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The Effectiveness of Differentiated Learning using the TaRL (Teaching at the Right Level) Approach for Improving Learning Interest and Learning Outcome

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Abstract: This research was motivated by the low interest in learning and the low learning outcomes of students. This is because the learning that is carried out does not follow the students' wishes and ability level, so students are less active and have a low interest in learning science. Learning interests will affect the learning outcomes of students. This class action research aims to improve learning outcomes and students' interest in learning by using differentiated learning using the TaRL approach with the help of the inquiry learning model. TaRL learning is learning by grouping students according to their ability level. This study was conducted at SMPN 49 Surabaya in class 8B. The research data collection method used a questionnaire about students' interest in learning, an observation sheet for the implementation of learning, and a written test to determine students' learning outcomes. The design used in this study was the Tagart and Kemmis cycle model, and the data obtained was analyzed using classical learning completeness. The results showed that differentiated learning using the TaRL approach improved student learning outcomes with a percentage increase of 37% and an increase in the average score of 17.10. In addition, the results showed that students' interest in learning experienced a rise in categories from the initial condition, which had a poor category, to a good category at the end of the cycle. Based on the study's results, it can be concluded that applying differentiated learning using the TaRL approach can improve learning outcomes and student interest in the learning cycle.

Keywords: Differentiated Learning; Learning Interest; Learning Outcomes; TaRL.

Introduction

Improving human resources' ability and capacity is vital in preparing the nation to face important future needs [1]. One of the steps to develop human resources can be done through the education sector. Education is designed to develop students' personalities, knowledge, and abilities in adjusting to the surrounding environment, which can help them achieve a successful life [2]. Therefore, it can be concluded that education plays a crucial role in shaping competent human resources. The sign of quality education is its ability to achieve educational goals [3].

The educational process is closely related to learning activities involving teachers and students. Learning increases one's potential, including behavior, attitude, and teaching something they don't know [4]. Therefore, the Ministry of Education, Culture, Research, and Technology always directs every educational institution to make learning plans, implement learning processes, and evaluate learning processes to improve the efficiency and effectiveness of learner competencies [5]. In this case, the government made changes by implementing an independent curriculum, which makes students the center of learning (student center) to learn according to the needs of students [6]. This curriculum gives teachers the freedom to teach material according to their needs, hoping that the material becomes more applied and efficient in everyday life [7].

Science education helps learners understand how science affects everyday life. Through science education, science concepts provide the necessary abilities to face real-world challenges in the 21st century [8]. Science learning requires Learners to understand knowledge through concepts and processes investigating human life and the environment. Science education is not only about science itself but also a conscious effort to reveal natural phenomena that occur by applying scientific attitudes to Learners to shape their personalities so that they can understand science and use it in everyday life [9]. Science education emphasizes direct learning experiences by applying scientific attitudes and abilities to Learner activities.

Science learning outcomes lead to the development of new methods and products. School science education can help learners learn about themselves and their surrounding environment. Science learning is centered on a process that allows learners to investigate and understand nature from a scientific point of view and helps them reach their potential [10]. In other words, science learning can increase learners' understanding of the basic concepts of science related to nature and humans and increase their sensitivity to the environment around them. Learning outcomes are essential in changing the behavior of learners. Learner learning outcomes will reflect the achievement of the learning objectives set [11].

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Learners' involvement and activities in the learning process are influenced by learning interest, which has a significant role [12]. If students have a strong interest in learning, they will feel happy and interested in the lesson [13], producing satisfaction for students. Learning interest is an encouragement or motivation accompanied by attention and deliberate effort to achieve satisfaction through changes in behavior, such as attitudes, skills, or knowledge [14]. Learning interest consists of 4 indicators, namely 1) a feeling of pleasure or like everything that is in the components of the learning process, 2) involvement in the learning process, 3) students' interest in learning where students will feel interested in learning, 4) students' attention where students will attend to learning and focus on what is being learned [14].

Initial observations conducted by researchers using a questionnaire in classes 8A and 8B at SMPN 49 Surabaya showed that only 21.67% of students showed interest in science subjects. Based on this data, it can be concluded that students' interest in science subjects tends to be low. One of the factors that cause low interest in learning is the tendency of teachers to use monotonous learning methods. Teachers often assume that all students have similar abilities, so they provide the same level of learning to students with various levels of ability, whether low, medium, or high. As a result, learning materials and processes are not adapted to the individual skills of learners [10]. Learners who are not interested in the lesson tend not to pay attention to the learning, are not interested, and are less involved in discussions and questions and answers, so they tend to dislike the lesson [10]. If learners' interest in learning is low, they rarely ask questions, ignore tasks and subject matter, and enjoy the learning process less. Consequently, this affects their learning outcomes, especially in daily assessments, where most learners do not reach the KKM [15].

The role of the teacher is crucial in arousing students' interest in learning by paying attention to students' individual characteristics and having a deep understanding of science learning materials. If students can increase their interest in learning, it will be in line with improving their learning outcomes [16]. Therefore, teachers must have the skills to create an entertaining learning experience for their learners by planning their learning process, adjusting evaluation to the needs of learners, and applying learning approaches that suit the needs of learners [17]. One learning method that considers learners' abilities and interests is the TaRL (Teaching at the Right Level) approach.[18]

The TaRL approach starts with applying an initial diagnostic test by the teacher to understand the learners' characteristics and initial abilities. In this way, teachers can assess the level of ability that learners need to improve [19]. TaRL is a learner-focused learning method that emphasizes a learning approach focused on individuals by grouping them based on their ability levels: low, medium, and high [20].

From this problem, the author sees various factors that cause low interest and learning outcomes in science. Therefore, research to improve interest and learning outcomes in science is essential and urgent. This research is expected to produce new findings that can help teachers plan lessons that can increase students' interest and learning outcomes in science materials on mixtures and separation of mixtures.

Research Methods

The research used is a type of classroom action research. Classroom action research is research conducted by teachers in the classroom or school environment, focusing on improving the learning process [21]. In this study, classroom action research looks at how actions intentionally appear in the classroom to solve problems or improve the quality of learning [22-23]. This research aims to enhance students' learning outcomes and foster students' interest in science subjects. This study adopted the Kemmis and Taggart model as a design framework or classroom action research model.

This research was conducted in two cycles using differentiated learning through the Teaching at the Right Level (TaRL) approach, which an inquiry learning model assists. Differentiated learning is used by taking into account the initial abilities of students, which are then grouped based on their ability level. The ability level grouping is divided into 2, namely developing and developing groups. This study has a subject, namely class 8B students at SMPN 49 Surabaya, with a total of 30 people in the 2023/2024 school year, which was held on March 4-7, 2024, according to the science subject schedule in the class. This class action research collects data through written tests to determine students' learning outcomes and non-tests, including a learning interest questionnaire and the implementation of learning implementation.

Learning Implementation Analysis

Implementation analysis is carried out by evaluating the teacher's learning activity of each syntax in one learning cycle by 3 observers. The evaluation is done by looking at the implementation criteria using a score of 0-4, considering the execution, demands, and interactions that occur with the adjustment of the planned Syntax. Further calculations are carried out to be able to criticize the learning activities performed by teachers with the following equations [24]:

$$\%\text{Implementation} = \frac{\text{Total Skor}}{\text{Maksimum Skor}} \text{x} 100\%$$

The criteria for the implementation of learning by teachers can be classified using the table below:

Table 1. Learning implementation criteria [25]

Percentage (%)	Criteria
0.00 < Skor ≤ 20.00	Very Poor
20.00 < Skor ≤ 20.00	Poor
40.00 < Skor ≤ 60.00	Simply
60.00 < Skor ≤ 80.00	Good
80.00 < Skor ≤ 100.00	Very Good

Analysis of Learners' Interest in Learning

The data collection method used to analyze students' interest in learning is a questionnaire. The questionnaire is a data collection method that involves respondents answering written questions. Thirty questions can be answered by adjusting the learning interest indicators, which contain feelings of pleasure, involvement, interest, and students' attention to learning [26]. Information on learners' interest in

learning was obtained through a learning interest survey that met the following criteria:

Table 2. Assessment of Learning Interest Questionnaire

Criteria	Question Type	
	Positive	Negatives
Strongly Agree	5	1
Agree	4	2
Moderately	3	3
Disagree less	2	4
Disagree	1	5

From the data above, the percentage calculation is carried out on each aspect using the equation:

$$\% \text{ Interest} = \frac{\text{Total Score}}{\text{Maximum Score}} \text{x} 100\%$$

The results of the learning interest obtained will be compared with the assessment criteria referring to [14] and presented in Table 3:

Table 3. Criteria for Assessing Students' Learning Interests

Percentage (%)	Criteria
85.00 < Skor ≤ 100.00	Very Good
70.00 < Skor ≤ 85.00	Good
35.00 < Skor ≤ 70.00	Less
00.00 < Skor ≤ 35.00	Very Less

Analysis of Student Learning Outcomes

Learning outcome data is obtained through written test activities at each cycle's end. The data will be processed using the equation [27]:

$$\text{Test Score} = \frac{\text{Total Score}}{\text{Maximal Score}} \text{x} 100\%$$

After the researcher gets the test score, the percentage of classical learning completeness will be calculated and categorized according to the table below:

Table 4. Categories of Learning Outcome Completeness [27]

Learning Outcome Completeness (%)	Categories
80.00-100.00	Very Good
66.00-79.99	Good
55.00-65.99	Simply
40.00-55.99	Poor
<40.00	Very Poor

Results and Discussion

The implementation of differentiated learning using the TaRL approach in class 8B of SMPN 49 Surabaya in two cycles, with materials including elements, compounds, and mixtures. In the first cycle, the focus was on the characteristics of mixtures, while in the second cycle, the discussion focused on the separation of mixtures. Learners were grouped according to their ability level, with the learning design tailored to individual needs [20]. The TaRL approach organizes learners according to their abilities, which aligns with Ki Hadjar Dewantara's educational principles that emphasize the importance of understanding learners' skills and learning needs to design a learning process that focuses on learners. [28]. From these conditions, learning adjustments are given according to the abilities and characteristics of learners, which are located in the table below [10].

Table 5. Learning Adjustment with TaRL Approach

Aspect	Adjustment	
	Developing	Start to Develop
Material Scope	Studying lessons with enrichment provided	Studying lessons without enrichment
Learning process	Learning assisted by LKPD with less scaffolding	Learning assisted by LKPD with more scaffolding
Learning outcome products	During group discussions, each individual can show their work according to their learning style.	
Teaching Materials	Provide references to teaching materials by considering learning styles and allowing students to explore other teaching materials.	

In the learning stage, observations were made by two Teacher Professional Education students and one class teacher who teaches science subjects. The results of these observations were then considered in reflection after each learning cycle as a reference for preparing more effective learning in the next cycle. Details of the learning implementation are presented in Table 6 below:

Table 6. Implementation of learning

Sintaks	Cycle 1 (%)	Cycle 2 (%)
Introduction	96.67	98.83
Orienting to the Problem	91.67	97.22
Formulating the Problem	91.67	100.00
Hypothesizing	91.67	100.00
Collecting Data	91.67	100.00
Testing the Hypothesis	87.50	95.83
Formulating Conclusions	93.75	97.92
Closing	93.75	100.00
Average	92.55	98.66

In cycle 1 and cycle 2, it can be concluded that the implementation of differentiated learning using the TaRL approach achieved a very good level of implementation. In addition, teachers showed a significant improvement in their learning implementation in cycle 2 compared to cycle 1. Thus, differentiated learning using the TaRL approach was also proven to be able to imitate. The following table shows the percentage value of students' learning motivation.

The table above shows that learners' interest in learning increased from poor conditions at the beginning of the cycle, increased at the end, and became good in each indicator. The results show that this class action research is considered sufficient until the end of the second cycle because the implementation of learning has improved the condition of students' interest in learning.

Table 7. Learning Interest for each indicator in each cycle

Indicators of Learning Interest	Pra Cyle (%)	Cycle 1		Cycle 2		Improving Cycle 1 to Cycle 2 (%)
		Score (%)	Desc	Score (%)	Desc	
Happiness	58.86	71.24	Good	79.81	Good	8.57
Attention	61.24	69.52	Less	79.24	Good	9.72
Interest	61.67	68.91	Less	76.33	Good	7.42
Engagement	59.42	74.17	Good	75.92	Good	1.78

This research phase starts with conducting a diagnostic assessment to determine the learning needs of learners. Then, learners will be grouped based on 2 levels of ability: developing and beginning to develop. The next step after mapping the ability level of learners is to plan learning that suits individual needs, including the use of methods such as discussions and LKPD given to implement the TaRL approach in learning. The advantages of using LKPD in learning include ease for educators in organizing the learning process, providing guidance to students in finding concepts through individual and collaborative activities, developing process skills and scientific attitudes, and facilitating evaluation of students' achievement of learning objectives [30]. Process differentiation refers to the way learners interpret or master the subject matter. In process differentiation, activities can be staged, including the provision of questions or challenges that match individual interests, the planning of individual tasks, the adjustment of the time needed to complete tasks, and the development of a range of learning activities [31].

The group discussion process when applying the TaRL approach to problems on LKPD is different. In groups with moderately developing abilities, learners have more limited opportunities to ask questions, provided they have searched for at least 7 references before asking questions. Meanwhile, in groups with developing abilities, learners are given more ease in asking questions, with the minimum requirement of searching for 3 references before asking the teacher. This step allows learners to choose learning sources or references that suit their interests and comfort so they can understand the material more effectively [28]. This is in line with the principle of process differentiation learning, which gives learners the freedom to choose according to their preferences and interests, which can improve the efficiency and effectiveness of learning [32]. In addition, there are differences in the content of the LKPD between the moderately developing and developing groups. The LKPD has more complex problems than the developing group in the moderately developing group.

After the discussion, learners will present the results of their discussion in the form of presentations in front of the class to increase their understanding of the material discussed through group discussions. To conclude the learning process, an evaluation of the learning process is carried out by implementing written tests for students. The purpose is to obtain information about the achievement of learning objectives or learning outcomes by applying the TaRL approach in differentiated learning and to support future learning design [33].

The first cycle discussed the characteristics of the mixture used in 2 JP. According to the data in Table 6, observations were made during the learning process. It was found that students were still relatively low in the hypothesis testing phase. This was because some students did not participate in the learning activities. After all, they did not understand the task well. Practical activities are the first experience for students, so students may not have understood the task well. In addition, because the problems in the practicum were not contextualized, students did not concentrate on the issues being solved. As a result, students do not feel it is helpful in everyday life [26]. This condition can be evaluated by seeing that the student's interest and attention indicators in Table 7 show a lower category of learning interest. The indicator of students' pleasure is quite good because the teacher has included ice-breaking activities and created a safe and comfortable learning environment so that students feel happy with the lesson without coercion [1]. The engagement indicator is also quite good because students have been fully involved in the syntax in classroom learning, making it easy for them to improve their understanding through various sources provided by the teacher according to their learning style [1].

The observation results from the first cycle were used as inspiration to make improvements in the second cycle. In the second cycle, learners were given contextual problems to study to increase attention to the interest indicator. To improve learning interest in the attention indicator, teachers should help each group divide the tasks evenly at the beginning of the process and supervise how learners divide the tasks. This is important so learners can pay more attention to the problem being solved and that learning interest in the feeling good indicator increases. Teachers must continue to create a safe and comfortable learning environment for students to feel happy and not forced [26]. Providing opportunities for students to talk and ask questions about material that is difficult to understand can help improve the engagement indicator. Teachers should often look at the time and inform learners about the duration of tracing activities so that learning runs according to schedule.

Cycle 2 learning begins with the planning stage. This stage is carried out by preparing the same learning instrument as in cycle 1. In preparing this instrument, improvements that need to be made are also considered based on the reflection results from cycle 1 [34]. The learning implementation stage began after the upgrades and instruments were ready [34].

The second learning cycle discussed the separation of mixtures used in 2 JP. Some things observed during the learning process are: 1) Learning was conducted by presenting a contextual problem in the learners' environment. The murky water condition that often occurs in the morning has been raised as a problem. This activity can increase students' interest in the interest indicator. Interested learners will show a curious attitude towards the material presented. Students will feel interested in learning science and try to understand what they are learning better [1]. 2) The teacher has helped students divide tasks to each student in the group so that students can actively participate and focus on the problem. This activity increased students' interest in learning with the attention indicator because students could pay

attention to the lesson and focus on the material provided [26]. In addition, the activity increases students' involvement and participation in learning by giving contextual problems. Teachers can also make learning fun by providing ice-breaking and rewards. This can improve students' desire to know based on the metric of feeling good [10].

The results of the observation of the learning process were used as discussion material during the reflection stage, and the results were as follows: (1) each student already understands their respective tasks and actively contributes to the group; (2) all students are well observed, so the teacher can identify less focused students and immediately provide assistance; (3) students can already more actively ask questions and adjust what they have learned; and (4) learning goes better than before. The research results shown in Table 7 indicate that applying differentiated learning with the TaRL approach can increase students' interest in learning. This aligns with research conducted by Jauhari (2023) and Ariani (2024), which also showed that applying differentiated learning with the TaRL approach can increase students' interest in learning. Saputra (2023) said that differentiated learning with the TaRL approach allows learning to meet the learning needs of each student by looking at their readiness, initial ability, and learning style. In addition, Kuway (2023) said that since learners are given reference teaching materials that can be adapted to each student's learning style, there will be an increase in learning interest.

In addition to seeing interest in learning, researchers see learning outcomes as a result of being given differentiated learning using the TaRL approach. The learning outcomes of students are presented in the table below:

Table 8. Learning Outcomes of Student

Aspect	Cycle	
	Cycle 1	Cycle 2
Total of Student	30	30
Completed	19	30
Not Completed	11	0
Classical Completeness	63%	100%
Average	75.38	92.38
Increase		17.10

Based on Table 8, it can be seen that cycle 1 has a sufficient learning outcome completeness category. 11 students were not complete due to students not focusing on solving the problems given. Hence, the fulfillment of students' needs was not optimal. In addition, it is known that the attention stage has low involvement and interest in learning. As a result, learners become unfocused and not actively involved in the problem-solving process.

Through reflection and evaluation of cycle 1, improvement efforts were made in cycle 2 so that an increase in learning outcomes in cycle 2 was obtained with a percentage of 100% completeness in the excellent category. This is because, in cycle 2, the teacher has begun to be intensive in assisting and supervising students to focus on solving the problems by helping to divide tasks into groups and providing issues close to students. The application of the TaRL approach has the advantage of stimulating the active involvement of students and facilitating learning tailored to their level of ability, so that it has the potential to improve students' cognitive skills [28]. This is in line with Jauhari's (2023) research findings, which show that the TaRL learning approach can be adapted to learners' abilities so that they become more active and involved in the learning process, increasing their interest and learning achievement.

Conclusion

Based on data analysis, it can be concluded that differentiated learning using the TaRL approach succeeded in increasing learning interest from the poor category at the beginning of the cycle to the good category at the end of the second cycle on each indicator of learning interest. In addition, the application of differentiated learning using the TaRL approach also improved learning outcomes, with an increase in the classical completeness rate of 37% and an increase in the average score of 17.1. It is hoped that differentiated learning with the TaRL approach can be developed widely by adjusting the needs of students to improve learning outcomes and interest in learning so that the needs of students can be accommodated holistically.

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References

[1] Putra, I. P. O. P., Pujani, N. M., & Priyanka, L. M. (2021). Analisis Minat Belajar Ipa Pada Pembelajaran Daring. Jurnal Pendidikan dan Pembelajaran IPA Indonesia, 11(2), 22-31.
[2] Irawati, I., Ilhamdi, M. L., & Nasruddin, N. (2021). Pengaruh gaya belajar terhadap hasil belajar IPA. Jurnal Pijar Mipa, 16(1), 44-48.
[3] Wiji Astutik Erna, Jusniar, and Masniaturofikoh. (2021). Upaya Meningkatkan Minat dan Hasil Belajar IPA Upaya Meningkatkan Minat dan Hasil Belajar IPA Melalui Model Pembelajaran Problem Based Learning. Profesi Kependidikan, vol. 2, no. 1, pp. 115–125, 2021
[4] Arianto, R. (2022). Permasalahan dalam Pembelajaran: Survey Kepustakaan. Jurnal Citra Pendidikan, 2(3), 550-554.
[5] Mayudana, I. K. Y., & Sukendra, I. K. (2020). Analisis kebijakan penyederhanaan RPP: Surat edaran menteri pendidikan dan kebudayaan nomor 14 tahun 2019. Indonesian Journal of Educational Development (IJED), 1(1), 61-68.
[6] Vhalery, R., Setyastanto, A. M., & Leksono, A. W. (2022). Kurikulum merdeka belajar kampus merdeka: Sebuah kajian literatur. Research and Development Journal of Education, 8(1), 185-201.
[7] Wibawa, K. A., Legawa, I. M., Wena, I. M., Seloka, I. B., & Laksmi, A. A. R. (2022). Meningkatkan pemahaman guru tentang kurikulum merdeka belajar melalui direct interactive workshop. Jurnal Cakrawala Ilmiah, 2(2), 489-496.
[8] Alma Pratiwi Husain. (2019). Analisis Strategi Pembelajaran IPA Dalam Buku Tematik Kurikulum 2013 Kelas IV SD. As-Salam: Jurnal Studi Hukum Islam & Pendidikan, 8(1), 125-150.

[9] Prayunisa, F., & Marzuki, A. D. (2023). Analisis Kesulitan Guru Ipa Dalam Pembelajaran Ipa Di SMP dan SD. NUSRA: Jurnal Penelitian dan Ilmu Pendidikan, 4(2), 268-275.
[10] Jauhari, T., Rosyidi, A. H., & Sunarlijah, A. (2023). Pembelajaran dengan Pendekatan TaRL untuk Meningkatkan Minat dan Hasil Belajar Matematika Peserta Didik. Jurnal PTK dan Pendidikan, 9(1), 59-74.
[11] R. Riyani, M. A. Sultan, and H. Yulia, "Analisis Minat Belajar Siswa terhadap Pembelajaran Daring pada Masa Pandemi COVID-19 Pada tingkat Sekolah Dasar," Pinisi J. Educ., vol. 1, no. 1, pp. 231–238, 2021.
[12] Mayudana, I. K. Y., & Sukendra, I. K. (2020). Analisis kebijakan penyederhanaan RPP: Surat edaran menteri pendidikan dan kebudayaan nomor 14 tahun 2019. Indonesian Journal of Educational Development (IJED), 1(1), 61-68.
[13] Saputra, dkk. (2023). Analisis Penerapan Pembelajaran Diferensiasi Dengan Model Problem Based Learning Terhadap Minat Belajar Peserta Didik di SD. Jurnal Ilmiah PGSD FKIP Universitas Mandiri. Volume 09 Nomor 04, September 2023
[14] Masyitoh, A. D. (2023). Analisis Minat Belajar Siswa Terhadap Proses Pembelajaran Ipa. Proceedings of Life and Applied Sciences, 1.
[15] Wahyuni. (2019). Pengaruh Pembelajaran Kooperatif Tipe Physics Clebo Tournament terhadap Peningkatan Hasil Belajar dan Kerjasama pada Materi Fisika Kelas VIII SMP Negeri 2 Barombong. Undergraduate (S1) thesis, Universitas Islam Negeri Alauddin Makassar.
[16] Yurnellisa, Y., Maizeli, A., & Zikra, Z. (2023). Hubungan Minat Belajar terhadap Hasil Belajar IPA Kelas VIII SMP Negeri 3 Padang. Jurnal Pend
[17] Aprima, D., & Sari, S. (2022). Analisis penerapan pembelajaran berdiferensiasi dalam implementasi kurikulum merdeka pada pelajaran matematika SD. Cendikia: Media Jurnal Ilmiah Pendidikan, 13(1), 95-101.
[18] Amoah, E., Mwangangi, M., Rastogi, T., Snow, E., Werner, L., & Gershenson, J. (2022). Technology Applications in Teaching at the Right Level Programs. In 2022 IEEE Global Humanitarian Technology Conference (GHTC) (pp. 285-291). IEEE.
[19] Suharyani, S., Suarti, N. K. A., & Astuti, F. H. (2023). Implementasi Pendekatan Teaching At The Right Level (Tarl) Dalam Meningkatkan Kemampuan Literasi Numerasi Anak Di SD IT Ash-Shiddiqin. Jurnal Teknologi Pendidikan: Jurnal Penelitian dan Pengembangan Pembelajaran, 8(2), 470-479.
[20] Ahyar, A., Nurhidayah, N., & Saputra, A. (2022). Implementasi Model Pembelajaran TaRL dalam Meningkatan Kemampuan Literasi Dasar Membaca Peserta Didik di Sekolah Dasar Kelas Awal. JIIP-Jurnal Ilmiah Ilmu Pendidikan, 5(11), 5241-5246.
[21] Arikunto, S dkk. (2014). Prosedur Penelitian suatu Tindakan Praktik. Jakarta: Rineka Cipta
[22] LUSIANA, V. (2022). Penerapan Problem Based Learning Untuk Meningkatkan Motivasi Dan Hasil Belajar Siswa. ACTION: Jurnal Inovasi Penelitian Tindakan Kelas dan Sekolah, 2(2), 165-177.
[23] Mardiana, I., & Syazali, M. (2020). Implementasi model pembelajaran kooperatif tipe snowball throwing untuk meningkatkan hasil belajar IPA. Jurnal Pijar Mipa, 15(1), 50-53.
[24] Nisa, F.A., dkk. (2023). Peningkatan Hasil Belajar dan Aktivitas Siswa Melalui Penerapan Model Discovery Learning Pada Materi Konsep Mol. Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram Jil. 11, No.3 hal.816-827
[25] Riduwan. (2015).Skala Pengukuran Variabel-Variabel Penelitian. Alfabet.
[26] R. Riyani, M. A. Sultan, and H. Yulia, "Analisis Minat Belajar Siswa terhadap Pembelajaran Daring pada Masa Pandemi COVID-19 Pada tingkat Sekolah Dasar," Pinisi J. Educ., vol. 1, no. 1, pp. 231–238, 2021.
[27] Prihandono, T., Supriyono, A., Abdillah, U. F., & Sudarti, S. (2023). Analysis of Differentiate Learning with Classroom Action Research to Improve Physics Activities and Outcomes. Jurnal Penelitian Pendidikan IPA, 9(9), 7427-7433.
[28] Avianti, M. N., Setiani, A. R., Lestari, I., Septiawati, L., Lista, L., & Saefullah, A. (2023). Peningkatan Hasil Belajar Peserta Didik Kelas XI melalui Pendekatan TaRL (Teaching at the Right Level) pada Materi Sistem Ekskresi. Jurnal Jeumpa, 10(2), 231-239.
[29] Suprapti, S. (2021). Meningkatan hasil belajar IPA materi energi dan perubahannya melalui metode proyek. Jurnal Terapan Pendidikan Dasar Dan Menengah, 1(2), 265-274.
[30] Khoirunisa, W. (2023). Pengembangan E-Lkpd Berbasis Inkuiri Terbimbing Untuk Menstimulus Keterampilan Proses Sains Peserta Didik Pada Materi Kalor.
[31] Aprima, D., & Sari, S. (2022). Analisis penerapan pembelajaran berdiferensiasi dalam implementasi kurikulum merdeka pada pelajaran matematika SD. Cendikia: Media Jurnal Ilmiah Pendidikan, 13(1), 95-101.
[32] Ngaisah, N. C., Aulia, R., & others. (2023). Perkembangan Pembelajaran Berdiferensiasi dalam Kurikulum Merdeka pada Pendidikan Anak Usia Dini. Bunayya: Jurnal Pendidikan Anak, 9(1), 1–25.
[33] Nurlina, L., & Israhayu, E. S. (2023). Lokakarya dan Pendampingan Sekolah dalam Penerapan Pembelajaran Berdiferensiasi. AMMA: Jurnal Pengabdian Masyarakat, 1(12), 1711–1719.
[34] Dirgari, Y., Panjaitan, R. G. P., & Kusmawati, A. (2023). Penerapan problem based learning untuk meningkatkan motivasi belajar siswa pada materi ekosistem. *Jurnal Pendidikan Informatika dan Sains*, *12*(1), 56-65.
[35] Kuway, N. P., Muhajir, M., & Wahid, A. (2023). Meningkatkan Minat Peserta Didik dalam Mata Pelajaran IPAS melalui Pembelajaran Diferensiasi Menggunakan Bahan Ajar Digital. *Jurnal Basicedu*, *7*(6), 3869-3877.
[36] Saputra, D. A., Andri, A., & Sulianto, J. (2023). Analisis Penerapan Pembelajaran Diferensiasi Dengan Model Problem Based Learning Terhadap Minat Belajar Peserta Didik Di Sd. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, *9*(04), 1570-1582.