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IMPLEMENTATION OF DIFFERENTIATED LEARNING TO IMPROVE LEARNING OUTCOMES ON THE EARTH AND SOLAR SYSTEM MATERIAL FOR JUNIOR HIGH SCHOOL GRADE VII

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Abstract

This study aims to determine the application of differentiated learning based on learning styles on the material of the Earth and the Solar System on student learning outcomes. This research is a Classroom Action Research (PTK) which was carried out in two cycles, namely Cycle I and Cycle II with each cycle consisting of four stages, namely planning, action, observation, and reflection. Instruments in classroom action research used observation sheets of teacher and student activities and multiple choice written test sheets. Data collection techniques in the form of observation and written tests. The data analysis method used is quantitative for the analysis of learning outcomes and qualitative for the results of observations. The results showed that the completeness of the classical learning outcomes was initially 0% at the pre-cycle stage, then increased to 37,50% in Cycle I, and reached 78.13% in Cycle II after applying the differentiated approach. These findings indicate that differentiated learning has a positive impact on improving the completeness of students' classical learning outcomes in the context of this research.

Keywords*: Differentiated Learning, Learning Styles, Learning Outcomes*

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INTRODUCTION

The current Education Curriculum in Indonesia uses the Merdeka curriculum. This independent curriculum is a form of improving the quality of Indonesian education to prepare future students who are competitive and meet the demands of the 21st century, which requires competent human resources. In this independent curriculum, teachers are given the freedom to choose how to deliver their learning according to the characteristics of the students. The purpose of this is to explore the potential of teachers and students and improve the quality of learning (Kemendikbud, 2020). Students are given the freedom to determine their learning. This independent learning allows students to experiment and be free and provide opportunities to determine what is best for them to learn. In the independent curriculum, the learning system is more flexible and not tied to certain limitations. Teachers are free to use tools that make it easier to deliver material.

The new thing and the focus in the independent curriculum is that the learning designed by teachers must pay attention to and facilitate the different characteristics of students. With the implementation of the independent learning curriculum based on differentiation in the 21st century, students are also expected to be able to utilize technology in their learning process (Ningrum *et.al*., 2023). Teachers must recognize that every individual is smart and unique. Everyone is competent in their fields, so we must refrain from forcing them to do what we want. Students' uniqueness must be supported and developed to achieve their goals, and learning must be designed according to their diversity of characteristics.

Each individual has uniqueness and differences in learning styles, interests, needs, and levels of mastery. The most visible differences include gender and physical aspects, but when we explore more profoundly, the diversity among students is much broader and more complex. These differences involve factors such as socio-economic level, family type, special needs, interests and abilities, cultural background, language used, and different learning profiles or styles (Carter in Tanjung *et al*., 2023). These differences are essential elements in the context of education. Rahayu *et al*. (2023) stated that students have diverse characteristics, needs, and social and cultural backgrounds. Students have various characteristics, needs, and social and cultural environments (Widyawati & Rachmadyanti, 2023). Each student also has different preferences and different tendencies in how to receive and process information or material given by the teacher (Widyawati & Rachmadyanti, 2023; De Potter et al., 2008).

Learning preferences or learning methods preferred by students are essential things that teachers must pay attention to so that they can more easily understand the material according to the learning method that suits them best. According to Tomlinson (Hocket, 2018), Learning profiles or learning styles are learning approaches preferred by students, influenced by their way of thinking, intelligence level, cultural background, and surrounding environment. Learning styles consist of visual, auditory, and kinesthetic. As a teacher, dealing with student diversity is a complex challenge, but also an opportunity to develop a differentiated learning approach. In dealing with student diversity, teachers must have a deep understanding of the individual characteristics of students, both academically and socially-emotionally. Teachers need to observe, observe, and evaluate each student to identify their needs. With a better understanding of students, teachers can design appropriate learning strategies to meet their needs.

Based on the results of student profiling at SMPN 2 Babat, it is known that students have diverse learning styles, namely visual, kinesthetic, and auditory. In addition, based on observations, the learning carried out by teachers needs to pay attention to and accommodate the characteristics of students. The learning carried out equates the conditions of students by providing the same activity/method. For example, teachers only deliver material through lectures and writing. In fact, students have different characteristics (learning styles). Technology has also yet to be integrated into learning, even though the use of technology can facilitate different learning styles of students in obtaining information. The results of the pre-research show that student learning outcomes are still relatively low, namely that there are no students whose learning outcomes pass the Maximum Completion Criteria.

Based on the explanation of the problems above, differentiated learning can be used as a solution. Differentiated learning is a learning approach that takes into account differences in abilities, interests, and needs of students in the learning process (Ratih, 2023). According to Tomlinson (2001), differentiated learning is an effort to adjust the learning process in the classroom to meet the learning needs of students as individuals. Basically, differentiated learning involves adjusting the learning process in the classroom to suit the individual learning needs of students. Differentiated learning is a teacher's response to student needs that is guided by the principle of differentiation, namely more flexible grouping and a process that is guided by the desire to learn (Mulyawati et al., 2022). There are four aspects of differentiated learning, namely content, process, product, and learning environment in the classroom (Wahyuningsari, 2022). It has differentiated learning content by providing various learning resources, such as visual-based learning, images, and learning videos. For auditory students, educators can hold group discussions or interactive lectures or use videos. Practical approaches, such as experiments in kinesthetic learning, also need to be considered.

In this classroom action research (CAR), differentiated learning is used in the content aspect based on learning styles. The teacher prepares various material content so that all students with different learning styles are facilitated. The material used in this study is the Solar System. The solar system material is a relatively abstract topic, so various sources and media are needed to visualize the material and help students understand the material (Mulyawati et al., 2022). Suwartiningsih's research (2021) shows that the application of differentiated learning in the material of soil and the sustainability of life can improve science learning outcomes. Differentiated learning in terms of content, process, and product provides benefits in improving student learning outcomes in each cycle (Fitra, 2022). In differentiated learning, students are given the freedom or independence to learn in their way and style to achieve successful learning. Based on the explanation above, this study aims to improve student learning outcomes through differentiated content learning.

RESEARCH METHOD

This research is a Classroom Action Research (CAR). The subjects of this classroom action research were class VII A students, with a total of 32 students. This research was conducted in May-June of the 2022/2023 Academic Year at SMPN 2 Babat. This research was conducted in two cycles, namely Cycle I and Cycle II, with each cycle consisting of four stages, namely planning, action, observation, and reflection. The following is a picture of the classroom action research cycle flow.

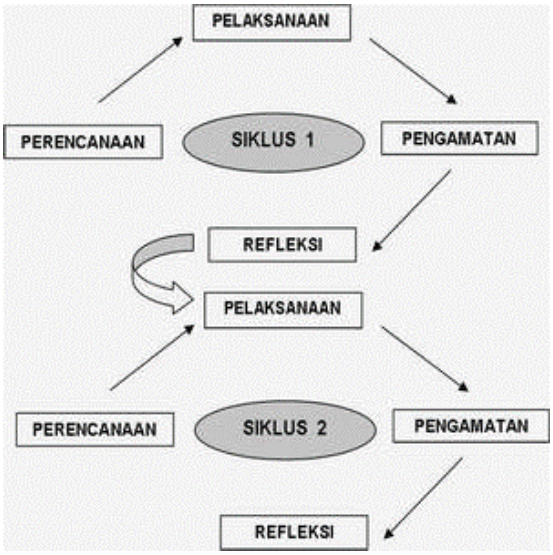

Figure 1. Classroom Action Research Stage

At the Planning stage, the activities carried out are preparing a learning plan consisting of teaching modules, Student Activity Sheets (LKPD), teaching materials, learning media used, and learning outcome test questions. The Implementation stage is carried out during the learning process, namely learning using a differentiated learning approach based on learning styles. At the observation stage, the observations of student activities and learning carried out by teachers are observed by observers. The Reflection stage is carried out after carrying out activities and is in the form of reflection on the planning that has been implemented, which is used as an improvement in the next cycle. The instruments used in classroom action research are teacher and student activity observation sheets and multiple-choice written test sheets to measure learning outcomes. Data collection techniques are in the form of observations and multiple-choice written tests. The data analysis method used is quantitative for learning outcome analysis and qualitative for observation results. The indicator of the success of this research is the completion of cognitive learning outcomes that meet the KKM, namely ≥ 75. The classical completion of a class is declared to have completed its learning if in that class there are ≥ 75% of students who have completed the KKM value (Trianto, 2018 in Panjaitan et al., 2020).

RESEARCH RESULTS AND DISCUSSION

Pre-Cycle Results

Based on the pre-cycle results conducted before the implementation of differentiated learning in science learning, low student scores were obtained. The following are the pre-cycle results

Table 1. Pre-cycle learning outcome data

Data	Result
Highest score	75
Lowest score	10
Average score	30,47
∑ Students Completed	2
Classical Completeness Percentage	6,25%

Table 1 shows that students' highest score is 75, and their lowest is 10, with an average score of 30.47. The percentage of classical completeness is 6.25%. The following graph describes the data on student completeness.

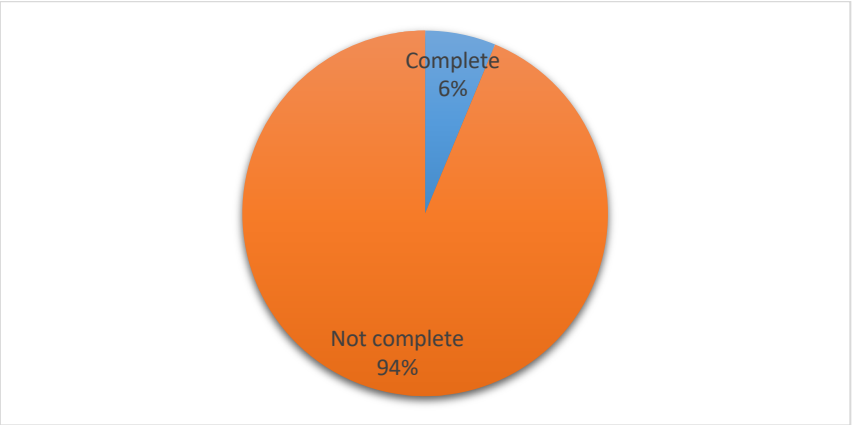

Figure 2. Percentage of Student Learning Outcome Completion

The failure of students to complete the learning outcomes can be caused by students not paying attention to the lessons given by the teacher because the learning has yet to facilitate the characteristics of students and equated students. Based on this, classroom actions are carried out with differentiated learning based on learning styles to improve student learning outcomes in cycles I and II.

Results of Cycle I

The cycle I stage begins with the planning stage. At this stage, the researcher prepares learning devices for differentiated content learning based on learning styles. The devices that need to be prepared consist of teaching modules, LKPD and teaching materials, written tests, and the media used. All learning devices are adjusted to the characteristics of the student's learning styles. The teacher (researcher) prepares images, videos, and teaching aids used to help students carry out learning activities in accordance with the material on the phases of the moon to facilitate visual, auditory, and kinesthetic learning styles.

The action stage is the stage of implementing differentiated learning in the classroom. In this differentiated learning, learning is centered on students using the Discovery Learning (DL) learning model. Students work on the LKPD, observing the phases of the moon in groups to discuss. The teacher facilitates the completion of the task according to their learning style, namely moon phase teaching aids, videos, and pictures of the phases of the moon to make it easier for them to learn according to their learning style. The role of the teacher in this learning is as a facilitator for students, and they are more active in participating in discussions and collaborating with classmates (Smith, 2016)

The observation stage was carried out during the provision of classroom actions in the form of differentiated learning. Observers on the implementation of learning by teachers and students carried out observations. During the observation, some students followed and were active in learning, but there were still some (5 students) who needed to be more focused on learning. Students have been actively involved in learning, namely by discussing and working on LKPD with the help of teaching aids, pictures, and videos to find information and then make presentations. Research by Smith (2016) shows that differentiated learning can encourage student activity in the learning process. By providing material that is appropriate to the level of understanding of each student, they feel more confident about participating actively. The teacher has helped and encouraged students who are less actively involved to work together and help in groups, and the teacher has facilitated guidance and asked questions of each group. The implementation of differentiated learning has been carried out well. Based on the results of reflection after the actions and observations were carried out in cycle I, the learning outcomes of students were still low but had increased from the pre-cycle learning outcomes—the learning outcomes of the cycle I can be seen in the following table.

Table 2. Learning Results of Cycle I

Data	Result
Highest score	80
Lowest score	20
Average score	50,16
∑ Students Completed	12
Classical Completeness Percentage	37,50%

Based on Table 2, it is known that the learning outcomes of cycle I obtained the highest value of 80 and the lowest 20 with an average value of 50.16. The percentage of classical completion of cycle I was 37.50%. The number of students completing learning outcomes is depicted in the following graph.

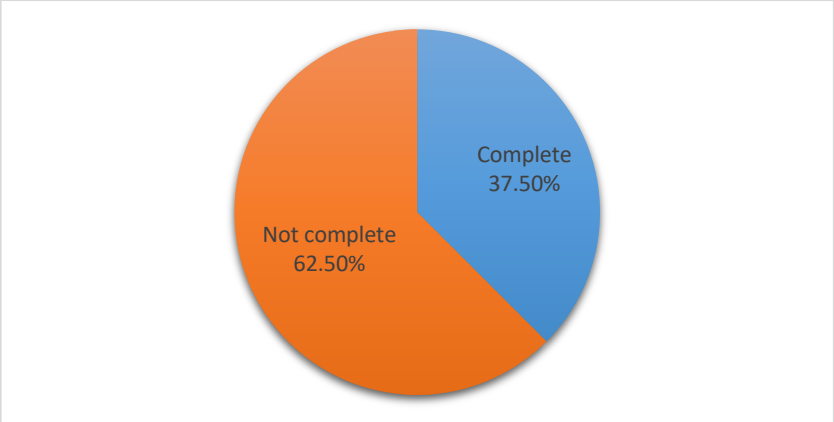

Figure 3. Percentage of Student Learning Outcomes Completion in Cycle I

Based on the results, cycle I experienced an increase in the classical percentage of learning outcomes from the pre-cycle, namely 6.25% to 37.50%. This increase occurred after differentiated learning of content based on learning styles was carried out. Marlina (2019) stated that differentiated learning can help all students in learning, motivate and improve learning outcomes, and make students independent learners. The results of the study (Juwana & Savitri, 2022) stated that the method of presenting material with the application of differentiated learning can increase the average learning outcomes. Learning that is adjusted to learning styles has a contributing effect on student learning achievement (DePorter & Hernacki, 2011). The increase in learning outcomes was also due to the learning planning carried out by the teacher being carried out well, namely by providing teaching aids, pictures, and videos that are relevant to the material and in accordance with learning styles. Susanti et al. (2023) stated that the learning outcomes of these students were due to good and mature planning by the teacher by mapping the characteristics of students before learning and using differentiated learning.

Reflecting on the results of the cycle, I found the advantages of the learning process carried out, namely 1) Differentiated learning that was implemented had shown an increase compared to before. 2) Students were motivated to learn, which can be seen from the fact that most students were involved and interacted with teaching aids, videos, images, and existing activities. 3) The learning that was carried out facilitated students by providing teaching aids, videos, and images in searching for information. Meanwhile, the weaknesses of this cycle of learning were 1) the learning outcomes obtained by students needed to increase optimally. 2) When forming groups, students need a long time, so the teacher needs time management. 3) Students had difficulty accessing the learning video link on the LKPD, so it was better to present the link in the form of a barcode, and the teaching materials could be changed to online. 4) There were students whose learning focus was diverted to their cell phones and who had yet to be involved in the discussion. The results of the reflection on cycle I will be followed up by maximizing strengths and improving weaknesses, which will be realized in cycle II.

Results of Cycle II

The results of the reflection of cycle I were improved and implemented at the planning stage. The planning stage of cycle II is similar to cycle one, namely preparing learning devices for differentiated learning based on learning styles consisting of teaching modules (LKPD and teaching materials and learning media). In addition, the teacher also prepares images, videos, and tools used for observation that are in accordance with the solar eclipse material to facilitate visual, auditory, and kinesthetic learning styles. This planning stage is based on improving the shortcomings of the cycle I. Namely, improvements were made to the LKPD. Namely, video links were made in the form of barcodes, and teaching materials were not only printed but also made online to make it easier for students to access materials/information, providing clear discussion rules to ensure that the class remains organized, especially the use of mobile phones.

The action stage is the stage of implementing differentiated learning in the classroom. This differentiated learning still uses student-centered learning with the Discovery Learning (DL) learning model.

Students are asked to work on the LKPD for observing the solar eclipse in groups. The teacher facilitated the students' work on the assignment according to their learning style, namely solar eclipse props, videos, and pictures of solar eclipses, to make it easier for them to learn according to their learning style. At this action stage, the teacher responded to the reflection of the previous cycle by giving students a time limit to gather with their groups and asking all students to get involved and work together.

The observation stage was carried out during differentiated learning. Observations were made by observers of the implementation of learning by the teacher and students. During the observation, in general, students followed and were active in learning, group discussions, and worked together in teams, but there were still two students who needed to be more focused on learning, and this was better than the previous cycle. The teacher has helped and encouraged students who were less actively involved to work together and help in groups and reprimanded students who could have done their assignments. In addition, the teacher gave directions to students so that they could ask their peers (peer tutors), and the teacher's activities in differentiated learning have been carried out well. Based on the results of reflection after the actions and observations were carried out in cycle II, the learning outcomes of students increased from the learning outcomes in cycle I. The learning outcomes in cycle II can be seen in the following table.

Table 3. Cycle II Learning Results

Data	Result
Highest score	85
Lowest score	40
Average score	73,59
∑ Students Completed	25
Classical Completeness Percentage	78,13%

Based on Table 2, it is known that the learning outcomes of cycle II obtained the highest value of 85 and the lowest value of 40, with an average value of 73.59. The percentage of classical completion of cycle II was 78.13%. The number of students learning outcomes completed is depicted in the following graph.

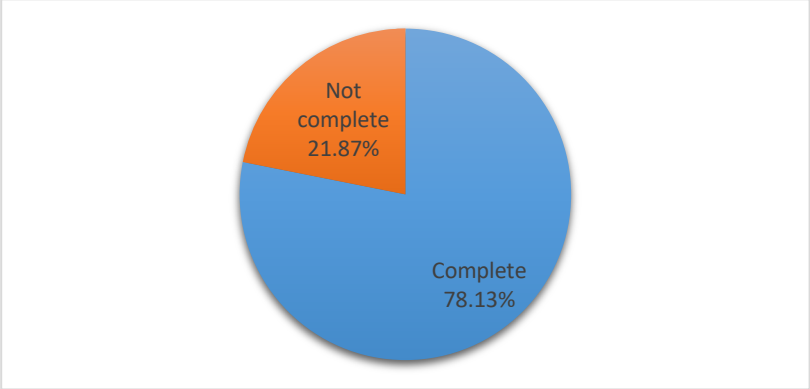

Figure 4. Percentage of Student Learning Outcomes Completion

Based on the results, cycle II experienced an increase in the classical percentage of learning outcomes from Cycle I, namely 37.50% to 78.13%. This increase occurred because in cycles I and II, differentiated learning content was carried out based on learning styles, and improvements were made to the previous cycle. Mulyawati et al. (2022) stated that the purpose of differentiated learning is to create a diverse class by providing opportunities to take content, process ideas, and improve the results of each student so that students can learn more effectively. Herwina (2021) explained that differentiated learning can help students achieve optimal learning outcomes. Students get increased learning outcomes because they are motivated to learn with the presence of teaching aids, videos, and pictures. This is supported by the opinion of Tanjung et al. (2023) that students are motivated because they can learn happily without pressure and according to their learning style.

Learning in cycle II was reflected so that it was known that student learning outcomes had increased because they used differentiated learning, and improvements had been made from the suggestions for learning cycle I. However, in Cycle II, student learning outcomes still need to be completed. This is caused by the different abilities/intelligence of students. Learning outcomes are influenced by the intelligence factor of each student (Rijal & Bachtiar, 2015). The weakness of this second cycle is managing the class because students

are less conducive. A comparison of learning outcomes from pre-cycle-cycle II can be seen in the following image:

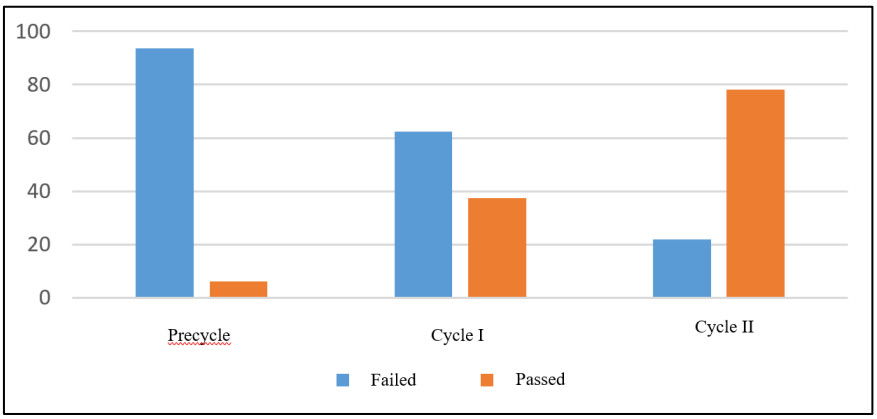

Figure 5. Student Learning Outcomes

Based on the picture, it is known that the percentage of classical completeness of student learning outcomes has increased from 6.25% in the pre-cycle to 37.50% in Cycle I and 78.13% in Cycle II. This increase in learning outcomes is due to the actions of the teacher using differentiated learning. The effectiveness of learning is influenced by the approach factor (approach to learning), which refers to all methods or strategies used by students to support the effectiveness and efficiency of the learning process of the material being taught (Rizal & Bachtiar, 2015). Astiti et al. (2021) stated that mastery of learning styles and the use of appropriate learning styles carried out by students will greatly help students absorb and understand the information material obtained, which will have an impact on good learning outcomes. In addition, learning style is one of the factors that is considered important in learning because it can affect student learning outcomes, especially learning outcomes in the cognitive domain. Smith, A., & Johnson, B. (2018) stated that the application of differentiated content learning based on learning styles has a positive impact on their learning outcomes. Students who receive materials according to their learning preferences have significant improvements in understanding and academic achievement.

CONCLUSION AND RECOMMENDATION

A. Conclusion

Based on the results and discussion, differentiated learning content based on learning styles on the Earth and Solar System material can improve student learning outcomes. The classical completeness of student learning outcomes increased from 6.25% in the pre-cycle to 37.50% in Cycle I and 78.13% in Cycle II after the application of differentiated learning based on learning styles.

B. Recommendation

Based on the classroom action research conducted, there are suggestions that in further research, differentiated learning can be designed with other aspects, such as processes and products, so that learning outcomes can be maximized. Learning can be carried out in more than two cycles. In addition, in forming study groups, it is better to inform students before learning. Managing differentiated learning classes can be more complex, so it is necessary to arrange time for each group, ensure that each student is involved, and keep the class organized.

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