to future needs, as well as support the creation of equal access to education throughout Indonesia. Can implement deep learning where teachers need to focus on the student learning process in depth(Mathew, Amudha, & Sivakumari, 2021)., relevant to the context(Hasanah, Al Badar, Al Ghazy, & Fauzia, 2023), dan bermakna, sehingga mampu mengembangkan keterampilan berpikir kritis(Hasanah et al., 2022), creativity, as well as problem-solving skills(Nurfalaq, Wahyuni, & Prasetyo, 2022). Deep learning and the relationship between conceptual and procedural knowledge, as well as the ability to apply that knowledge in new situations. Implementing this approach will be more effective with the support of digital technology that can increase students' active participation(Havid & Salmiah, 2025) and utilize learning practices that have proven to be successful.

Many research that examines deep learning discusses the principles of deep learning such as the implementation of fun learning(Pinatih, 2020), Implementing joyful learning strategy(Sufiani & Marzuki, 2021), Joyful learning in elementary school, Applications for deep learning in ecology(Christin, Hervet, & Lecomte, 2019), Deep learning in chemistry, Deep learning techniques an overview(Oprea et al., 2022), Implementation of contextual teaching and learning (CTL)(Zheng, 2022). However, the research still focuses on one discussion of techniques or strategies, there is no research that focuses on the implementation of the deep learning approach in elementary schools that discusses how teachers implement deep learning, prepare learning plans, deep learning activities and carry out deep learning evaluations that can increase students' awareness in critical, creative, and independent thinking as well as increase meaning in the process learning in elementary schools, especially in the Mantrijeron Ministry area, Yogyakarta City.

In the Mantrijeron Kemantren area, there are many elementary schools consisting of public and private schools. Of these, several elementary schools have begun to adopt and implement an in-depth learning approach in their learning activities. Some schools that stand out in the application of the deep learning approach as pilot projects implement deep learning in the learning process. The school, which is a pilot project, shows its commitment to integrating the principles of deep learning into all stages of the learning process. Starting from the planning stage, teachers at the school began to develop a learning plan that emphasized the development of conceptual understanding, critical thinking, and problem-solving skills. At the implementation stage, the learning strategies and methods used are also directed to build active involvement of students in the learning process. Meanwhile, in the evaluation

stage, assessments are carried out not only to measure cognitive learning outcomes, but also to assess the thinking process and depth of understanding of students (Sataroh, Hasanah, & Dahlan, 2025). This effort is a form of proactive response from these schools to the changes and demands of the times, especially in terms of adjustments to national education policies that emphasize the importance of meaningful, transformative, and relevant learning to the needs of students in the 21st century.

The main purpose of this study is to explore in depth how elementary school teachers in the Mantrijeron Boarding School area apply a deep learning approach in teaching and learning activities. This research focuses on three main aspects in the learning process, namely the planning, implementation, and evaluation stages. In the planning stage, the researcher wants to know how teachers design learning plans that are in accordance with the principles of deep learning. Furthermore, in the implementation stage, it is explored how teachers manage learning activities to be able to encourage strong conceptual understanding and active student involvement. Finally, in the evaluation stage, it is observed how teachers assess students' learning processes and outcomes in the context of deep learning. Based on this background, the formulation of the problem that is the focus of this research is: how to implement the deep learning approach at the elementary school level, especially in the Mantrijeron Ministry area?

2. METHODS

The research was carried out using a qualitative method (Moleong, 2021) with a case study approach that aims to explore in depth how elementary school teachers in the Mantrijeron District apply a deep learning approach in teaching and learning activities. This research focuses on three main aspects in the learning process, namely the planning, implementation, and evaluation stages. The subjects of the study are teachers of public and private elementary schools in the Kemantren area of Mantrijeron State Elementary School, Minggiran State Elementary School, Suryodiningratan State Elementary School 2, Suryodiningratan State Elementary School 3, Muhammadiyah Danunegaran Elementary School, and Suryowijayan Elementary School, the 5 schools are pilot projects in implementing the deep learning approach. With participants determined using purposive sampling techniques (Sugiyono, 2018), With the criteria for elementary and lower school teachers, the participants of 10 teachers consisted of 2 teachers from each school. Data collection with in-depth interview and observation process (Hasanah et al., 2022) learning that is carried out in the classroom, so that it can get more contextual information about the situation of the deep learning process in the field. The researcher is an instrument data collector where the researcher conducts research directly at the school that is a participant in the research. Researchers play the role of data sources, data collection, and data analysis, while data analysis techniques with thematic analysis techniques (Priyambodo & Hasanah, 2021).

3. FINDINGS AND DISCUSSION

Based on the results of the analysis above, the implementation of learning in elementary schools implemented by elementary school teachers in the Mantrijeron Yogyakarta Ministry area is carried out through the following components;

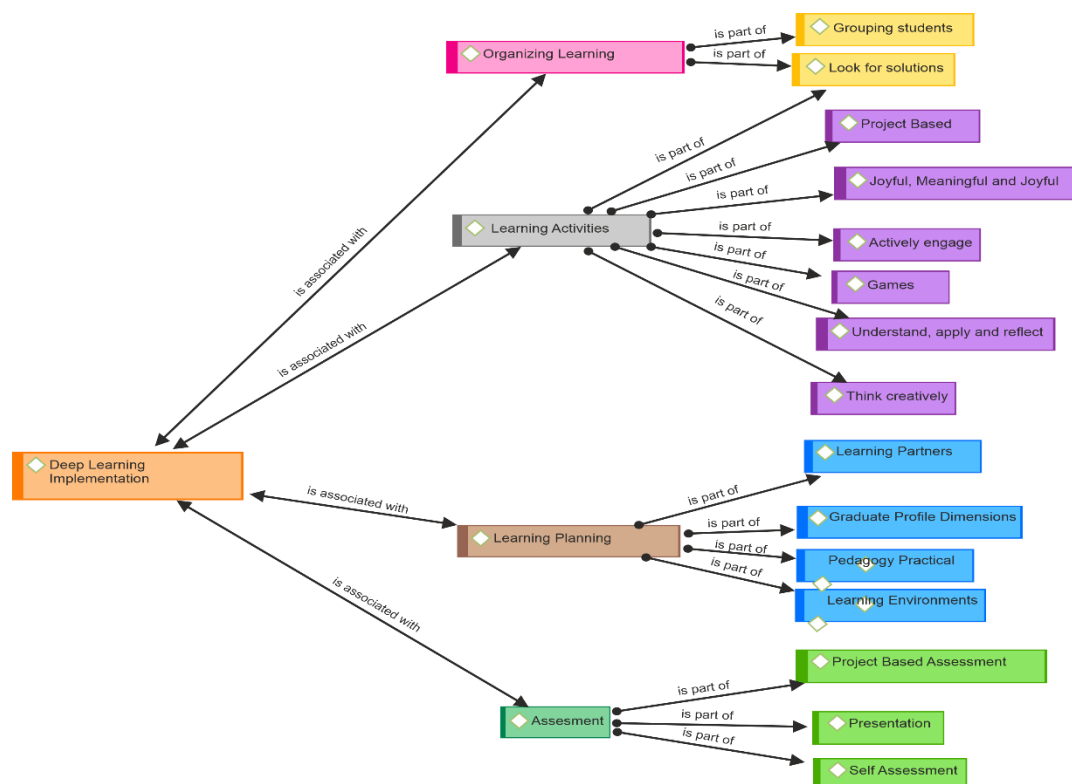


Figure 1 Data Analysis

Learning Planning

Teachers in implementing deep learning must prepare learning activities starting with the creation of a learning plan which is often called the Learning Implementation Plan or known in the independent curriculum, namely the Teaching Module, in the data analysis it is found that in the deep learning planning the teacher includes the Dimensions of Graduate Profiles, Learning Partners, Pedagogic Practices and the Learning Environment this is a new aspect in the learning planning component.

Dimensions The graduate profile is a component part of the learning plan which consists of 8 dimensions as conveyed by one of the teachers as follows;

__ Actually, it 's the same as the previous one, the difference is that there are dimensions of the profile of graduates, yes it's not wrong that there are 8 such as collaboration, independence, critical reasoning, what else__ (lines 13- 14 : N1)

Other speakers also said that the learning implementation plan that integrates deep learning must contain an 8-dimensional component of the graduate profile which later students are expected to achieve success in education by having the graduate profile. The deep learning framework also has a Pedagogic Practice section, this appears to be an important component in the learning plan as a teaching strategy determined by the teacher to achieve the learning objectives as conveyed by the following teachers;

Oh, for example, the identity is public, the demination of the graduate... There are continuing to have learning goals, there are pedagogic practices and then there are partners because here we eh as much as possible there are partners with other parties, the learning is more deep, ma'am. More meaningful, then there is a learning environment for digital utilization, so there are still learning steps per meeting, ma'am....(Lines 105 – 109: N2)

The teacher also said that in the learning implementation plan component, there is also a Learning Partner section where teachers can collaborate with other parties in carrying out learning, of course, in accordance with the learning objectives to be achieved.

In the analysis of the data, components of the learning environment and the use of digital as learning tools and media that support the implementation of learning carried out by teachers emerged.

The learning environment delivered by one of the teachers is not only in the classroom but can involve a physical environment that supports learning as conveyed by one of the following teachers;

Deep now, we are not alone in teaching, we can continue to be partners, for example, involving others, inviting parents, we can be resource persons. Continue to be able to partner with the Regional Library or Puskesmas like that.. In deep learning, there is also a component of the learning environment as well, for example using the school yard, studying at the mosque and the nearby Pe-Vita library..(Lines 55 – 59 : N1)

Organizing Learning

Organizing learning in the classroom is a very important thing to do by teachers in designing learning plans and implementing them, teachers prepare materials, strategies and the selection of learning environments that will be used by teachers convey that in achieving learning goals by organizing learning as conveyed by the following teachers;

I usually group students in several groups to do the task and then the students are given a theme or problem that they can do.. Prepare relevant learning resources as well, ma'am..., and design activities that encourage collaboration and problem-solving __ (Lines 32 – 36 : N)

The statement above states that in organizing learning, teachers group themselves in doing assignments and prepare learning resources that will be carried out in the classroom so that they can encourage student activity in learning. Teachers organize learning using various strategies such as presenting problems as material for discussion, students find solutions to the problem so that learning goals are achieved, as follows;

__in the activity for example I use the PBL method so the students do learning with the teacher giving 1 problem and the students can find a solution to the problem. Continuing to learn that is fun or exciting, students are actively involved in learning can be given games related to the material __ (Lines 24-27: N)

Deep learning methods can be done using the problem-based learning method, where learning is more meaningful because students can solve the problems given.

Learning Activities

Deep learning is closely related to understanding and applying knowledge in various situations. In this context, deep learning adopts the principles of mindful, meaningful, and joyful learning. Each of these principles plays a role in creating a complete and immersive learning experience for students, thereby encouraging more engagement, reflection, and motivation to learn. One of the teachers also argued that in learning activities there are 3 pillars;

---The strategy has 3 pillars taken, meaningful, mindful, and joyful, which is deep, meaningful, and fun--- (Lines 158-159 : N3)

Based on the above statement, teachers have integrated the 3 pillars of deep learning into part of the learning plan components and are carried out in the learning process in the classroom. Mindful learning is learning that has involved students consciously, both mentally and physically, in the learning process. Meaningful learning (meaningful) is learning where participants are able to relate material that can be in class in the context of daily life. While the third pillar is joyful, which is learning that can create a comfortable atmosphere for students so that they can be active and experience firsthand both in terms of knowledge and contextuality, this is in accordance with the following teacher's statements.;

What do you want to update... For fun learning for example ... How is that? The technique is so that children, especially me, admit mathematics so that mathematics is not boring and can be a game for children and children accept it happily, not forced. And not afraid to face the lesson (Lines 197-199: N3)

Teachers have tried to do learning that encourages students so that in participating in learning they do not feel bored and can receive material with pleasure and without coercion, it is done by teachers using game media.

In addition to games in implementing deep learning carried out by teachers with project-based learning as conveyed by one of the following teachers;

---or do trial practice, for example, heat transfer materials in the classroom, students can practice trying it themselves. It's a matter of eating, right?. --- (Lines 28-29 : N1)

In addition to participants doing hands-on practice or trying, they can apply the learning in their daily lives, this encourages active involvement of students so that meaningful learning is achieved. Deep learning activities can also be carried out by doing light games to motivate students' activeness so that learning does not interfere in the explanation of the material as stated by the following teacher;

--Continue to learn that is fun or exciting, students are actively involved in learning can be given games related to the material--- (Lines 26-27 : N)

A component that is no less important in deep learning, namely the activity of understanding, applying, and reflecting on this is found in the following teacher statements;

---This deep learning is now emphasized on understanding, applying and reflecting activities as well, so it must also be in the lesson plan. How can teachers come up with activities such as students understand the Pancasila part by encouraging the use of practice instead of just pictures--- (Lines 96-99 : N2)

Activities in learning such as understanding, applying and reflecting are things that can provide learning experiences to students and can build creative thinking skills.

Assessment

Based on the above data analysis, elementary school teachers in the Mantrijeron Yogyakarta Ministry of Education implemented deep learning by completing learning activities in the form of assessments that were sometimes carried out such as project-based assignments, followed by presentations and at any time teachers held self-assessments for students to be able to assess themselves as conveyed by one of the teachers;

If I do assessments depending on learning objectives and activities, for example skills, yes, I do assessments with project-based assignments, so I look at learning activities as well, after what.. Students produce works and then make reports and present (Lines 129-133 : N3)

Based on data, some teachers said that assessment is an activity carried out by teachers to measure the achievement of the learning objectives that are carried out, assessments carried out at the end of learning are carried out with self-assessments to create awareness and meaningfulness of learning that has been followed.

Discussion

Learning Planning

Based on the results of data analysis on learning planning, it can be discussed that elementary school teachers in the Mantrijeron Kemantren area are still designing learning plans as exemplified by the Ministry of Primary and Secondary Education such as the components of the Graduate Profile Dimension, Learning Partners, Pedagogic Skills, and Learning Environment, this is different from the basis of the concept of learning plans conveyed in the theory of education which states that Learning plan, which is a structured document(Sharma, 2022) or devices designed to systematically direct the course of the learning process(Urhahne, 2020)). This document serves as a guideline for teachers in designing clear learning objectives((Rogante & Santelli, 2023), formulate relevant learning activities, determine the necessary resources, and set measurable achievement indicators. Learning plans can be applied both in the context of a formal curriculum in educational institutions and in self-development independently(Nofamataro Zebua, 2025)). In its preparation, this plan must contain goals that are specific, measurable, achievable, realistic, and have a specific deadline. In addition, learning objectives should ideally be formulated in the form of observable behaviors, including the cognitive (knowledge), psychomotor (skills), and affective (attitude) domains, and can use Bloom's taxonomy as a reference to classify the level of competence to be achieved. From the point of view of deep learning theory, the learning plan not only focuses on achieving academic goals, but also emphasizes the importance of in-depth understanding of concepts, innovation in the learning process(Kurniawan, Noviantry, Irham, Arif, & Suyudi, 2025), as well as the development of essential core ideas. Important elements in this

theory-based learning plan include the formulation of clear learning objectives, the organization of knowledge structures (Ončevska Ager & Anderson, 2025), designing challenging problems, creating contextual learning scenarios, reflection on learning processes and outcomes, and continuous evaluation. Thus, the learning plan serves to build a logical framework of thinking that encourages students to be actively involved in problem solving and the development of new ideas (Ibrahimova, 2025)).

The learning plan that implements deep learning has learning principles such as; 1) Awareness, Awareness in learning is an experience that students experience when they realize the importance of being active learners and being able to manage and control their own learning process. In this condition, students not only clearly understand the purpose of the learning they are undergoing, but also have an intrinsic motivation that motivates them to continue learning (Schuman-Olivier et al., 2020). The teacher plans the learning that will create the students' comfort in learning so that it can produce focused, concentrated and full of attention from the students. 2) Meaningfully, David Ausubel introduced the concept of meaningful learning in 1963. This learning becomes more optimal when the new knowledge learned by students can be linked to previous experiences or knowledge. This principle is in line with the meaningful learning approach, which emphasizes understanding meaning and contributes to efficiency and long-term memory. Meaningful learning occurs when students are able to relate new information to existing knowledge, thus forming a deeper understanding of a concept. Linking meaningful learning with the relevance of learning activities to real life, the relevance of students' knowledge in various contexts and the use of the surrounding environment as a learning resource. Deep learning also adopts the principle of meaningful learning because it emphasizes comprehensive, not just memorization. When students engage in meaningful learning, they will actively build connections, analyze, and synthesize information, which is at the core of meaningful learning. 3) Encouragingly, education experts such as John Dewey (1936) and Howard Gardner (1983) affirm the importance of learning that is relevant to real life (Pal, Taywade, & Alekhya, 2022), emphasizing the active involvement of students as well as hands-on experience in skills and knowledge. (Sujinem, 2025)

In research, designing comprehensive learning (Anshori, Suwarno, & Kasbani, 2022) said The learning plan is prepared to be a guide for teachers in carrying out daily teaching and learning activities in order to achieve learning goals, learning objectives can differ from one educator to another, even though they teach in the same phase, because each teacher adjusts to the needs of students, the school environment, and the availability of existing facilities and infrastructure (Abdulayeva, 2024) This difference in learning planning is natural because each teacher considers various factors that affect the learning process, such as student characteristics, school conditions, and available resources. Thus, the learning design made by each educator will vary according to the context and needs in the field (Mutalib, Yahaya, Kamaluddin, & ..., 2023) Based on the results of data analysis on how elementary school teachers of Mantrijeron Yogyakarta organize learning by choosing learning strategies, grouping students and providing a problem at the beginning of learning to involve students in finding solutions. In another theory, it is said that organizing learning with an in-depth learning approach requires planning that emphasizes the active involvement of students in the learning process (Ibrahimova, 2025)). This approach requires teachers to create a learning environment that encourages students to relate new knowledge to existing experiences or knowledge, as well as stimulate critical and reflective thinking. Models such as Presage-Process-Product highlight the importance of a learning environment, in-depth learning strategies, and students' social-cognitive attributes in producing optimal learning outcomes. Thus, deep learning focuses not only on how much material is learned, but also on how students understand and process information meaningfully (Kim, Crooks, Bax, & Shokoohi, 2021) In addition, organizing deep learning can be done by providing students with the opportunity to develop learning strategies that suit their needs and interests (Hopeman, Hidayah, & Anggraeni, 2022) This process involves planning clear learning objectives, flexibility in implementation, and ongoing evaluation to tailor the method to the needs of students. Collaborative activities, discussions, and real problem-solving can be used to strengthen a deeper understanding of concepts. Thus, deep learning

helps students not only remember information, but also be able to apply that knowledge in various life contexts((Sholeh, Jannah, Mahmudah, & ..., 2021)

Learning Activities

Learning activities that implement a deep learning approach are very different from conventional learning by teachers by providing materials, explanations and questions to students but learning that can create awareness(Li, 2021), kebermaknaan, dan menggembirakan(Rzabayeva et al., 2024). Based on the data analysis, several teachers said that the deep learning activity applied three pillars but based on the teacher's explanation it still only understood the concept of deep learning but had not fully implemented it, what kind of learning activities that created awareness had not yet emerged(Schussler, Harris, & Greenberg, 2020), Meaningful learning activities also mean that teachers have not fully understood and can practice. Based on the theory, deep learning is a learning process in which teachers play a role in creating an atmosphere that is able to motivate students to learn actively without any pressure or coercion (Shorten & Khoshgoftaar, 2019).

In addition, previous research has revealed that exhilarating learning is learning that provides a sense of comfort, safety, and fun for students. This kind of atmosphere will encourage them to be actively involved, participate, and dare to express their opinions without fear of making mistakes. A positive learning environment not only increases intrinsic motivation, but also fosters confidence and independence in learning(Mulyani, Munir, & David, 2022). Therefore, teachers need to create warm interactions, the use of creative methods, and varied learning strategies to maintain students' interest in learning while building a conducive classroom climate. In the explanation of the Ministry of Primary and Secondary Education, in-depth learning activities are expected to provide experience to students by; (1)Understand; It is an activity that can build student awareness, in the phase of understanding students represents the initial stage of learning that has a strategic goal, namely building student awareness of expected learning outcomes. In this phase, students are not only directed to receive information, but also motivated to play an active role in constructing knowledge independently and collaboratively(Herliana, Zulfikar, Duskri, & Furqan, 2024). Understanding concepts or materials is carried out through the exploration of various sources and contexts, allowing for the formation of comprehensive insights. Substantively, the knowledge developed includes three main dimensions, namely essential knowledge, applicative knowledge, and knowledge that contains value and character(Hidayati et al., 2023). 2) Applying, Applying knowledge in learning is a learning experience where students apply the knowledge that has been gained to real or contextual situations. This process broadens students' understanding by providing opportunities to use that knowledge, both individually and in groups, thus encouraging collaboration and strengthening skills(Hasanah et al., 2019)). 3) Reflecting, Reflecting is a process in which students assess and re-understand the experiences and results of the real actions they have taken. Through reflection, students can assess the extent to which learning objectives have been achieved, as well as identify strengths, challenges, and aspects that still need to be improved in their learning process.

Assessment

Based on information from elementary school teachers in the Mantrijeron Boarding School area, in conducting student assessments using the deep learning approach, teachers conduct several types of assessments, such as by conducting project-based assignments for assessments carried out on learning, there are also self-assessments to assess the achievement of learning goals that have been implemented. Assessment is an activity carried out by teachers to achieve the level of achievement of a learning goal. In this data, teachers also conduct assessments by way students make presentations to achieve speaking skills and convey information, this can be done in certain learning.

Assessments in deep learning can be in the form of formative and summative assessments, where the purpose of the assessment is to determine student achievement in learning objectives(Meyers & Lytle, 1986). According to research, assessment is not only limited to formative and summative forms,

but can also be carried out through various alternative methods such as authentic assessments, portfolios, project assessments, observations, self-assessments, and peer assessments to measure the cognitive, affective, and psychomotor aspects of students in a more holistic manner (Othman, Osman, & Othman, 2024)

Other research suggests that assessment is a key element in the learning process that functions not only to measure learning outcomes, but also as a means of reflection, improvement, and follow-up that supports the sustainable development of students' competencies (Agaj, 2015). The principles of assessment serve as a guideline so that the assessment truly reflects the student's learning achievement in a comprehensive, fair, and meaningful manner. Effective assessments can boost motivation, confidence, and provide feedback that helps students understand their own strengths and weaknesses, so they can thrive as independent and reflective learners. In addition, well-designed assessments also help teachers in planning teaching strategies that are more appropriate and relevant to students' needs (Mathew et al., 2021)

According to the reference book of the Ministry of Primary and Secondary Education of the Republic of Indonesia, in deep learning to measure the achievement of students' learning goals, educators can conduct formative assessments (Othman et al., 2024). Formative assessments on students with learning disabilities are carried out by collecting information related to their learning difficulties and development. This information serves as feedback that helps students monitor and improve learning processes and progress, thus supporting lifelong learning skills (Laili, Supriyatno, & Gafur, 2022). For teachers, the results of formative assessments are the basis for reflection and improvement of learning effectiveness in inclusive and special classrooms. While summative assessment in deep learning is a summative assessment usually carried out through final exams, major assignments, or projects designed to objectively assess student learning outcomes based on predetermined criteria. The results of summative assessments can also be used to analyze the effectiveness of the learning process and as a basis for future educational planning.

4. CONCLUSION

This study concludes that employing deep learning requires time and understanding of educators as the main actors in the classroom defense process, the results of this study illustrate that the preparation of learning planning by educators is still limited to fulfilling basic components such as in-depth learning activities that include three principles of awareness, depth, and meaning have not yet emerged in the form of activities, in terms of organizing educators' learning. Still focusing on the grouping of students, they do not understand the selection of in-depth learning strategies and models. In terms of assessment, educators also emphasize assignments, in the in-depth learning approach, teachers can also conduct formative and summative assessments that are used to measure learning objectives. So that it can be described that currently implementing learning is still in the compliance stage, according to the ministry there has been no innovation from educators to develop learning, even though the ministry hopes that teachers can develop and find new innovations in carrying out deep learning activities that will be more meaningful for students.

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