



Understanding differentiated learning for primary education students as prospective teachers

Suhardi Abdullah*, Dwi Widyastuti Nurharyanto, M. Irfan Hasanuddin, Eka Agustina, Kyla Putri Nursyabani

Department of Primary Education, Universitas Khairun
Akehuda Street, Ternate Utara, Kota Ternate, 97735, Indonesia

*Corresponding Author. E-mail: abdullahsuhardi@gmail.com

Received: 22 May 2025; Revised: 30 June 2025; Accepted: 13 March 2026

Abstract: This study aims to measure prospective primary school teachers' understanding of differentiated learning (DL). Most previous studies focus on the implementation of DL in schools, whereas limited attention has been given to the extent to which prospective teachers are prepared to implement it. In the context of curriculum changes, teacher education programs are expected to produce graduates who are able to understand, design, and apply learning tools that support DL implementation. Therefore, university teaching materials also need to adapt to the demands of DL so that students become familiar with its concepts, principles, and classroom practices. This study employed a quantitative approach with a descriptive research design. A total of 30 students from the Primary School Teacher Education Study Program at Khairun University participated in this study. Data were collected using 107 multiple-choice questions adapted from a DL implementation book consisting of six chapters. Each correct answer was scored 1, while each incorrect answer was scored 0. The findings show that students' understanding of DL remains low. Only 13 students achieve a correct score of 50% or above, and the overall classical achievement percentage is 43.33%. These results indicate that prospective teachers' understanding of DL, particularly its background, theoretical and empirical foundations, and implementation strategies such as student grouping, needs improvement. This study contributes to teacher education by highlighting the need to strengthen DL-oriented teaching materials and learning experiences for prospective primary school teachers.

Keywords: differentiated learning, primary education students, prospective teachers

How to Cite: Abdullah, S., Nurharyanto, D. W., Hasanudin, M. I., Agustina, E., & Nursyabani, K. P. (2026). Understanding differentiated learning for primary education students as prospective teachers. *Jurnal Prima Edukasia*, 14(2), 208-222. DOI: <https://doi.org/10.21831/jpe.v14i2.85581>



Introduction

Differentiation learning (DL) is learning that adapts to the different needs of students. Differentiation is based on the principles of the independent curriculum currently applied in Indonesia. According to Tomlinson, in his book, DL is defined as learning designed to meet students' needs (Tomlinson, 2014). The application of DL is grouped into content differentiation, process differentiation, product differentiation and learning environment differentiation. The application of this differentiation can also be grouped again by students' learning readiness, learning style, and learning profile.

Differentiation in education can be seen as a way to address students' diversity and realise the school vision for all. Differentiation has been widely and deeply discussed globally and has become a phenomenon with various names and adjustments (Eikeland & Ohna, 2022; Setambah et al., 2025). Two main findings can be concluded through the analysis of this literature review. First, differentiation is a complex idea that can be presented as a differentiator for students or as a way to differentiate teaching. Four perspectives on differentiation as a phenomenon are: differentiation as individualisation,

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



differentiation as adaptation to a particular group, differentiation as adaptation within a diverse class, and differentiation in a system perspective. Second, the analysis shows that almost no studies go beyond focusing on teachers and classes to address systems/policies.

The key to DL is a good understanding of the teacher. The term "differentiated learning" itself sounds new to Indonesian education. However, teachers have implemented DL for a long time without realising that their actions are part of differentiated learning. If students are behind in the material, the teacher will treat them differently from other students with normal abilities. This is also done if there are students with above-average skills.

Prospective teacher students need to be equipped with an understanding of DL from an early age, including prospective teachers in the Elementary School Teacher Education study program. Research conducted by Abdullah et al. (2024) shows that primary education students at Khairun University do not yet fully understand the implementation of the independent curriculum. His study, entitled "Comprehension of elementary teacher education students as future teachers toward the implementation of the independent curriculum principles," found that, out of 36 essay questions, they were categorised as insufficient overall. All students are in the "do not understand" category across the learning components, implementation, and final evaluation. One of the understandings that led to low results was the lack of differentiation in learning regarding meaning and its objectives.

In addition, students understand that the assessment is part of the learning process, and that teachers must first master it. How to deliver material in several different ways at the same time. This ability can be seen in teachers' pedagogical skills, especially in students still preparing to become teachers. Especially students in the Primary School Teacher Education Study Program, because they are at the most basic level of education. Through the elementary school learning planning course, students' lack of understanding of independence implementation is addressed through classroom learning. The research team, who are also lecturers in the course, reinforce materials requiring special study and create teaching materials registered as their property.

Primary education students are future teachers, so students should understand all components of learning that will be applied in the classroom. If graduate students cannot meet the field's needs, several problems will occur. First, graduate students who become teachers cannot analyse students' different needs, resulting in students' rights not being fulfilled. This teacher's ability will be a stigma on the campus's output. The long-term impact is that campus output is not optimally absorbed.

Another study revealed that students in the Islamic Religious Education Study Program at UIN STS Jambi experienced several obstacles: a lack of comprehensive theoretical understanding, a relatively short time, difficulty managing heterogeneous classes, and a lack of teaching practice experience (Subban et al., 2025). These obstacles are what make DL understanding less in-depth. The lecture process at the S1 level must be adjusted to field needs, which is commonly referred to as field-phenomenon-based learning. However, if this is applied, Learning Achievements in a course can be reduced or not achieved. On the one hand, students must prepare for fieldwork and meet academic targets.

The obstacles students experience will become more complex when they become teachers, including different teaching loads, class sizes, and limited learning time (Al-Shaboul et al., 2021). Differences among students pose a significant challenge for teachers and prospective teachers responsible for the educational process, as one of their main tasks is to provide equal educational opportunities for all students to ensure better growth, meet students' needs, and improve the efficiency and quality of the education system. When grouping students based on their learning readiness, caution must be exercised in labelling students with lower readiness as 'weak'. This label is feared to impact their learning motivation (Magableh, 2020).

One study conducted in an English-language study program in Indonesia compared DL understanding among prospective and experienced teachers (Musyarrofah et al., 2024). The results showed that prospective teachers had lower levels of DL understanding than professional teachers. Prospective teachers require more knowledge and practice in lectures and teaching practice.

International studies generally present two findings that are used as paradigms for DL. First, DL is a differentiator for students in participating in learning. Second, there is no definitive policy regulating DL in education (Eikeland & Ohna, 2022). There are no obligations or laws that apply to its implementation. This means that if an educational unit does not implement DL in accordance with

central policy, it will not face any sanctions (Molina-muñoz et al., 2025). No specific regulations explicitly regulate differentiated learning; however, the principles are accommodated in broader education regulations, particularly in the Independent Curriculum. This is one of the causes of unfamiliarity with DL among teachers, prospective teachers, and education personnel. DL was chosen as a learning principle in the Independent Curriculum because of its flexibility. Through different formative assessment strategies, DL that can be applied based on grouping content, processes, and products has been shown to improve learning in the classroom (Aminuriyah et al., 2023; Begum & Ambreen, 2021; Dulfer et al., 2025). Learning designs based on learning styles effectively meet students' needs (Putri & Elizar, 2025; Ramaila, 2025). If this principle is applied, various learning plans can be created, taking into account the duration and available infrastructure.

One study in the Netherlands analysed the effect of group differentiation with student learning strategies on approximately 1200 students in 46 classes from eight secondary schools. The experiment was conducted with a random system into three groups (Haelermans, 2022). The division of students into three groups per class (instruction-independent, average, and instruction-dependent) was based on learning strategies, as measured by the Motivated Learning Strategies Questionnaire (MSLQ). Each group was offered instruction that matched their learning strategies. The results showed that student performance was higher in the classrooms that implemented differentiation, and that these students scored higher on several posttest scales of the motivation, metacognition, and self-regulation questionnaires. However, there were differences between classrooms and different teachers. Additional teacher questionnaires confirmed differences in teacher attitudes towards the intervention.

Differentiated learning (DL) has several advantages in supporting learning in heterogeneous classrooms. Its implementation can be applied practically in large, diverse classes when teachers can design appropriate learning strategies (Kara & Tekindur, 2025; Tajik et al., 2024). Heterogeneous classrooms can become productive learning environments, for example, through the implementation of the Problem-Based Learning (PBL) model, in which students with higher abilities can support peers with lower abilities (Rakhmawati et al., 2024). Therefore, the assumption that DL is incompatible with existing learning models is a misconception. In addition, DL can improve students' literacy skills, which are essential competencies in the 21st century (Nirmala et al., 2025). If teachers have adequate readiness in designing DL, its implementation can be carried out sustainably through the exchange, documentation, and archiving of learning designs. These DL planning archives can also serve as learning resources for prospective teacher students.

Despite the growing number of studies on DL implementation, previous research has generally focused on students' abilities, learning planning, learning processes, assessment, and understanding of the independent curriculum. However, limited attention has been given to measuring prospective teachers' specific understanding of DL as part of their preparation to implement curriculum changes in primary schools. This study builds on the previous research by Abdullah et al. (2024), which examined the readiness of PGSD students as prospective teachers to implement the independent curriculum. The novelty of the present study lies in its specific focus on mapping PGSD students' understanding of DL using multiple-choice questions adapted from DL implementation materials.

Based on this gap, this study aims to determine the extent of DL understanding among prospective teacher students in the PGSD Study Program at Khairun University. The measurement of students' DL understanding is expected to identify conceptual and practical gaps that require immediate follow-up in teacher education. This study contributes to the preparation of prospective primary school teachers by providing empirical data to strengthen DL-oriented teaching materials, enhance learning experiences in the PGSD program, and support the development of competent future teachers responsive to the needs of the field.

Methods

This study employed a quantitative approach with a descriptive research design. The research team measured students' understanding of differentiated learning by administering a questionnaire through Google Forms. The research instrument consisted of 107 multiple-choice questions. The participants were 30 fourth-semester students in the Primary Education Study Program. The study was conducted in the Learning Planning course, a compulsory course in the Primary Education Study

Program. This course focuses on the preparation of learning tools before classroom instruction, including the role of teachers in designing and implementing learning activities. Therefore, the course can be adjusted to meet students' needs and society's demands. Data were collected through questionnaire distribution and analysed descriptively using quantitative methods.

The questionnaire items were developed based on the academic manuscript entitled "Principles of Differentiated Instruction Development in the Flexible Curriculum as a Form of Independent Learning," published by the Agency for Standards, Curriculum, and Education Assessment, Centre for Curriculum and Learning, under the Ministry of Education, Culture, Research, and Technology. The book consists of six chapters, all of which were represented in the questionnaire. The six chapters include Chapter I: Introduction; Chapter II: Philosophical, Sociological, and Legal Foundations; Chapter III: Theoretical and Empirical Studies; Chapter IV: Implementation of Differentiated Learning; Chapter V: Stages of Differentiated Learning Implementation; and Chapter VI: Evaluation and Follow-up. Each correct answer was scored 1, while each incorrect answer was scored 0. Thus, the maximum score for each student was 107, and the maximum score per question was 30. All questionnaire items had undergone validity and reliability testing. The results showed that all items were valid ($p < 0.05$) and reliable, with a reliability coefficient of 0.997.

Results and Discussion

Results

DL is a learning process designed to meet students' needs. Its implementation must be properly understood to achieve learning objectives. This is crucial for students to ensure that upon graduation, they are prepared and competent teachers who can manage classes with diverse student characteristics. Students' understanding of DL was measured using a 107-question questionnaire. The questionnaire was based on DL components, ranging from its background to its evaluation. The research results provide an overview of the components that require further improvement. A summary of the findings is presented in the following two tables.

Table 1. Recapitulation of Student Understanding Results Per Question Item

Item Number	Total Score	Item Number	Total Score	Item Number	Total Score	Item Number	Total Score	Item Number	Total Score
1	13	26	18	51	10	76	17	101	25
2	21	27	13	52	15	77	9	102	12
3	21	28	21	53	10	78	13	103	21
4	12	29	7	54	15	79	22	104	18
5	16	30	17	55	20	80	21	105	26
6	12	31	20	56	16	81	19	106	22
7	6	32	14	57	5	82	16	107	29
8	20	33	16	58	11	83	11		
9	12	34	16	59	21	84	22		
10	17	35	18	60	19	85	12		
11	16	36	16	61	18	86	11		
12	16	37	20	62	19	87	25		
13	17	38	10	63	22	88	17		
14	14	39	20	64	8	89	20		
15	23	40	14	65	8	90	21		
16	14	41	18	66	14	91	13		
17	6	42	14	67	15	92	14		
18	16	43	18	68	7	93	21		
19	26	44	21	69	13	94	15		
20	27	45	16	70	15	95	14		
21	26	46	16	71	17	96	20		
22	23	47	20	72	17	97	12		

Item Number	Total Score	Item Number	Total Score	Item Number	Total Score	Item Number	Total Score	Item Number	Total Score
23	23	48	17	73	18	98	24		
24	28	49	24	74	15	99	26		
25	24	50	19	75	11	100	24		

The results in Table 1 indicate that of the 107 questions given, 41 are not optimal. The 39 questions consist of question items number 1, 4, 6, 7, 9, 14, 16, 17, 18, 27, 29, 32, 38, 40, 42, 51, 52, 53, 54, 57, 58, 64, 65, 66, 67, 68, 69, 70, 74, 75, 77, 78, 83, 85, 86, 91, 92, 94, 95, 97, and 102. Students who can provide correct answers are no more than 15 people, or no more than 50%. The lowest-scoring question item is number 57, which was answered correctly by only five people.

Table 1 above also shows that 68 question items were answered by students with more than 50% or more than 15 people. Furthermore, details of student understanding based on the learning material in the academic manuscript book are presented in Table 2 below.

Table 2. Recapitulation of Average Student Understanding Scores Per Sub-Chapter

Chapter		Item Number	Average Score	
Chapter 1	Background	1-3	18.33	
	Objectives and Benefits	4-6	13.3	6
	Scope	7	6	
CHAPTER II	Philosophical Basis	8-13	16.33	
	Sociological Basis	14-16	17	14
	Legal Basis	17-18	11	
CHAPTER III	Flexible Curriculum	19-25	25.28	
	Differentiated Learning	26-59	16.06	15.53
	Independent Learning	60-74	15	
	Differentiated Learning Content	75-76	14	
CHAPTER IV	Differentiated Learning Process	77	9	
	Differentiated Learning Product	78	13	14.5
	Differentiated Learning Learning	79	22	
	Environment			
Chapter V	Stages of Learning		16.75	
	Implementation Initial Stage	80-83		16.82
	Implementation Stage	84-91	17.63	
	Evaluation Stage	92-97	16	
Chapter VI	Evaluation Results of			
	Differentiated Learning Models	98-104	21.43	
	Evaluation Results Conclusions	105	26	25.75
	Recommendations and Follow-up	106-107	25.5	

In Table 2, the data on students' understanding collected in the sub-chapters are presented by the question item indicators in the questionnaire. Based on the table, the highest average student score was in Chapter IV, with the sub-chapter on Recommendations and Follow-up scoring 25.5. For the lowest average score, namely 6 in Chapter I, the sub-chapter Scope. Overall, six sub-chapters get an average score below 16: Scope, Legal Basis, Independent Learning, Differentiated Learning Content, Process, and Product. Chapter IV: Implementation of Differentiated Learning has the largest number of students with the lowest score.

Based on Chapter I, the findings indicate that a basic understanding of the nature of DL has not been fully grasped, particularly in terms of the scope of the material. This statement aligns with the very low average score obtained. Scope is the limitation of DL applied to educational units. For Chapter II, student understanding has not yet reached the high category, with no one achieving more than 20 points. However, when compared to Chapter I, student understanding has improved. The following is a screenshot of the recap of scores for 30 students on each question item.

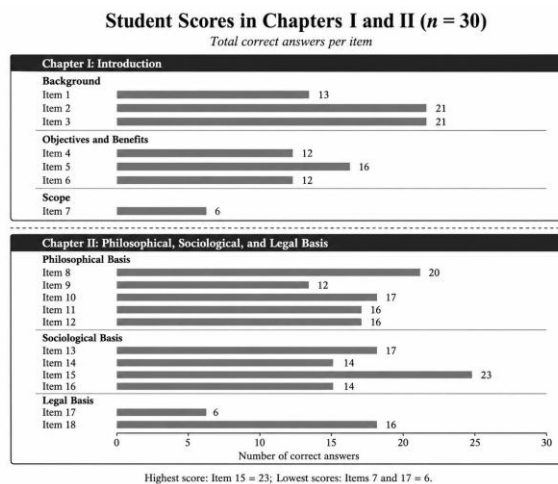


Figure 1. Details of Student Scores in Chapters I and II

Each correct answer was given a score of 1, and each incorrect answer was given a score of 0. A score of 0 dominated the student responses. The green bar represents the total score. For Chapter II, student understanding did not reach the high category, with no one scoring more than 20. However, compared to Chapter I, student understanding improved. The following screenshot summarizes the scores of 30 students on each test item.

For items 19-25 in Chapter III, understanding was quite good, with students scoring above 20. This indicates that the majority of students understand that DL is part of the independent curriculum, which can be adapted to their needs and therefore considered a flexible curriculum. Of the 30 students, understanding is considered good if at least 16 students score correctly. The detailed results for Chapter III are shown in the image below.

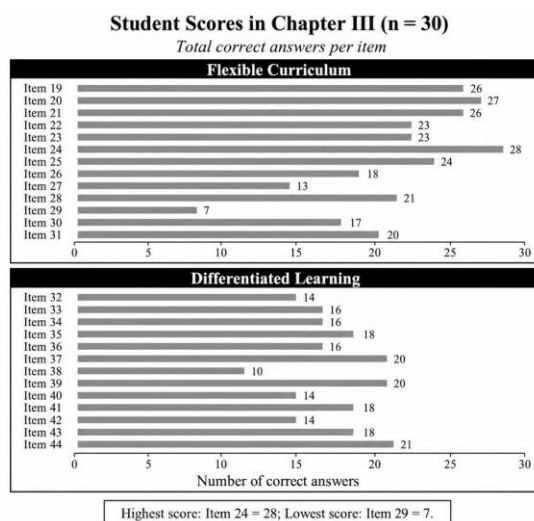


Figure 2. Detailed answers in Chapter III

In Chapter III, items 19-25 were quite good, with student understanding exceeding 20%. This finding indicates that most students understand that DL is part of the independent curriculum and can be adapted to their needs, thus being called a flexible curriculum. Furthermore, in Chapter IV, students' understanding of the types of DL was still very lacking, ranging from definitions to examples of their application.

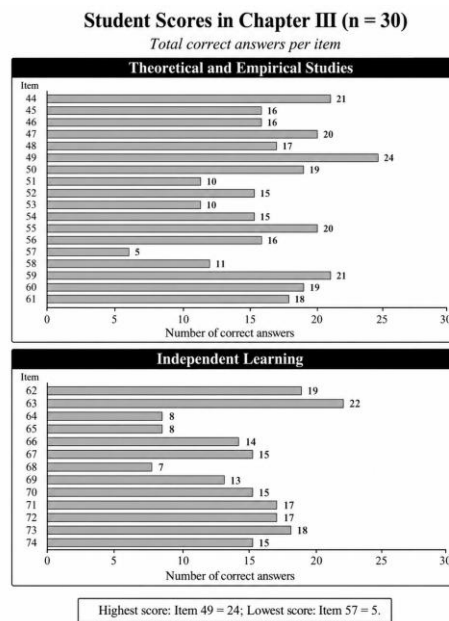


Figure 3. Continue Detailed answers in Chapter III

The results for the subsequent chapters in Chapter III were also less significant. Students' understanding of this chapter was still very low. Furthermore, in Chapter IV, students' knowledge of the types of DL remained inferior, from their definitions to examples of their applications.

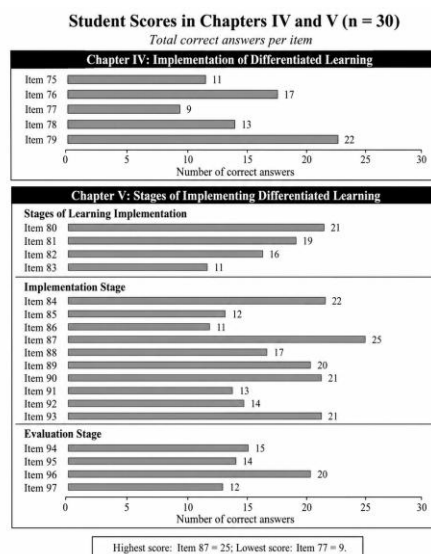


Figure 4. Detailed Answers in Chapters IV and V

Chapter V also did not show optimal results. Many still failed to correctly answer the three stages of DL: planning, implementation, and evaluation, even though these parts are not different from general learning steps. A good activity will always begin with careful planning and must conclude with an assessment, allowing for improvements to be made in the next activity. As mentioned in Chapter V, a comprehensive evaluation was conducted in Chapter VI. In Chapter VI, students' understanding was quite good. This actually led to the conclusion that there was an imbalance between process and outcome. The learning process was not comprehensively understood.

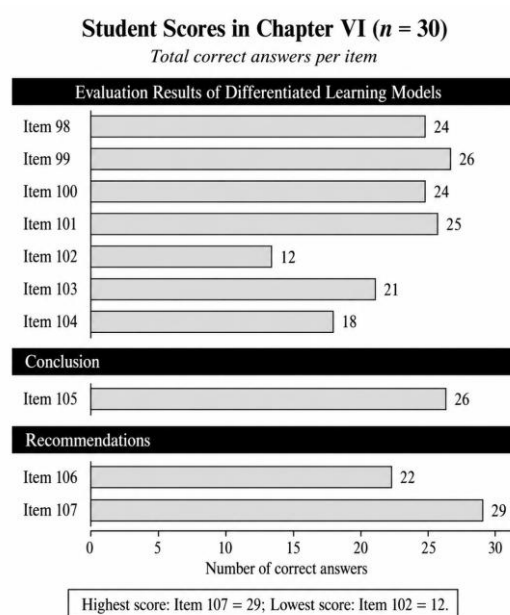


Figure 5. Detailed Answers in Chapters VI

Next, to assess each student's ability to answer all the questions, Table 3 is presented below. The results of 30 students were totalled, and the final score was calculated by dividing the total by the number of questions (108) to produce a score range of 1 to 100.

Table 3. Summary of Questionnaire Results per Respondent

Subject	Total Score	Final Score	Subject	Total Score	Final Score	Subject	Total Score	Final Score
Respondent 1		39					36.45	
Respondent 2		67					62.62	
Respondent 3		54					50.47	
Respondent 4		59					55.14	
Respondent 5		53					49.53	
Respondent 6		52					48.60	
Respondent 7		51					47.66	
Respondent 8		42					39.25	
Respondent 9		96					89.72	
Respondent 10		90					84.11	
Respondent 11		62					57.94	
Respondent 12		91					85.05	
Respondent 13		90					84.11	
Respondent 14		52					48.60	
Respondent 15		58					54.21	
Respondent 16		52					48.60	
Respondent 17		61					57.01	
Respondent 18		57					53.27	
Respondent 19		64					59.81	
Respondent 20		55					51.40	
Respondent 21		22					20.56	
Respondent 22		37					34.58	
Respondent 23		44					41.12	
Respondent 24		55					51.40	
Respondent 25		33					30.84	
Respondent 26		89					83.18	
Respondent 27		30					28.04	

Subject	Total Score	Final Score	Subject	Total Score	Final Score	Subject	Total Score	Final Score
Respondent 28		86			80.37			
Respondent 29		82			76.64			
Respondent 30		100			93.46			

Table 3 above shows that as many as 13 students achieved a score of more than 50%, whereas, in general, students' understanding achieved only 43.33%. The rate is very low, given that at least 50% of students are expected to understand DL.

Discussion

Question item number 7, as the item with the lowest correct answer, reads "The scope of DL focuses on...". The answer to this question is elementary and secondary education levels, but only six people answered correctly, and the rest were wrong. Most students answered with elementary, secondary, and higher education levels. This answer is incorrect because the government prioritises the implementation of DL, focusing on elementary and secondary education levels first. This is stated in the academic book *Principles of Differentiated Learning Development (Differentiated Instruction)* (Purba et al., 2021).

The legal basis sub-chapter in chapter II is reflected in questions 17 and 18. The lowest score is in number 17, which discusses the laws and regulations in implementing DL. The basis for implementing DL is the basis for implementing policies in educational units. In number 17, the question is "The legal basis for implementing DL is...". The correct answer is Article 1 of Law Number 14 of 2005. Through this regulation, it is explained that teachers and lecturers are required to have academic qualifications, competence, teacher certificates, be physically and mentally healthy, meet other qualifications needed for the higher education unit where they work, and have the ability to realise national education goals. This law is considered a legal umbrella for teachers and lecturers without any difference in treatment between state and private teachers. The Teachers and Lecturers Law clearly and in detail regulates aspects that have not been regulated so far. For example, the position, function and purpose of teachers, the rights and obligations of teachers, competence, etc. The low average score obtained in Chapter II illustrates that the direction from policymakers is merely an order that prospective teachers do not fundamentally understand.

Regarding policies from the government and in practice in the field, namely work units at related schools, must also create policies that support teachers in implementing DL (van Vijfeijken et al., 2023). Supportive policies can help teachers prepare classroom learning. Teachers seem to work alone without support from the school. Teachers have the opportunity to change and develop themselves and their teaching methods to become a force capable of bringing about the desired change by creating a generation that is well prepared for the future that does not consider anything other than excellence (Al-Shaboul et al., 2021).

Furthermore, chapter III in the independent learning sub-chapter consists of 15 numbers, ranging from 60 to 74. In numbers 60-63, the score obtained has exceeded 50% of the maximum score. However, in numbers 64-70 and 74, the overall student score decreased from the previous numbers. This sub-chapter discusses the meaning of independent learning, independent learning from a curriculum perspective, and new paradigm learning as a form of independent learning. For numbers 71-73, the scores obtained have exceeded 50%. For example, in number 64, the question is "The approach currently used for the independent learning policy is...". The answer that should be chosen is the heterogeneous approach. This approach is used because DL adapts to the different characteristics of students. However, the majority of students choose the practical and theoretical approaches.

From these results, efforts must be made to improve prospective teachers' understanding of the independent learning paradigm as the core of DL. Understanding the curriculum greatly influences the quality of learning and student achievement (Sianturi et al., 2025). Students will learn directly from quality resources and know what is being done in the classroom.

Chapter IV consists of 4 sub-chapters, but only one sub-chapter has an average score of over 15. The other sub-chapters are DL content, process, and product. Numbers 75, 77, and 78 describe the conditions in the previously mentioned sub-chapters, except for number 76. In number 77, several

solutions are presented for multiplication material in mathematics; only seven people answered correctly, namely the Number Table. References to using learning models also turned out to be a problem for students.

Designing universal learning with one type of activity and assessment is already quite complicated for students, especially when organising various activities with different components in differentiated learning. This does not mean that differentiated learning is focused on the current curriculum; universal learning is ignored. Students as prospective teachers also need to understand two learning perspectives at once (Griful-Freixenet et al., 2021). DL is applied when teachers want to focus on the abilities of each student. When the learning achievements of all students have reached almost the same stage, universal learning can be applied. Universal learning can also deliver material at the beginning of learning.

For Chapters V and VI, starting from number 80 to 107. The average score in these numbers has already exceeded more than 50% of the maximum score. However, if you look at the details in Table 1, several numbers do not match their achievements. In this chapter, students have difficulty determining the actions to be taken during the initial activities, implementation and evaluation. Some of the reasons are a lack of references, inability to identify individual differences, lack of learning adjustments, and lack of additional resources (Gibbs, 2023; Hajis & Othman, 2024). The references that are currently available are more for universal learning. Finding open materials, practice questions, or assessment instructions implemented by DL is difficult. In addition to preparing appropriate references, knowing the individual differences with diagnostic assessments in advance is necessary (Pangestuningtyas et al., 2025). This assessment is one of the components often overlooked in learning.

Students' difficulties in understanding assessments are shown in the results of the answers to question number 97, namely "The definition of Assessment of Learning is...". This assessment aims to measure the achievement of learning objectives and the development of student competencies. Only 12 students were able to answer correctly. DL divides assessments into three types: assessment for learning, assessment as learning, and assessment of learning (Purba et al., 2021). Assessment for learning is intentionally integrated into the ongoing instructional process to continuously refine and improve both teaching and learning strategies. In the context of differentiated instruction, this approach serves as a critical diagnostic tool implemented at the beginning of each learning cycle to map student readiness and needs. Similarly, assessment as learning occurs actively within the learning environment by directly involving students in the evaluation of their own progress. This self-reflective practice effectively functions as a formative assessment that can be seamlessly embedded throughout the content and process differentiation stages. Ultimately, assessment of learning is conducted at the final stage of the instructional cycle to measure the overall achievement of learning objectives and the development of student competencies. Executed through product differentiation, this summative assessment provides a definitive evaluation of student mastery and outcomes.

Every educational unit using the independent curriculum must conduct a diagnostic assessment at the elementary and other levels. Diagnostic assessment aims to identify students' deficiencies, strengths, knowledge, skills and characteristics during a specific time. However, few can communicate it (Fan et al., 2021). Communication in diagnostic assessment is how a teacher can see weaknesses that need to be addressed and strengths that need to be improved. In addition to diagnostic assessment, formative and summative assessments play a significant role in learning. All of these assessments need to be understood by prospective teachers as well.

Formative assessment has a significant influence on instructional design. Teachers adjust their teaching approaches according to students' learning pace and level. It is not the teacher who decides about the instructional activities, but the students' learning that guides the instructor to continue or change the strategy. Information about students' learning is obtained through formative assessment practices that explain the effectiveness of classroom instructional activities in content, process, and product differentiation (Begum & Ambreen, 2021). Matching instructional design to students' learning styles to improve their learning in the classroom significantly supports students' learning according to their learning needs (Fahrozi & Sutikno, 2024). To ensure the effective implementation of educational evaluations, several strategic steps must be taken when designing high-quality assessments. First, instructors should employ a backwards design approach, which begins by clearly defining the intended learning outcomes and then determining the most suitable assessment methods to measure them. Furthermore, it is essential to establish comprehensive student portfolios that can serve as concrete

evaluation materials for professional discussions and collaborative reviews with colleagues or institutional leaders. To capture a holistic view of student progress, educators must continuously diversify their assessment types by drawing from various valid references, while consistently monitoring the alignment of these tools with established learning outcome standards. Ultimately, conducting periodic evaluations of the entire assessment process is vital to maintaining its long-term relevance and effectiveness.

After implementing diagnostic assessment and formative assessment, summative assessment can be continued. Summative assessment functions to provide grades to students and is intended as a practical tool to assist in the entire process of planning, developing, and implementing tests and monitoring their effectiveness (Kibble, 2017). In addition to the three assessments previously explained, one assessment complements learning, namely, authentic assessment. Authentic assessment is an approach designed to assess students' knowledge and skills in real-world situations, encompassing cognitive, affective, and psychomotor aspects (Gedera, 2025). A complete series of assessments is one of the essential steps in implementing DL. Starting with diagnostic assessment, then formative assessment, and ending with summative and authentic assessments. This series of assessments differentiates DL from previous learning, namely, thematic learning.

DL is also closely related to inclusive learning (Nepal et al., 2024). Inclusive learning recognises and values diversity among learners and adapts learning to include each student. The concept of differentiation has been discussed for the past two decades. However, little attention has been paid to how prospective teachers understand this phenomenon. Meanwhile, when related to Indonesia, almost all public schools have implemented the principle of inclusion. Inclusive schools open up enormous opportunities for students' diverse learning styles. Some solutions to improve prospective teacher students' understanding in this study include implementing peer-teaching practices to familiarise them with DL (Fadil & Aryani, 2021; Fadillah et al., 2024). Peer teaching must be preceded by careful planning of readiness, materials, assessments, and teacher mentality. These prospective teachers must adjust all learning devices to DL. DL requires significant teacher commitment and time (Tajik et al., 2024). A well-designed classroom can serve the special needs of learners and increase efficiency. The efficiency in question is that the strategies that have been used can be reapplied in heterogeneous environments in the future.

The activity of strengthening students' abilities to implement the Merdeka DL curriculum involves creating teaching materials (Mustadi et al., 2024). This activity can also focus on creating teaching modules for students attending lectures. Teaching modules can also be integrated with TPACK (Technological Pedagogical Content Knowledge) (Hastomo, 2024; Ramdhani et al., 2025; Spyropoulou & Wallace, 2025). Developing a learning model that combines problem-based learning methods with local culture and TPACK to produce adaptive and creative prospective elementary school teachers in the 21st century. This learning model enhances student competence and improves learning outcomes in educational practice. In addition, this model fosters a learning environment that combines local culture and TPACK, thereby equipping prospective elementary school teachers with the skills necessary for adaptation and innovation in the 21st century. Although it is also essential to realize that, to date, access and training in technology remain persistent obstacles (Bunga et al., 2025).

Efforts to improve student skills can begin early in the course. Training in creating engaging media, developing practical teaching modules, and utilizing technology-based learning models should be integrated into the curriculum to enhance student learning. Examples include the creation of Pop-Up Books, which have been shown to improve student understanding through Understanding by Design (UBD) (Prastika et al., 2023), and the use of Learning Maps, which formally represent the thinking process, demonstrating how humans perceive, process, and retain new information (Romine et al., 2025). Engaging learning media will keep students focused on the teacher.

In addition to efforts to improve DL implementation capabilities, the government is also expected to conduct regular evaluations of educational units. This action is supported by research findings from a religious-based school (Madrasah). The suboptimal evaluation results have led the Madrasah to adopt outdated learning methods and neglect innovation, as they are deemed inappropriate for the Madrasah's characteristics (Sandy & Putri, 2024). Evaluations at the student level can be conducted by relevant lecturers or policymakers within the campus environment.

Conclusion

The implementation of DL in elementary and secondary education units requires special attention. The understanding of differentiated learning (DL) among primary education students who are prospective primary school teachers needs to be tailored to field needs. University teaching materials also need to be adapted to DL. Students also need to become accustomed to new learning outcomes, namely the ability to master, design, and practice all DL learning tools. The understanding of prospective teacher students in the primary education major, particularly at Khairun University, regarding DL still needs to be improved. This includes the background of DL, theoretical and empirical studies, and the implementation of DL, which consists of various types of grouping. Several possible solutions include implementing peer teaching, regularly evaluating student abilities, and evaluating within educational units. Furthermore, all relevant leaders are expected to support the role of teachers in DL implementation as a field-based approach, which also reassures prospective teachers of policymakers' support. Given the current development, the independent curriculum also implements deep learning, which can serve as a new reference for future researchers in integrating deep learning and DL.

References

- Abdullah, S., Nurharyanto, D. W., Hasanuddin, M. I., & Hasanuddin, M. I. (2024). Comprehension of elementary teacher education's students as future teachers toward the implementation of the independent curriculum principles. *Jurnal JPSPD (Jurnal Pendidikan Sekolah Dasar)*, 11(2), 50–59. DOI: <https://doi.org/10.26555/jpsd.v11i2.a29340>
- Al-Shaboul, Y., Al-Azaizeh, M., & Al-Dosari, N. (2021). Differentiated instruction between application and constraints: Teachers' perspective. *European Journal of Educational Research*, 10(1), 127–143. DOI: <https://doi.org/10.12973/eu-jer.10.1.127>
- Aminuriyah, S., Imron, A., Ma, A., & Destya, A. (2023). A case study of differentiated instruction at elementary school. *Al-Ishlah: Jurnal Pendidikan*, 15(4), 6227–6240. DOI: <https://doi.org/10.35445/alishlah.v15i4.3860>
- Begum, S., & Ambreen, M. (2021). Differentiated instruction based on formative assessment in Associate Degree in Education program. *Journal of Educational Research, Dept. of Education, IUB, Pakistan*, 24(1), 112–128.
- Bunga, J. B., Olano, M. L. R., & Morga, M. R. (2025). Differentiated instruction in multigrade classrooms: Bridging theory and practice. *International Journal of Educational Methodology*, 11(3), 377–390. DOI: <https://doi.org/10.12973/ijem.11.3.377>
- Dulfer, N., Saito, T., & McKernan, A. (2025). Differentiated instruction: An investigation into the effect of class compositional factors on teaching processes. *Asia Pacific Education Review*. DOI: <https://doi.org/10.1007/s12564-025-10065-y>
- Eikeland, I., & Ohna, S. E. (2022). Differentiation in education: A configurative review. *Nordic Journal of Studies in Educational Policy*, 8(3), 157–170. DOI: <https://doi.org/10.1080/20020317.2022.2039351>
- Fadil, A., & Aryani, I. K. (2021). Improvement of teacher pedagogical competence through in house training activities. *DINAMIKA Jurnal Ilmiah Pendidikan Dasar*, 13(2), 89–92. DOI: <https://doi.org/10.30595/Dinamika/v12i2>
- Fadillah, Jabu, B., & Muhalim. (2024). Navigating teaching practicum in the real classroom: Insights from ESL teaching practicum experiences. *Research and Innovation in Applied Linguistics (RIAL)*, 2(2), 111–123. DOI: <https://doi.org/10.31963/rial.v2i2.4811>

- Fahrozi, I., & Sutikno, P. Y. (2024). Profiling student learning styles to design differentiated learning to support independent learning. *Journal of Education Action Research*, 8(3), 459–467. DOI: <https://doi.org/10.23887/jear.v8i3.78669>
- Fan, T., Song, J., & Guan, Z. (2021). Integrating diagnostic assessment into curriculum: A theoretical framework and teaching practices. *Language Testing in Asia*, 11(1), Article 2. DOI: <https://doi.org/10.1186/s40468-020-00117-y>
- Gedera, D. (2025). A holistic approach to authentic assessment. *Asian Journal of Assessment in Teaching and Learning*, 13(2), 23–34. DOI: <https://doi.org/10.37134/ajatel.vol13.2.3.2023>
- Gibbs, K. (2023). Voices in practice: Challenges to implementing differentiated instruction by teachers and school leaders in an Australian mainstream secondary school. *The Australian Educational Researcher*, 50(4), 1217–1232. DOI: <https://doi.org/10.1007/s13384-022-00551-2>
- Griful-Freixenet, J., Struyven, K., & Vantieghem, W. (2021). Exploring pre-service teachers' beliefs and practices about two inclusive frameworks: Universal Design for Learning and differentiated instruction. *Teaching and Teacher Education*, 107, Article 103503. DOI: <https://doi.org/10.1016/j.tate.2021.103503>
- Haelermans, C. (2022). The effects of group differentiation by students' learning strategies. *Instructional Science*, 50(2), 223–250. DOI: <https://doi.org/10.1007/s11251-021-09575-0>
- Hajis, S. A., & Othman, N. (2024). Navigating challenges and strategies in implementing differentiated instruction: A conceptual overview. *International Journal of Academic Research in Business & Social Sciences*, 14(8), 1182–1199. DOI: <https://doi.org/10.6007/IJARBS/v14-8/22153>
- Hastomo, A. (2024). The development of educational practice lecture models to prepare adaptive and innovative 21st-century primary school teachers. *Jurnal Prima Edukasia*, 12(2), 177–182.
- Kara, S., & Tekindur, A. (2025). The effect of differentiated instruction on the academic achievement and opinions of 3rd-grade students in science education: A mixed-methods study. *Journal of Intelligence*, 13(126), 1–28. DOI: <https://doi.org/10.3390/jintelligence13100126>
- Kibble, J. D. (2017). Best practices in summative assessment. *Advances in Physiology Education*, 41(1), 110–119. DOI: <https://doi.org/10.1152/advan.00116.2016>
- Magableh, I. S. I. (2020). The effectiveness of differentiated instruction by streaming: A preliminary study of current practices in the UAE. *International Journal of Learning, Teaching and Educational Research*, 19(6), 95–110. DOI: <https://doi.org/10.26803/ijlter.19.6.6>
- Molina-Muñoz, D., Contreras-García, J. M., & Molina-Portillo, E. (2025). Understanding educational inequality in Spain: Factors influencing low and high mathematical competence. *Social Sciences*, 14(463). DOI: <https://doi.org/10.3390/socsci14080463>
- Mustadi, A., Wibowo, S. E., Zubaidah, E., Supartinah, S., Sugiarsih, S., & Sayekti, O. M. (2024). Needs analysis of project based teaching module development in the independent curriculum. *Jurnal Prima Edukasia*, 12(1), 52–60. DOI: <https://doi.org/10.21831/jpe.v12i1.66933>
- Musyarrofah, H., Kurniawati, A. A., Sidiq, A. A., & Fadlillah, A. (2024). Differentiated instruction in ELT: Indonesian preservice and in-service teachers' capabilities, strategies, and barriers. *Journal of English Education and Linguistics Studies*, 11(2), 877–906. DOI: <https://doi.org/10.30762/jeels.v11i2.2847>
- Nepal, S., Walker, S., & Dillon-Wallace, J. (2024). How do Australian pre-service teachers understand differentiated instruction and associated concepts of inclusion and diversity? *International Journal of Inclusive Education* ∞, 28(2), 109–123. DOI: <https://doi.org/10.1080/13603116.2021.1916111>

- Nirmala, S. D., Firdaus, F. M., Ramdhani, S., & Hidayat, A. R. (2025). Differentiated learning activities: How does it impact students' literacy? *Jurnal Prima Edukasia*, 13(1), 169–180. DOI: <https://doi.org/10.21831/jpe.v13i1.74220>
- Pangestuningtyas, D., Gunansyah, G., & Mariana, N. (2025). Analysis of diagnostic assessment in the science subject for 4th grade elementary school. *Science Education Journal*, 9(1), 23–36. DOI: <https://doi.org/10.21070/sej.v9i1.1654>
- Prastika, B. A., Senen, A., & Cahya, R. D. (2023). Immersive pop-up books: Enhancing disaster awareness in the merdeka curriculum. *Jurnal Prima Edukasia*, 11(2), 186–196.
- Purba, M., Purnamasari, N., Soetantyo, S., Suwarna, I. R., & Susanti, E. I. (2021). *Naskah akademik prinsip pengembangan pembelajaran berdiferensiasi (differentiated instruction) pada kurikulum fleksibel sebagai wujud merdeka belajar* (1st ed.). Pusat Kurikulum dan Pembelajaran, Badan Standar, Kurikulum, dan Asesmen Pendidikan, Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, Republik Indonesia.
- Putri, K., & Elizar. (2025). Implementing a differentiation approach in teaching to accommodate diverse learning styles of primary school students: A systematic literature review. *Journal for Lesson and Learning Studies*, 8(1), 119–128. DOI: <https://doi.org/10.23887/jlls.v8i1.89659>
- Rakhmawati, D., Kawuryan, S. P., & Adi, B. S. (2024). In-house training: Improving teacher skills in implementing problem-based learning. *Jurnal Prima Edukasia*, 12(1), 99–110. DOI: <https://doi.org/10.21831/jpe.v12i1.60498>
- Ramaila, S. (2025). Unveiling the potential: A systematic review on harnessing the affordances of differentiated instruction. *Journal of Teaching and Learning*, 19(2), 41–56. DOI: <https://doi.org/10.22329/jtl.v19i2.8561>
- Ramdhani, S., Nurcahyono, N. A., & Dewi, S. (2025). Designing interactive e-modules based on differentiated instruction and the theory of didactical situations for primary mathematics education. *Educational Process: International Journal*, 17, 1–23. DOI: <https://doi.org/10.22521/edupij.2025.17.368>
- Romine, R. S., Schuster, J., Karvonen, M., Thompson, W. J., Erickson, K., Simmering, V., & Bechard, S. (2025). Learning maps as cognitive models for instruction and assessment. *Education Sciences*, 15(3), 1–26. DOI: <https://doi.org/10.3390/educsci15030365>
- Sandy, M. A. F., & Putri, N. S. E. (2024). Capturing pseudo-innovation in ELT: The analysis of implementing differentiated learning to suburban private madrasahs. *English Language Teaching Educational Journal*, 7(2), 124–138. <https://files.eric.ed.gov/fulltext/EJ1454537.pdf>
- Setambah, M. A. B., Saad, M. I. M., Ghazali, N. H. C. M., & Adnan, M. (2025). A comprehensive synthesis of differentiated instruction approaches in mathematics. *LUMAT: International Journal on Math, Science and Technology Education*, 12(4), Article 3. DOI: <https://doi.org/10.31129/lumat.12.4.2371>
- Sianturi, T. J. A. U., Suryadi, Santoso, B., & Fatwa, A. D. S. (2025). Impact of teachers' understanding and merdeka curriculum implementation on teacher competence and student academic performance. *Journal of Ecohumanism*, 4(2), 757–774. DOI: <https://doi.org/10.62754/joe.v4i2.6346>
- Spyropoulou, E., & Wallace, M. (2025). Differentiated education using technology in junior and high school classrooms. *Encyclopedia*, 5(71), 1–14. DOI: <https://doi.org/10.3390/encyclopedia5020071>
- Subban, P., Suprayogi, M. N., Preston, M., Liyani, A. N., & Ratri, A. P. P. (2025). “Differentiation is

sometimes a hit and miss”: Educator perceptions of differentiated instruction in the higher education sector. *Asia-Pacific Education Researcher*, 34(3), 873–884. DOI: <https://doi.org/10.1007/s40299-024-00904-8>

Tajik, O., Noor, S., & Golzar, J. (2024). Investigating differentiated instruction and the contributing factors to cater EFL students’ needs at the collegial level. *Journal of Modern Research in English Language Studies*, 4(1), 69–87. DOI: <https://doi.org/10.1186/s40862-024-00299-5>

Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners* (2nd ed.). Pearson.

van Vijfeijken, M., van Schilt-Mol, T., van den Bergh, L., Scholte, R. H. J., & Denessen, E. (2023). How teachers handle differentiation dilemmas in the context of a school’s vision: A case study. *Cogent Education*, 10(1), Article 2165006. DOI: <https://doi.org/10.1080/2331186X.2023.2165006>